

**Systems of State-Owned Enterprises:
from Public Entrepreneurship to State Shareholding**

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Declaration of originality

I, Simone Gasperin, confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis and that all sources and quotations are cited. Some sections of the thesis – in Chapters 1, 4 and 8 – have been developed extensively in two separate publications: Gasperin (2022) and Forum Disuguaglianze Diversità (2020).

Abstract

This thesis outlines a new analytical perspective on state ownership through the original concept of systems of state-owned enterprises (SOSOE). It is argued that the SOSOE concept adequately captures the evolution of state-owned enterprises (SOEs) in modern capitalist economies, challenging and enriching existing economic theories as well as contributing to reinstate the policy instrumentality of state ownership. The concept is defined from a comparative case study analysis of two distinct SOSOEs, operating within the same national context in different time periods. The first case concerns the *Istituto per la Ricostruzione Industriale* (IRI), Italy's former and most relevant state holding company, that played a central role in the Country's post-WWII economic development. This thesis advances an interpretation of IRI's economic function based on an original empirical investigation of its archival and documentary sources, focusing on its main public policy missions and on its display of industrial entrepreneurship features. The second case examines the current Italian system of SOEs, assessing the still relevant presence of SOEs in the Italian national context and evaluating the overall governance of the system through a set of interviews with leading executives. Despite the similarity in size and sectoral diversification, the two SOSOEs differ significantly in terms of their operating configurations. In fact, they could be assimilated to two dichotomous ideal types: the IRI SOSOE represents a template for the policy-oriented and dynamic 'public entrepreneurship' model, while the current Italian SOSOE resembles the policy-neutral and passive 'state shareholding' variant. Implicit in these results is the opportunity for current SOSOEs to embrace a public entrepreneurship configuration, in order to exploit the full policy potential of state ownership in driving economic change. The thesis concludes with a proposal for reforming Italy's current SOSOEs via the creation of a state holding company.

Impact statement

This thesis represents an unprecedented attempt to examine the concept of systems of state-owned enterprises (SOSOE), as it was never discussed previously in the policy or academic literature. By introducing the SOSOE concept, this thesis develops a new analytical perspective on state-owned enterprises (SOEs), supported by original empirical evidence. It also suggests a preliminary but comprehensive framework for interpreting different operative configurations of SOSOEs, defined by the two ideal types of 'public entrepreneurship' and 'state shareholding'.

Within academia, this thesis contributes to challenging and enriching existing economic analyses on SOEs. First, through the SOSOE concept, state ownership can be analysed beyond the simplistic dichotomy 'private versus public', as portrayed by conventional theories. The SOSOE perspective highlights the heterogeneity of state ownership, with SOEs differing according to national and sectoral specificities, to the degrees of state control of and to overall governance of the system. Second, by addressing state ownership through a neo-Schumpeterian innovation perspective, SOSOEs – and their composing SOEs – could be appraised as distinctive elements of national systems of innovation, due to their hybrid nature of business organisations owned or controlled by public authorities. Furthermore, the case study on IRI revisits its central economic function in Italy's post-WWII period, with the support of original empirical evidence that points to a distinct entrepreneurial and policy-oriented approach towards technological innovation and structural change. The IRI case can also teach useful policy lessons for the governance of modern SOSOEs organised under a state holding company.

On the practical policy side, the public entrepreneurship model of SOSOEs – as opposed to the state shareholding one – revamps the policy perspective on state ownership, providing valuable suggestions for national governments on how to design the configuration of their SOSOEs. Finally, this thesis highlights the policy opportunity that a state holding company offers in coordinating the national portfolio of SOEs, outlining a specific proposal for reforming the current Italian SOSOEs with the creation of a state holding company.

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This PhD thesis would have never seen the light of the day, had it not been for Mariana Mazzucato. In fact, without her, this adventure would have never began. I was a knowledge-seeking but frustrated student of economics in 2013 (frustrated with the discipline), when Mariana's *Entrepreneurial State* came out. For me, it was like a second epiphany, after my conversion to economics, driven by the ambition to understand the roots of the 2011-2012 eurozone crisis. Two illuminating propositions from Mariana's book inspired me above everything else: first, historically the state has been a major player in driving innovation and structural change; second, economic theory could effectively conceptualise this 'stylised fact'. The following year, attending Giovanni Dosi's course on economics of innovation further activated my interest for the subject and for the role of the state the economy. In the meantime, I was becoming increasingly passionate about studying Italy's extraordinary economic development in the post-war decades, as I compared it to the dismaying decline of the last thirty years. Then Mariana participated to an event about IRI, mentioning its positive role in the Italian economic development as a particular manifestation of the 'state as an entrepreneur'.

From that point on, it was clear to me that if I were to pursue a research project for a potential PhD, it would be focused on the entrepreneurial function of IRI in the Italian economic context. Nonetheless, I was not convinced about this prospect, as I could not reconcile my passion for economics with the methodological and sometimes even epistemological approaches prevailing in the academic discipline.

Then, in the Summer of 2016, Robert Skidelsky played the role of 'Cupido': at a Brussels conference he convinced Mariana to have a quick chat with me about my PhD proposal. I managed to do it, and she reacted enthusiastically, pushing me to apply for a PhD under her supervision. To my great surprise, I got accepted, but the financial support I got was not enough for me to cover the cost of living. I was able to compensate by working for Mariana as a research and then policy assistant, and this enriched me enormously.

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It was not an easy decision for me to leave my Country, my family and my friends to move for a four-year period in the UK. I have a distinct memory of a phone call with Clara Mattei, whose enthusiasm convinced me that it was the right choice. I have not thanked Clara for this afterwards, I am keen to do it here.

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Part I

Chapter 1

Motivations, aims and structure

1. General introduction

Suppose that an alien moved to planet Earth landing on Daxing International Airport in Beijing, built by China State Construction Engineering Corporation with 52,000 tonnes of steel supplied by the HBIS Group. At the airport (operating on a radar control system installed by the French company Thales), it would buy a Lenovo laptop and a ZTE 5G phone to organise the details of its trip. Then it would take a flight on an Airbus 350 (powered with fuel from China National Aviation Fuel) operated by China Air with destination London Heathrow. From there it could take the London Underground to King's Cross St. Pancras and get on a Eurostar train with destination Paris. In Paris it could buy a Renault Zoe (with its microelectronic components supplied by STMicroelectronics) and power it at any EV charging point with electric energy supplied by the company EDF. After a brief phone call to its ET relatives with the telecom operator Orange, it would drive towards the South of Italy, along the A1 motorway down to the city of Reggio Calabria, where it would load the car on the Scilla ferryboat (built by the shipbuilder Fincantieri) directed to Sicily, through the maritime transport service of the railway operator Rete Ferroviaria Italiana. Once in Sicily, it would visit the Enel Green Power 3SUN solar panel factory near Catania, before going to relax on a beach and cooling off with a Rothaus beer ordered online from a Swedish Systembolaget shop (using a Commerzbank credit card operating on a Nexi payment platform) and shipped to destination through DHL's cargo services.

Had this been its only consumer experience of the planet's economy, the alien would have exclusively had interactions with state-owned commercial entities. Absurd as it might be, this tale testifies an astonishing and unimaginable outreach of state-owned enterprises (SOEs) across key sectors of the modern global economy.

As more commonly understood, at the end of the past century, massive privatisations of SOEs appeared to confine state ownership of banks and industrial enterprises to

the dustbin of economic history, while prevailing economic theories were celebrating the inherent superiority of unfettered markets and of the private enterprise model.

However, the recent unexpected revival of SOEs in both advanced and emerging economies – China in particular – has renewed the interest on the forms and functions of state ownership in modern economic systems.

This thesis represents an attempt to examine the economic nature of state ownership from an unexplored perspective, by introducing the concept of systems of state-owned enterprises (SOSOE). This is primarily motivated by the recognition that SOEs do not operate in an institutional vacuum with complete separation from one another. In fact, within a given national polity they share a defining feature: SOEs are ultimately owned (or controlled) by a superior public entity. The common state ownership nature of national SOEs entails a shared governance framework, under which it is possible to pursue public policy objectives and intra-system interactions: the SOSOEs as a whole is thus greater than the sum of its composing SOEs.

A particular configuration of SOSOEs offers the potential for a transformative function of state ownership, one that combines the pursuit of public policy objectives with the entrepreneurial fostering of technological innovation and structural change. This model, inspired by past experiences, is here defined as ‘public entrepreneurship’, in opposition to the ‘state shareholding’ configuration of SOSOEs currently prevailing.

While challenging and supplementing conventional economic studies on SOEs, this thesis explores ways to innovate the existing policymaking process by reconceiving state ownership as a unique and unrivalled policy tool for addressing economic, environmental and social challenges.

2. Motivations of the thesis

The following section (2.1.) illustrates the motivations for studying state ownership in the current economic context under a SOSOEs perspective. The SOSOEs concept is defined and qualified hereafter (section 2.2.). A specific subsection (2.3.) is dedicated to motivating the choice of the Italian case study and its relevance, in particular the focus on Italy’s former state holding company *Istituto per la Ricostruzione Industriale*

(IRI) as a role model for SOSOEs with a public policy orientation and industrial entrepreneurship features.

2.1. The historical and current relevance of SOEs

Governments have been involved in the production of goods and in the provision of services since the dawn of human civilisation, in every corner of the globe. In fact, SOEs have represented central elements of economic systems even before the appearance of the capitalist mode of production.

The earliest and most recognisable form of state enterprise was the *fiscal state monopoly model*. In this case, the commercialisation of certain commodities was subject to the control of dedicated governmental agencies or departments whose prime concern was to obtain the maximum amount of fiscal revenues. China introduced a state monopoly on salt and iron as early as in the 7th century BC. By imposing a state monopoly on a price-inelastic commodity such as salt, Chinese rulers were able to raise fiscal revenues to finance their military expenditures as well as the construction of the Great Wall (Kurlanksy, 2002). Centuries later, in France, the *Contrôleur général des Finances* Jean-Baptiste Colbert introduced a state monopoly on the production and distribution of tobacco (1681). Once again, the decision was adopted with the policy aim of maximising fiscal revenues¹ that could be deployed to reinforce the public administration, in its effort to develop a stronger national industry.

With the evolution of the capitalist mode of production, new forms of state companies emerged. The early 20th century saw the rise of the *public corporation model*, whereby state ownership was extended to business undertakings in industrial activities such as electricity generation, rail and air transport, telecommunications, postal services. The public corporation was a business enterprise entrusted with a particular public policy function defined by public law, yet operating under a significant degree of managerial and financial autonomy. The creation of the London Passenger Transport Board by the Transport Minister Herbert Morrison (Morrison, 1933), or the establishment of the

¹ The tobacco state monopoly company Seita was providing more than 6% of France's total fiscal receipts still in 1950. Author's elaboration based on *Economie Française* (1952).

Tennessee Valley Authority during Roosevelt's New Deal (Hargrove, 1994) were among the earliest and most visible examples of modern public corporations.

After the Second World War, the public corporation model² of SOEs increased its diffusion among Western economies (Friedmann, 1954), especially in Europe, where the need for wartime reconstruction of infrastructures and capital stocks were particularly pressing (Toninelli, 2000). For instance, the UK nationalisations of coal (1947), electricity (1947), railways (1948), electricity (1948) and gas (1949) brought under state ownership two million employees and 20% of domestic capital formation (Millward & Singleton, 2002). The French nationalisations between 1945 and 1946 were even more extensive (Chadeau, 2000). In less than two years, the state took over the four largest commercial banks and thirty-six insurance companies. The carmaker Renault and the aircraft engines producer Gnome & Rhône were expropriated. The state became the sole shareholder of Air France. The coal mining industry, the electricity and gas sectors were also nationalised in 1946 under the new public corporations Charbonnages de France (CDF), Electricité de France (EDF) and Gaz de France (GDF). In Austria, the requisition of former German property led to the 1946 nationalisations of 71 large companies representing the totality of the steelmaking and oil production sector, as well as a significant share of the chemical, machinery and mining industry (Stiefel, 2000). One year later, the three largest banks and the great majority of the electric energy sector fell under public ownership. By 1951, the share of SOE industrial employment in Austria was around 19%. In Italy, the new Republic resolved to preserve state control over hydrocarbons production by developing the state-owned oil company AGIP into the large energy conglomerate ENI (1953), followed in a later phase by the nationalisation of electric energy industry in 1962 through the public corporation ENEL.

These nationalisations of capital-intensive industries underpinning the development of industrialising economies, accompanied by the preservation and expansion of existing public ownership assets, represented a characteristic feature of the mixed-economy model (Friedmann, 1974; Baumol, 1980; Shonfield & Shonfield, 1984). State planning

² In France, the public corporation model assumed the form of *Établissement public à caractère industriel et commercial* (EPIC). In Italy, it came to be known as *Ente pubblico economico*. In both cases, they represented public law business undertakings with autonomous juridical status (Friedmann, 1974).

and public ownership had become constituent elements of ‘Modern Capitalism’ (Shonfield, 1965).

During the 1970s, a further quantitative expansion of state ownership was accompanied by the diffusion of a third type of SOEs, the *state as a shareholder model*. SOEs became more and more diffused across a broad range of manufacturing activities³ (Holland, 1974), especially in capital-intensive (e.g. steelmaking and automotive) or high-technology (e.g. aerospace, pharmaceutical and electronics) oligopolistic industries. The objective of state ownership shifted towards the preservation and development of strategic national players. Through the state as a shareholder model, state ownership expanded across different sectors as a result of further nationalisations, but increasingly via diversification of existing SOEs or through joint-ventures, often multinational, with both public and private counterparts (Monsen & Walters, 1983). At the same time, the organisational form of the state holding company, largely inspired⁴ by Italy’s *Istituto per la Ricostruzione Industriale* (IRI), had emerged as a governance model for joint-stock SOEs (Nora, 1967; Holland, 1972; Singh, 1972; Roy, 1974; Bohm, 1990; Kumar, 1993).

State ownership peaked in its quantitative importance and sectoral diversification between the late 1970s and early 1980s. As reported in Table A1.2, with the exception of the United States, by 1978 state ownership in Western economies weighted between 25% and 100% of total output in sectors such as postal services, telecommunications, railways, electricity, gas, airlines. The share of state ownership in

³ See Table A1.1 in the Appendix for a list of major manufacturing SOEs in Western economies in the early 1980s.

⁴ Apart from the most notable IRI on which this thesis largely focuses, only few other state holding organisations were already existing before the 1960s (all inspired by IRI’s model): Chile’s *Corporación de Fomento a la Producción* (CORFO), established in 1939; Spain’s *Instituto Nacional de Industria* (INI), created in 1941. However, from the early 1960s onwards, several countries started to adopt or to plan the adoption of a state holding company. In France, the *Rapport Nora* (1967) suggested the creation of sectoral holdings of SOEs, to be supervised by a ‘superholding’ company; the result was the establishment of the *Institut du Développement Industriel* (IDI) in 1970, a state agency similar to the Belgian *Société National d’Investissement* (SNI), founded in 1962. In Britain, the IRI model influenced the creation of the short-lived Industrial Reorganisation Corporation (IRC) in 1966 and subsequently inspired the introduction of a state holding company, the National Enterprise Board (NEB), in 1975. The IRI formula was also considered as a benchmark for the establishment of Sweden’s *Statsföretag* and Austria’s *ÖIAG* in 1970. The Canada Development Corporation (CDC) was similarly instituted in 1971. In 1970, West Germany outlined plans, later abandoned, for an IRI-type state holding company, through the reorganisation of the existing state company VIAG. Finally, several developing countries (e.g. India, Pakistan, Algeria, Egypt, Zambia, etc.) introduced a state holding companies, under which most of their SOEs were progressively incorporated.

manufacturing sectors (i.e. motor industry, steelmaking and shipbuilding), while lower, was still very significant.

In the same period (Table A1.3), SOEs' value added as a percentage of GDP in a sample of major developed economies could be estimated at around 6.2%, with higher values for France (9.3%) and Austria (14.5%) and lower values for the United States (1.2%) and The Netherlands (3.6%). Among a representative pool of developing countries, the same figure was significantly higher but with extreme variations – for instance, 37.3% in China, 14.3% in South Korea, 5.8% in Brazil. As SOEs were particularly involved in capital-intensive sectors, the share of SOEs' national investments was twice as higher than the value-added share, on average around 13.1% in developed economies. With few exceptions (the UK, Belgium and Spain), the share of total employment by SOEs was lower than the value added share, namely 3.8% on average in developed economies.

By the early 1980s, SOEs were also among the largest global companies, especially after the nationalisations programme implemented by the French government in 1981⁵. The 1985 'Fortune International 500' list⁶ of the largest non-US industrial corporations by sales was populated with 68 SOEs (13.6% of the total), particularly in the top positions⁷, accounting for 17.5% of total revenues and 19.8% of total employees of the top 500 list in its entirety (Table A1.4).

Nevertheless, the long-lasting expansion of state ownership came to a symbolical end on 28 November 1984 with the initial public offering of 50.2% of British Telecommunications⁸. This event inaugurated the privatisation season that characterised both developed and developing economies in the second half of the

⁵ Following the '*Loi de nationalisation n°82-155 du 13 février 1982*' the French government transferred under state ownership some of the Country's largest industrial enterprises: Thomson (computer and electronics), Saint-Gobain (building materials), Usinor (steel), Sacilor (steel), Rhône-Poulenc (pharmaceutical and biotechnology), Pechiney-Ugine-Kuhlmann (metal manufacturing), Compagnie générale d'électricité (electronics), Bull (informatics), Roussel-Uclaf (pharmaceutical). The nationalisation affected also two major investment banks – Paribas and Suez – including their industrial holdings.

⁶ With reference to the year 1984.

⁷ Italy's state holding companies ENI and IRI ranked third and fifth respectively.

⁸ It represented the world's largest IPO by value to that moment.

1980s and throughout the 1990s, peaking in 2000 with a global amount of \$180 billion on that year (Reviglio, 2001; Megginson, 2005).

Until the early 2000s, partial or full privatisations of SOEs reduced the degree of state ownership at the global level. At the same time, former public corporations were transformed into profit-oriented joint-stock SOEs, while the liberalisation of previous state monopolies in transport, telecommunications and energy have drastically diminished their policy functions.

Despite all this, SOEs still appear to be a significant presence in major economies throughout the world. The recent revival of state ownership – largely accounted for by Chinese SOEs – is among the most relevant economic developments of the past fifteen years. After the global financial crisis of 2007, in several advanced economies, financial and industrial companies⁹ have been bailed out in order to avoid their inevitable collapse. At the same time, the pervasive role of SOEs in emerging economies such as China, Brazil, Russia, and Middle East countries has been labelled as ‘state capitalism’ (Bremmer, 2010; *The Economist*, 2012; Musacchio & Lazzarini, 2014).

As reported in Table A1.5, 2,197 enterprises in OECD countries have been classified in 2012 as state-owned (including minority holdings of more than 10%). Together they had a market value of 3,049 billion US dollars, representing 14.1% of their Countries’ GDP on average – with substantial variations from the US (0.37%) and Canada (1.93%) to Norway (87.82%) and Sweden (27.37%). More than nine million workers were employed in those SOEs, an average of 2.89% of total employees in those countries – with lower shares for Japan (0.54%) and the US (0.57%) and higher values for Norway (11.03%) and France (9.84%).

SOEs are still among the largest companies in the world. From 2013 onwards, more than one-fifth of the top global companies by revenues in ‘The Fortune Global 500’ list are SOEs (Sturesson et al., 2015), up from 9% only in 2006, although this increase has largely been driven by the Chinese subset. When in 2019 China overtook the US

⁹ In 2008 the Dutch government nationalised ABN AMRO, the third largest bank in The Netherlands. The UK government did the same with the Royal Bank of Scotland, the largest bank in the world at the end of 2007 (in terms of total assets). In 2009, the US and Canadian governments became the owners of the troubled car-maker General Motors, with controlling stakes of 60% and 12.5% respectively.

in the Fortune 500 Global list with 124 companies (compared to 121 in the US), 91 of these were SOEs, accounting for 78% of total revenues (Kennedy, 2020). Similarly, the OECD (2016a) estimated that among the world's largest 100 firms in 2014, 22 of them were under some form of state control, the highest number over the past decades. Finally, the IMF (2020) has recorded how the share of SOE assets among the world's 2,000 largest companies has risen from 5.2% in 2000 to 20.1% in 2018, largely but not exclusively explained by the expansion of Chinese SOEs.

SOEs have also become dominant players in global cross-border mergers and acquisitions (Cuervo-Cazurra et al., 2014; Cuervo-Cazurra, 2018). Unctad (2019) has classified around 1,500 state-owned multinational enterprises (SO-MNEs) in the year 2018, up from 650 in 2010 (Unctad, 2011). Although SO-MNEs constitute a small fraction (1.5%) of all the existing multinational enterprises, they are relatively larger: 16 SO-MNEs rank among the top 100 multinational enterprises (Unctad, 2019).

Currently, SOEs seem to have conformed to a revisited version of the state as a shareholder model, where the state operates as a controlling shareholder¹⁰ of joint-stock companies incorporated under the same commercial law as private companies. The presence of manufacturing SOEs in the current state ownership scenario is much lower than the pre-privatisations model – in a sample of mostly OECD countries at the end of 2015 (OECD, 2017a), only 9% of total SOEs employment is accounted for by manufacturing SOEs (compared to 18% in China). The sectoral composition of modern SOEs is mainly – but not exclusively – concentrated in utilities, transport, energy telecommunications and financial sectors. Current joint-stock SOEs have thus broadly substituted pre-existing public corporations in former nationalised industries¹¹ (OECD, 2016a; IMF, 2020).

In several countries, these historical processes have transformed state ownership from a list of siloed nationalised industries pursuing sectoral-specific objectives to a more homogeneous portfolio of government stakes in joint-stock companies. It is in light of this recent evolution that the concept of SOSOEs assumes its current relevance,

¹⁰ In some cases, the government's stake is lower than 50%, but their listed nature is enough for the state to exercise its control over them.

¹¹ SOEs are also a significant presence in the financial sector.

forcing shareholding states to rethink the policy function of their SOEs and with new institutional forms of state ownership.

2.2. Defining systems of state-owned enterprises (SOSOE)s

The renewed importance of state ownership and its recent reconfiguration should stimulate the development of new analytical perspectives on the subject. This thesis introduces the concept of systems of state-owned enterprises (SOSOE)s, an unexplored theoretical outlook that aims to capture the institutional nature of state ownership within national contexts.

A preliminary definition is necessary: a SOSOE)s can be described as a portfolio of relevant national companies controlled by the central government under a common governance framework.

The terms ‘relevant’ and ‘national’ refer to them being among the largest domestically-based companies within their respective sectors. The ‘control’ characterisation implies that the central government is the key shareholder with an effective control or considerable influence over the company’s governance, thus excluding from this definition minority investments by sovereign wealth funds¹². The common governance framework implies the existence of a formalised or unwritten code of conduct that regulates intra-system interactions among SOEs as well as the relationship between companies and their public shareholder.

Modern systems of SOEs – at the national level – differ in at least five different ways:

1. in their overall *size*, deriving from the aggregate combination of all the composing SOEs;
2. in the *sectoral variation* of the SOEs, which could be modest or high;
3. in the various *degrees of shareholdings*, from 100% unlisted SOEs to companies with minority but controlling stakes;
4. in the *number and nature of the controlling entities* (e.g. ministerial departments or state holding agencies) giving shape to different ownership models, ranging

¹² Sovereign wealth funds (SWFs) are typically state-investment vehicles which take minority non-controlling equity stakes in mostly foreign companies.

from a significant decentralisation to the concentration under a single entity (see Table 1.1 for an illustrative example)

5. in the *number and types of policy mandates*.

Through the SOSOEs lens, this thesis explores critical theoretical elements in the governance of modern SOEs and its policy implications.

	National system	Ownership entities
Pure centralised ownership	Italy	• Ministerial department – Ministry of the Economy and Finance
	Singapore	• State holding agency – Temasek
	Sweden	• Ministerial department – Division for State-Owned Enterprises of the Ministry of Enterprise and Innovation
	UK	• State holding agency – UK Government Investments
	Brazil	• Ministerial department – Ministry of the Economy
	South Korea	• Ministerial department – Ministry of Economy and Finance
	India	• Ministerial department – Department of Public Enterprises
Significant centralised ownership	Spain	• State holding agency – Sociedad Estatal de Participaciones Industriales (SEPI) • Sectoral ministries – Renfe (Transport)
	Russia	• State holding agency – Rosimushchestvo • State corporations – Rostec, Rosatom, Roscosmos, VEB
	Austria	• State holding agency – Österreichische Beteiligungs ÖBAG • Sectoral ministries – Less economically significant SOEs
	France	• State holding agency – Agence des participations de l'État • State investment bank – Caisse des Dépôts
	Finland	• Prime Minister's Office – Ownership Steering Department • State holding agency – Solidium • Sectoral ministries
	Dubai	• State holding agency – Investment Corporation of Dubai • State holding agency – Dubai World
	Belgium	• State holding agency – Federal Holding and Investment Company • Autonomous public enterprises – SNCB, bPost, Proximus, etc.
	China	• State holding agency – SASAC (Industrial companies) • State holding agency – Central Huijin (Banks) • State holding agencies – Local SASACs • Ministerial departments and agencies – Lenovo, ZTE, etc.
Dual model ownership	Norway	• Ministerial department – Ownership Department of the Ministry of Trade, Industry and Fisheries • Sectoral ministries – Equinor (Petroleum and Energy), Vygruppen (Transport)
	Chile	• State holding agency – CORFO-Sistema de Empresas Públicas • Sectoral ministries – Codelco (Mining), Enap (Energy), etc.
	Saudi Arabia	• State holding agency – Public Investment Fund • Sectoral ministries
	South Africa	• Ministerial department – Department of Public Enterprises (DPE) • Sectoral ministries
	Switzerland	• Ministerial department – Federal Finance Administration • Sectoral ministries
Dispersed ownership	Germany	• Ministerial department – Ministry of Finance • Sectoral Ministries • State investment bank – KfW
	Japan	• Ministerial departments – Financial Bureau of the Ministry of Finance (MOF), Civil aviation Bureau of the Ministry of Land, Infrastructure, Transport and Tourism (MLIT), and Japan Railway Construction, Transport and Technology Agency (JRRT)
	Malaysia	• State holding agencies – Khazanah Nasional, Permodalan Nasional
	Mexico	• Sectoral ministries

Table 1.1: Major national SOSOEs and their ultimate ownership entities. Source: Author's elaboration on OECD (2020a).

2.3. The relevance of the Italian case and its evolution

The Italian case is paradigmatic of the function played by state ownership in industrial development. In the post-WWII period, the expansion of Italy's SOEs in dimensions and functions has paralleled an extraordinary process of economic convergence. GDP per capita in purchasing power parity terms relative to the US moved from 32.7% in 1948 to a peak of 72.9% in 1991¹³ (Figure 1.1). In the same year, Italy became the 5th largest industrialised economy in the world (after the US, Japan, Germany and France), overtaking the United Kingdom also in GDP per capita terms¹⁴.

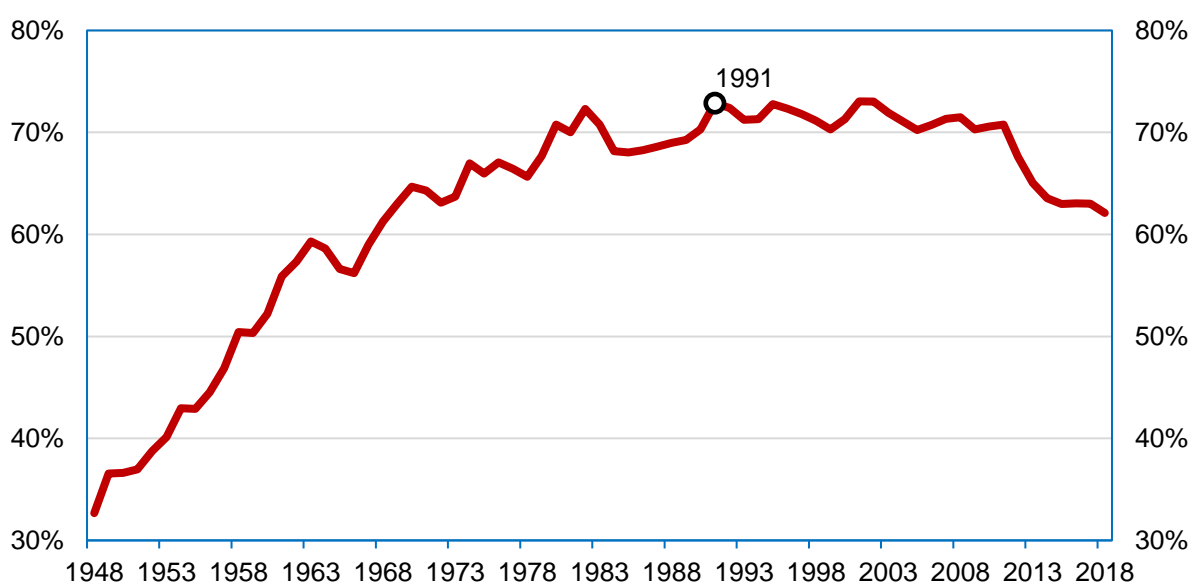


Figure 1.1: Italy's GDP per capita relative to the US. Source: Author's elaboration from Maddison Project Database (Version 2020). Notes: In PPP terms with reference to the year 2011.

State ownership in Italy traces its roots in the 1905 'statalisation' of the railways sector, reaching its peak during the 1970s. In 1971, SOEs in Italy could be estimated to account for 11.3% of national value added, 38.7% of national fixed investments and 7% of employment relative to the non-agricultural industrial economy¹⁵.

¹³ As a comparison, the UK's GDP per capita in real PPP terms relative to the US went from 73% in 1948 to 70.7% in 1991.

¹⁴ Already in 1987, a revision of Italy's GDP certified the so-called *Sorpasso* ('overtaking') of the Italian economy relative to the United Kingdom in both nominal and purchasing power parity terms.

¹⁵ Author's elaboration from De Battistini (1975). The shares of value added, investments and employments would increase respectively to 13%, 43.9% and 8.2% if the Montedison group was included among the SOE sector, as the state was its *de facto* majority shareholder through the public financial holding Sogam (equal joint-ownership between IRI and ENI).

Around the same period and until the early 1990s, Italy's public enterprise sector was characterised by three¹⁶ different categories of SOEs, corresponding to three distinct legal regimes (see Figure 1.2):

- a) Autonomous state bodies
- b) Public economic corporations
- c) State holding management entities

Autonomous state bodies (*Aziende Autonome*) were operating arms of sectoral ministries, providing public services (e.g. rail transport, postal services, intra-urban telecommunications, air traffic controls) and building infrastructures (e.g. construction and maintenance of roads and highways). These large public entities¹⁷, despite being regulated by administrative law rules and supervised by their respective line ministry, had autonomous organisational and contractual capacity but no assets of their own (they formally belonged to the state). Autonomous state bodies elaborated a separate budget, attached to the public administration one, as most of them were recurrently recipient of state subsidies.

Public economic corporations (*Enti Pubblici Economici*) were public law entities with autonomous legal personalities and own assets, operating under private commercial law. They compiled corporate financial accounts and hired their employees through private contracts. Public corporations were also financially independent from the state and could finance themselves through bonds issuing. They were mostly involved in banking, being supervised by the Bank of Italy (commercial banks) and by the Treasury (lending institutions specialised in long-term industrial credit), with the notable exemption of the electric energy state monopolist ENEL¹⁸ and the insurance giant INA¹⁹, both supervised by the Industry Ministry.

¹⁶ A fourth category, which is here excluded, is the 'municipally-owned company', a public law entity controlled by local public authorities. The 'municipally-owned company' could take either the public corporation or the state autonomous legal form.

¹⁷ The state railways employed around 220,000 workers in the early 1980s, the post services approximately 240,000 in 1990.

¹⁸ ENEL (*Ente Nazionale per l'Energia Elettrica*) was created in 1962 from the nationalisation of the electric energy sector, of which around one-third was accounted for by IRI's electric energy joint-stock companies.

¹⁹ INA (*Istituto Nazionale delle Assicurazioni*) was established in 1912 as a state monopolist for life insurance (monopoly abolished in 1923), also involved in public housing from 1949.

State holding management entities (*Enti Autonomi di Gestione*) were the most significant state-owned organisations. In terms of their overall size, they were larger than the previous two combined. As opposed to the unitary structure of the sectoral public economic corporations, state holding management entities were multisectoral holding companies. They were constituted by a public law entity at the apex of a multilevel shareholding structure entrusted with managing and coordinating a set of subsidiaries having a joint-stock legal nature (some of them were also listed on the stock exchange). As with the public corporations, commercial law applied to the whole holding company in terms of accounting principles, financing and relations with employees. Among the three state holding management entities, IRI²⁰ was by far the largest and most diversified in key manufacturing and service sectors, followed by the energy giant ENI²¹ and by the smaller manufacturing conglomerate EFIM²² (Table 1.2). From 1956, they were all supervised by a dedicated Ministry of State Holdings.

	Share of value added	Share of investments	Share of employment
IRI	65.1%	69%	73.9%
ENI	30.6%	29%	19.5%
EFIM	4.2%	2%	6.6%

Table 1.2: Shares of IRI, ENI and EFIM in terms of value added, investments and employment within the group of state holding management entities in 1991. *Source:* Author's elaboration from IRI, ENI and EFIM's annual reports.

The profound heterogeneity among the three categories of SOEs in Italy's pre-1992 landscape does not allow their analytical subsumption under a unitary national

²⁰ For a summary of IRI's origins see the next section and Chapter 4. This thesis is focuses on the analysis of this former state holding company (Chapter 4, 5, 6 and 7), Italy's largest and most relevant during the 20th century.

²¹ ENI (*Ente Nazionale Idrocarburi*) was a state holding company established in 1953 with Law n. 136 (10 February 1953) from the constituting companies AGIP (oil and gas E&P), SNAM (gas pipelines) and ANIC (petrochemicals), with the aim to promote the national availability of hydrocarbon fuels. In the following decades, ENI expanded its international activities and diversified in infrastructure engineering (Saipem), in mechanical engineering (Nuovo Pignone) and in other chemical activities (EniChem) to become a vertically integrated company. By 1990, ENI had become the 5th largest energy group in the world by revenues. In 1992, it was transformed into a joint-stock company. Following its listing on the stock exchange in 1995, the government's stake in ENI has been reduced to the current 30.3%. In the meantime, most of ENI's previous activities have been either privatised (Nuovo Pignone, sold to General Electric), spun-off to other state shareholders (Snam, Saipem) or significantly reduced in size (the chemical company Versalis).

²² EFIM traces its roots in *Fondo per il Finanziamento dell'Industria Meccanica* (FIM), a state fund established in 1947 to provide loans to financially troubled mechanical companies. When the manufacturing conglomerate Finanziaria Breda was unable to repay its debts, the fund converted its credits into equity: in 1962 it was formally transformed into a state holding company (named *Ente partecipazioni e Finanziamento Industria Manifatturiera*, EFIM) and diversified into military productions (OTO Melara), helicopters (Agusta), glass manufacturing (Società Italiana Vetro) and aluminium products (Alumix). EFIM was liquidated in 1992.

SOSOE. It would be more appropriate to consider them as three separate systems, regulated by different legal frameworks. State holding management entities is the category that best resembles the configuration of modern systems of SOEs²³.

At the same time, despite the legal similarities, IRI and ENI had different statutory purposes²⁴. In the case of ENI, the public mission was essentially to supply the national economy with affordable and reliable energy sources, while in the case of IRI it was multifaceted²⁵. Consequently, each state holding management entity – and IRI above all – should be better considered as a SOSOE of its own.

²³ In fact, it was referred to as the 'system of state holdings' (Saraceno, 1975a).

²⁴ EFIM's smaller dimensions make it less significant.

²⁵ Chapter 6 presents IRI's main public missions.

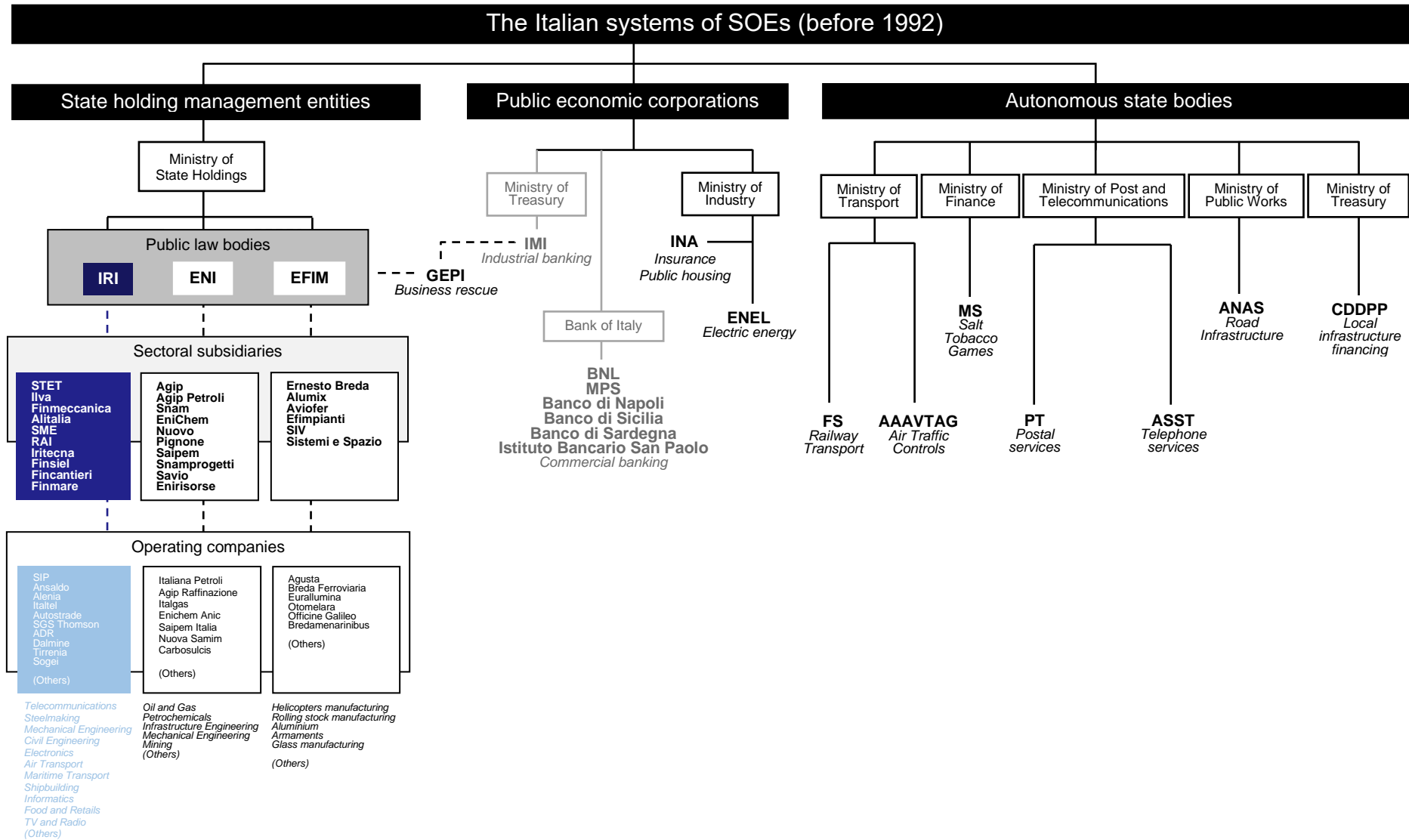


Figure 1.2: The Italian systems of SOEs before 1992. Source: Author's elaboration.

2.3.1. The relevance of the current Italian SOSOEs

The year 1992 marked a watershed in Italy's economic history. Among other events – above all the signing of the Maastricht Treaty – it inaugurated the so-called 'season of privatisations' that lasted until 2005 (with a last-ditch effort in the years 2013-2016). During the 1990s, Italy was among the countries that privatised most on a global scale, around 1.15% of its annual GDP from 1993 to 2000 (Ministero del Tesoro, 2001; Mediobanca, 2000; Bemporad & Reviglio, 2001; OECD, 2001). Elaborating on estimates²⁶ from Privatization Barometer, the total value of receipts from Italy's privatisations between 1992 and 2016 amounted to 186.7 billion USD in current values.

Furthermore, state autonomous bodies and public economic corporations have been transformed into joint-stock companies (Ferrovie dello Stato, ENEL, Poste Italiane, etc.) and the three state holding management entities have been either liquidated (IRI and EFIM) or transformed into a multidivisional joint-stock company in the case of ENI. As the former Governor of the Bank of Italy – and early champion of privatisations – Guido Carli (1993) suggested, the abandonment of the mixed economy was part of a 'constitutional mutation'.

Nevertheless, contrary to other major European economies such as the UK and Spain but similarly to France and Germany, the Italian state has preserved a certain degree of control over a considerable number of large companies²⁷. The Ministry of the Economy and Finance (MEF) is currently the ultimate shareholder of a variegated portfolio of SOEs, with several direct stakes in major companies and with an indirect control on the remaining SOEs through the shareholding vehicles CDP and Invitalia (see Figure 1.3).

In 2003, the year after IRI's liquidation, *Cassa Depositi e Prestiti*²⁸ (CDP) was transformed from a state autonomous body of the Treasury into a joint-stock company.

²⁶ Author's elaboration on Privatization Database, from July 1992 until 2016.

²⁷ Chapter 8 shows the extent of Italian SOEs in the current landscape, as they rank among the largest companies in the Country.

²⁸ The establishment of Cassa Depositi e Prestiti in 1850 predates the Italian unification of 1860, having been created in Turin under the Kingdom of Sardinia as a state-owned bank to fund public works. Under the new Italian state, Cassa's role was expanded to providing long-term loans to local public authorities for infrastructural projects, especially since 1875, when Cassa was allowed to use national postal savings as its main financing source. In 1898, it was turned into a Treasury department. Cassa continued to carry out the role of lender for local public administrations even after its transformation into a state

Coincidentally, CDP's mandate was expanded beyond its traditional specialisation in long-term financing of infrastructural investments performed by local public authorities. Since then, CDP has progressively assumed a shareholding role on behalf of the Treasury. More recently, CDP has also become the government's main shareholding agent, intervening in critical industrial operations regarding the national telecommunications infrastructure (TIM-Open Fiber), the Milan stock exchange operator (Borsa Italiana-Euronext), the digital payments platform (Nexi-Sia) and the most relevant segments of the national motorways network (Autostrade per l'Italia).

Furthermore, starting from 2018, a smaller state agency called Invitalia²⁹ has become a major shareholder³⁰ of commercial companies. It now owns one of the largest banks operating in the South of Italy (Mediocredito Centrale), it is the majority shareholder of the leading domestic manufacturer of buses (Industria Italiana Autobus) and it is expected to control Italy's largest steelmaking producer (Acciaierie d'Italia) by 2024.

Despite these novelties, the structure of Italy's system of SOEs appears more simplified and homogeneous than during the pre-1992 years. The MEF formally remains the 'centralised ownership entity' (OECD, 2015a; 2020a) of the system, which is thus composed by a plurality of joint-stock companies sharing the same legal framework, with the only remaining distinction between listed and unlisted companies.

The current Italian SOSOEs represents an interesting analytical case, for its significant dimensions and sectoral diversification, for the centralisation of the ownership function

autonomous body in 1983. In 2003, Cassa Depositi e Prestiti was transformed into a joint-stock company (named CDP S.p.A.) and it is now owned by the MEF (82.8%), with banking foundations as minority shareholders (15.9%). Currently CDP continues its traditional activity of lender for the local public administrations, but has extended it to the private sector. It is involved in real estate activities, it owns the largest venture capital fund (*Fondo Nazionale Innovazione*) and it acts as a shareholder for a considerable number of SOEs on behalf of the MEF.

²⁹ Invitalia is a joint-stock company, 100% owned by the MEF but operating as a policy instrument for the Ministry of Economic Development. It is involved primarily in reviving crisis areas and operates mainly in the less-developed South of Italy. Invitalia is responsible for all national incentives aimed at creating new companies and innovative start-ups. It prepares development plans and finances targeted investment projects, especially in innovative sectors. Invitalia provides technical assistance and services to public authorities for timely disbursement of EU and national funds. Invitalia is also the purchasing body and contracting authority for the execution of governmental programmes at the local level.

³⁰ Invitalia owns 100% of Mediocredito Centrale, 42.76% of Industria Italiana Autobus (the SOE Leonardo owns another 28.65%) and 38% of Acciaierie d'Italia (set to increase to 60% by 2024).

and its shared legal framework, but also for the legacy that it incorporates from the previous systems – IRI above all.

The legacy of IRI in the Italian economy is still ubiquitous, especially in the current SOEs sector. IRI has been responsible for the creation of the leading national telecommunications company (currently TIM), for half of the national motorways (Autostrade per l'Italia) and for the once respectable national flag carrier (Alitalia, today ITA Airways). IRI's heir companies have built some of the key high-speed railway connections and most high-speed trains that operate on the network. IRI contributed to turning Italy into Europe's second producer of steel (after West Germany), following the establishment of the largest steelworks on the continent at Taranto, in the underdeveloped Southern region. The aerospace company Leonardo – the world's second largest manufacturer of helicopters – and Europe's largest shipbuilding group (Fincantieri) are the outcome of IRI's restructuring and investment operations. The largest semiconductor company in Europe (STMicroelectronics) would not currently exist without IRI's financial and technical promotion. Even the public TV broadcaster RAI was developed under IRI, while the relatively modest digital company Sogei was created by IRI and used to be part of the second largest European information technology group (Finsiel). Most of these companies still are – or have gone back to being – state controlled.

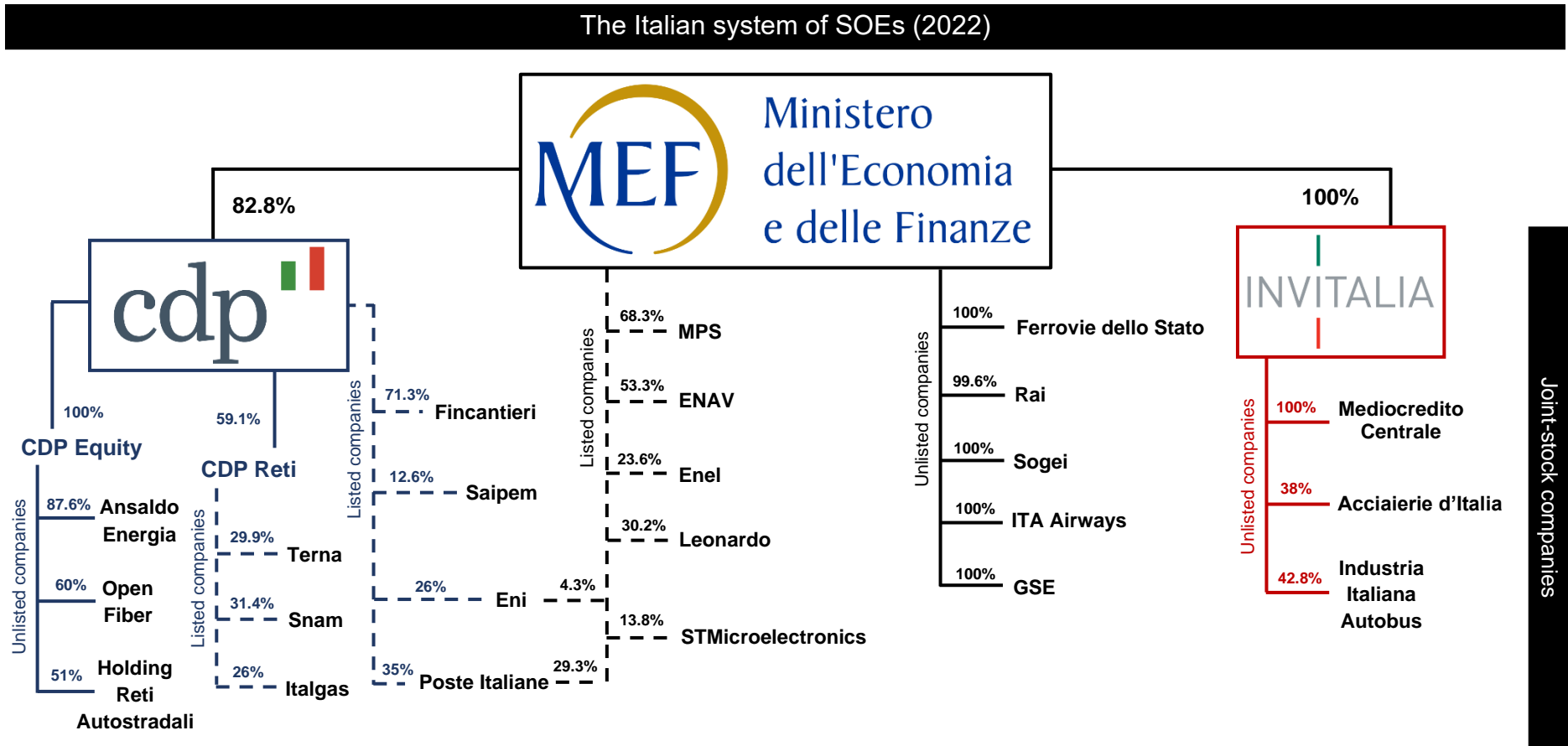


Figure 1.3: The Italian system of SOEs in 2022. Source: Author's elaboration.

2.3.2. The relevance of IRI

The motivations for investigating the IRI system of SOEs are its comparability, peculiarity and relevance.

First, the *comparability* of IRI with the current Italian system of SOEs derives from their similar dimensions and degrees of sectoral diversification, but also from their direct historical connection through former IRI-owned SOEs. Moreover, IRI's companies were state owned, but had a joint-stock legal nature and some of them were listed on the stock exchange, as in the current Italian system of SOEs. Lastly, both systems share an internally homogeneous governance framework.

Second, IRI's main *peculiarity* resided in its unique multilevel shareholding structure and governance formula. It was the first and most visible example of a state holding company with a multisectoral configuration – involved in manufacturing, service and infrastructures – and a mixed public-private shareholding and financial structure. Furthermore, IRI's state-owned nature implied that it had to pursue public policy objectives of general socio-economic interest.

Finally, the *relevance* of IRI lies in its origins but also in what it eventually became. According to IRI's 1990-91 Yearbook³¹ (p. 11):

IRI – *Istituto per la Ricostruzione Industriale* – was set up in 1933 as part of the plan to reform and restore health to the Italian banking system, following the severe depression of those years.

Despite being recognised as a state holding company for large industrial companies, IRI was initially established to save the ailing banking sector³². At that time, Italy's three largest banks – Banca Commerciale Italiana, Credito Italiano, Banco di Roma – had become major shareholders of large industrial corporations in a plurality of different manufacturing and service sectors.

³¹ English version.

³² For a reconstruction of IRI's origins and its first years until the war, see Saraceno (1956, 1981), Cianci (1977), Marsan (1992), Castronovo (2012) and Gasperin (2022).

By bailing out³³ and nationalising those three banks, IRI accidentally became the nation's largest shareholder of industrial companies (Saraceno, 1956), with more than one-fifth of Italy's shares in joint-stock companies, mostly majority shares. At the beginning of 1934, the extension of IRI's shareholdings included³⁴:

- The three largest banks by deposits: Banca Commerciale Italiana, Credito Italiano and Banco di Roma (31.7% of total domestic lending in 1937);
- More than 80% of the maritime transport sector;
- Around 90% of the shipbuilding industry;
- The totality of the artillery and military-related steelmaking industry;
- Over 40% of the civil steelmaking sector;
- A consistent share of rolling stock manufacturing (80% of locomotives and 30% of railway vehicles);
- The totality of the coal industry;
- All the telephone services in the North and Centre of Italy, as well as part of those in the South;
- Around two-thirds of the total domestic production of electrical energy (reduced to a third, following the immediate divestment of the largest electrical company, Edison);
- 20% of the rayon industry and 13% of the cotton industry;
- Real estate assets evaluated more than 500 million lire³⁵.

At that moment IRI was nonetheless considered as a *temporary* rescue agency with the specific mandate to restructure the three banks and separate their retail activities from any shareholding involvement in industrial companies. IRI was supposed to finance these operations and to repay the State for its intervention through the liquidation of the banks' industrial shareholdings. Despite divesting assets for about 3.28% of Italy's 1936 GDP in the first three years (Gasperin, 2022), from 1937 it was clear that IRI's mandate of selling all the existing shareholdings could not be fulfilled,

³³ Total liabilities incurred by IRI from the bailout of the three banks were estimated as 16.3 billion lire, around 15.4% of Italy's GDP in 1934. From 'L'Iri. Ente di carattere permanente. 1937-1942' (Archivio storico IRI, Serie Nera, Busta STO/521).

³⁴ From 'Dati sul patrimonio passato all'Iri (dati al 1. gennaio 1934-XII)' (Archivio storico IRI, Serie Nera, STO/521).

³⁵ 600 million euros in 2018 prices.

for two complementary reasons. First, the failure of private capital to take over and manage large industrial organisations without the necessary financial support from the banks. Second, especially after the economic isolation that the Country underwent following its invasion of Ethiopia in 1935-36, the realisation that IRI could become a direct instrument for a rational reorganisation of Italy's strategic industries and for achieving specific objectives linked to the new autarkic policy regime.

Thus, already in 1937, IRI was transformed into a *permanent* state holding company, a status that was confirmed with the promulgation of a new Statute in 1948, under the post-war democratic regime. From that moment onwards, IRI became Italy's first and largest state holding company, constituting the dominant industrial group in the Country and one of the largest in the world³⁶. Still in 1991 (Table 1.3), the year before its privatisation began, IRI was ranking first among the largest national industrial holdings, with consolidated revenues of 63.4 billion euros (in 2018 constant prices) and almost 370,000 employees (in the industrial section, banks excluded).

Ranking	Group	Revenues	Employees
1	IRI ¹	63.4	368,267
2	FIAT	48.9	287,957
3	ENI ¹	47.5	131,248
4	ENEL ¹	25.0	109,860
5	Ferruzzi Finanziaria	16.6	44,949
6	Pirelli	9.3	64,854
7	Fininvest	9.1	27,127
8	Olivetti	8.0	46,484
9	Ferrovie dello Stato ¹	4.1	170,741
10	SMI	2.8	11,638

Table 1.3: The ten largest Italian industrial groups in 1991 by revenues (in 2018 billion euros). *Source:* Author's elaboration on Mediobanca (1992). *Notes:* ¹State-owned groups. The postal group does not appear as the Mediobanca ranking excluded state autonomous bodies for not being proper commercial enterprises.

In its 60-year existence, IRI had profoundly shaped Italy's economic structure. Apart from its three leading banks, IRI controlled and developed key sectors of the Italian economy. IRI's companies were the national largest in steelmaking, shipbuilding, aerospace, semiconductors, informatics, energy engineering, civil engineering, and shipping. As mentioned, IRI was also responsible for the national telecommunications

³⁶ See Chapter 5.

sector, it operated the public broadcasting network, it built and managed around half of the motorways and developed the national flag carrier.

Finally, the relevance of IRI for Italy's economic development has to be appraised in comparison with other economic systems – particularly in East Asia – that adopted the conglomerate model for implementing long-term industrialisation policies. As Chapter 4 and 5 will expose, the multiannual planning process, the internal of surpluses and losses through cross-subsidisation, the upgrading of its national economic specialisation, the pursuing of industrial (but also socio-economic) policy aims – that characterised IRI's function – were also distinguishing elements of the Japanese (Johnson, 1982; Okimoto, 1989) and South Korean (Amsden, 1989; Wade, 1990) models of the large (horizontal) *keiretsu* and *chaebol* in the second half of the 20th century.

3. Research questions and objectives of the thesis

This thesis addresses two fundamental research questions:

RQ1: Which are the key features of a system of state-owned enterprises (SOSOE)s? How can it be conceptualised?

RQ2: Which type of configuration (in terms of governance and organisational structure) is required for a system of state-owned enterprise to incorporate a public policy orientation and an entrepreneurial function?

The first question is more theoretical, as it seeks to establish a new conceptual understanding of state ownership and to outline an original analytical framework for different configurations of SOSOEs. The second question is more empirical and policy-oriented, as it confronts the actual functioning of SOSOEs relative to the dynamics of structural economic change in modern capitalist economies.

By confronting the two research questions, this thesis aims to achieve four main objectives. First, to establish a new theoretical concept that can provide an insightful perspective on the study of SOEs, especially in light of its recent revival in both advanced and emerging economies. Second, to challenge past and existing theories on the role of SOEs, showing their limitations in understanding the actual structure and functioning of modern state ownership. Third, to confront the conventional wisdom on

the role of Italy's IRI in the post-war period, debunking a series of misconceptions about its supposed inefficiency, demonstrating its demiurgic role as it executed public policy missions and fostered technological innovation as well as industrial transformation. Four, to demonstrate the merits of the public entrepreneurship policy model and to suggest its adoption in countries presenting a significant system of SOEs, in contrast with the largely prevailing model of state shareholding.

4. Structure of the thesis

The thesis is divided into three parts. The first one (Part I) begins with this introductory chapter (Chapter 1). Chapter 2 delves into the political and economic debates on SOEs, highlighting shortcomings in the existing literature. It also examines critical aspects of evolutionary theories of innovation in relation to the concept of entrepreneurship. It is suggested that, by filling the voids in the SOEs and innovation literature with a Schumpeterian understanding of entrepreneurship, it is possible to outline a theoretical framework for analysing and understanding SOSOEs. Chapter 3 explains the methodological strategy adopted in addressing the thesis's main research questions, describing the case study methodology adopted in building a comparative analysis between IRI and the current Italian system of SOEs.

Part II is entirely dedicated to the case study on the two different Italian SOSOEs, with an unbalanced emphasis towards the IRI case. Chapter 4 is a comprehensive overview of IRI's multi-level structure and governance system. Chapter 5 provides an original quantitative reconstruction of its main economic and financial dimensions, which further justifies the focus on IRI as a case of particular interest, while contributing to debunking established myths about its supposed inefficiency and value-destructive nature. Chapter 6 analyses IRI's main public missions: technical and managerial training; modernisation of the underdeveloped Southern regions; research aimed at knowledge generation and diffusion. Chapter 7 presents an analytical reconstruction of IRI's industrial entrepreneurship: its diversification into new sectors; the restructuring of distressed activities and their long-term development; IRI's industrial and technological innovations; IRI's international competitiveness. Chapter 8 is dedicated to the current Italian system of SOEs, reconstructing its quantitative and qualitative dimensions and providing a critical analysis of its governance.

Part III is composed by Chapter 9 and by a concluding Chapter 10. Chapter 9 is dedicated to outlining a tentative but comprehensive theoretical framework for systems of SOEs. Chapter 10 concludes by summarising the contributions of this thesis and by championing the public entrepreneurship configuration as a policy model for public authorities to organise their SOSOEs.

Part I

Chapter 2

Literature review

1. A suggested review of the relevant literature

This chapter illustrates and confronts the most relevant literature on the central topic of the thesis. The following sections are structured according to three different subjects:

1. A review of the political and economic literature on SOEs in a historical perspective, critically reconstructing the theoretical debates and reporting on the most recent contributions (section 2).
2. A review of evolutionary theories on innovation, focusing on the central role of the business enterprise, on the concept of National Systems of Innovation and on mission-oriented innovation policy (section 3).
3. A historical retrospective on the theoretical concept of 'entrepreneurship' and its classical Schumpeterian definition (section 4).

The ultimate purpose of this literature review is to build the theoretical foundations of a policy-oriented analytical framework for SOSOEs, to be composed by matching the missing elements in the SOEs and innovation literatures with a Schumpeterian understanding of the concept of entrepreneurship.

2. Literature review on SOEs

“In the first place, *economically*, state capitalism is immeasurably superior to our present economic system”

Vladimir Lenin, *'Left-Wing' Childishness* (1918)

This section presents a review of the existing literature on SOEs, exploring the political significance of state ownership in the history industrial capitalism and focusing on the most relevant economic theories which have been elaborated to conceptualise, justify or criticise the introduction and existence of SOEs.

2.1. The contested political nature of state ownership

The collective ownership of industrial enterprises has always been a contested issue of political discussion. Historically, state ownership has been championed by Marxist thinkers as an indispensable preliminary stage towards the establishment of a socialist economic system.

In *Socialism: Utopian and Scientific* (1880, pp. 123-124), Friedrich Engels discussed the transformation of industrial enterprises in relation to the conflict between workers and individual capitalists, concluding that:

State-ownership of the productive forces is not the solution of the conflict, but concealed within it are the technical conditions that form the elements of that solution. This solution can only consist in the practical recognition of the social nature of the modern forces of production, and therefore in the harmonizing the modes of production, appropriation, and exchange with the socialized character of the means of production.

Decades later, during the socio-economic transformation that followed the Bolshevik Revolution, Lenin (1917, p. 363) was praising the virtues of ‘state capitalism’ as the necessary intermediate phase in the transition to socialism:

State-monopoly capitalism is a complete *material* preparation for socialism, the *threshold* of socialism, a rung on the ladder of history between which and the rung called socialism *there are no intermediate rungs*.

Few years later, while debating the merits of the ‘New Economic Policy’, Lenin commented that the essence of state ownership was the retention “in the hands of the state” of “all the commanding heights in the sphere of means of production” (Lenin, 1922, p. 585).

Subsequently, state enterprises, later grouped into large industrial conglomerates called ‘combines’, became constituting features of socialist planned economies. János Kornai famously exposed his devastating critique in *The Socialist System: The Political Economy of Communism* (1992, p. 118):

Direct bureaucratic control is inefficient in many respects. It is extremely rigid; there are long delays and serious losses before it adapts to changes in needs, technology, the domestic political situation, or the outside world. It provides no incentives for initiative, entrepreneurial spirit, or innovation.

Even in the capitalist world, the existence and expansion of the state enterprise sector was championed by socialist and communist parties as a means to obtain an effective

control over the ‘commanding heights’ of the economy and to implement industrial democracy in the workplace. These were among the objectives upheld by the proponents of a democratic transition from capitalism to socialism – for instance, with the Chilean experience (1970-73) under the presidency of Salvador Allende (Vuskovic, 1985), with the 1974 Labour government in the UK (Holland, 1975) or with the 1981 Socialist-Communist government in France (Bloch-Lainé, 1982).

These motives were ardently disputed by vocal detractors of public ownership: US President Eisenhower (1953, p. 433) famously indicated in the possibility of expanding the Tennessee Valley Authority a danger of “creeping socialism”. Likewise, Karl Popper (1945) assimilated the New Deal with other types of state interventionism, such as Soviet collectivism and Fascist “regimented economy”. State ownership of the means of production could be a danger for the “open society”, since Marx’s programme contained in the *Communist Manifesto* had been largely executed in several countries (*ibid.*, p. 130):

7. Increase in the number and size of factories and instruments of production owned by the state. (Achieved in the Smaller Democracies; whether this is always very beneficial is at least doubtful.)

The political nature of the debate emerged vividly also from the words of influential Western economists. Friedrich Hayek associated economic planning with an inevitable ‘*Road to Serfdom*’ (1944, pp. 202-203), while state ownership would constitute a “crushing power over the individual” even in the case of natural monopolies such as transport, gas and electricity. In *The Constitution of Liberty* (1960, p. 334), he later specified that the state enterprise did not pose a threat to the “free system” *per se*, but only in the form of a “state monopoly”:

Certainly it ought to be kept within narrow limits; it may become a real danger to liberty if too large a section of economic activity comes to be subject to the direct control of the state. But what is objectionable here is not state enterprise as such but state monopoly.

On a similar vein, Milton Friedman (1962) maintained that the preservation of individual freedom was at odds with some of the activities undertaken by the US government, including the public management of national parks, the mail system and the motorways. Some years later, he would claim that “only a few die-hard Marxists today regard further nationalization as desirable” (Friedman & Friedman, 1980, p. 95).

From a different disciplinary perspective, in *The End of History* (1992, p. 44) the political scientist Francis Fukuyama argued that the pervasive influence of state ownership was by definition incompatible with liberal democracies:

it is probably more useful to look at what attitude the state takes in principle to the legitimacy of private property and enterprise. Those that protect such economic rights we will consider liberal; those that are opposed or base themselves on other principles (such as 'economic justice') will not qualify.

The underlying theme of this historical debate is the high degree of politicisation that the issue of state ownership raised in the 19th and 20th centuries. From one side, socialist thinkers saw in the state enterprise formula the expedient through which class conflict between workers and capitalists (or their managers) could be tamed, if not completely eradicated, via the introduction of democratic principles in the managerial conduct of the companies. On the opposite side of the political spectrum, detractors of state ownership systematically assimilated the existence of a significant SOE sector with the dangers of discredited socialist regimes.

In the 21st century, state ownership seems to have become a much less divisive political topic. This could be explained by the renunciation of socialist and social-democratic parties to achieve the “common ownership of the means of production, distribution, and exchange”, as drafted by Sidney Webb in the original 1918 Clause IV of the British Labour Party Constitution (before its amendment in 1995).

Nevertheless, external social objectives are still widely recognised as distinctive to the nature of SOEs. For instance, international organisations such as OECD are declaring this possibility as a constituting principle of SOEs. As stated in the *OECD Guidelines on Corporate Governance of State-owned Enterprises* (2015a, p. 17):

[T]he ultimate purpose of state ownership of enterprises should be to maximise value for society, through an efficient allocation of resources.

The government should develop an ownership policy. The policy should *inter alia* define the overall rationales for state ownership, the state's role in the governance of SOEs, how the state will implement its ownership policy, and the respective roles and responsibilities of those government offices involved in its implementation.

This would imply that public policy objectives, other than the purely economic ones of profit and shareholder value maximisation, could be assigned to SOEs when this is deemed more efficient (i.e. Pareto-optimal) than other solutions.

2.2. Early economic debates on SOEs

As with other themes in the history of economy thought, classical economists were the first to investigate the economic function of public ownership with bold and ambitious questions.

For instance, Jean-Baptiste Say (1803, p. 136) was asking “if the government increases national wealth by becoming itself a producer”³⁷. His response was negative: the government should outsource the production of goods, even in the case of military equipment.

Adam Smith (1776, p. 533) favoured a regulating role for the state, rather than its direct involvement in the production of goods and provision services. “Publick extravagance of government” (*ibid.*, p. 343) would retard the “natural progress” (*ibid.*, p. 345) of nations:

The sovereign is completely discharged from a duty, in the attempting to perform which he must always be exposed to innumerable delusions, and for the proper performance of which no human wisdom or knowledge could ever be sufficient; the duty of superintending the industry of private people, and of directing it towards the employments most suitable to the interest of the society.

At the same time, he envisaged for the government a direct role in the realisation of “public works” (e.g. roads, bridges, canals, ports), which should be made to “facilitate the commerce of the society”. More interestingly perhaps, Smith indicated in fiscal and commercial monopolies – what he called “mercantile projects”, such as the post office or public banks – a potential source of revenue for the sovereign (*ibid.*, pp. 632-633).

Later on, John Stuart Mill (1848, pp. 216-217) was already questioning, in the context of rising socialist movements, whether an alternative system of property would be “fitted to substitute itself for the ‘organization of industry’ based on private ownership of land and capital”.

By the end of the 19th century, Alfred Marshall had become the most explicit economic investigator of public ownership. In *Principles of Economics* (1890, p. 35), he outlined some very straightforward theoretical questions:

³⁷ Author’s translation from original French: “*Si le gouvernement augmente la richesse nationale en devenant producteur lui-même*”.

What business affairs should be undertaken by society itself acting through its government, imperial or local? Have we, for instance, carried as far as we should the plan of collective ownership and use of open spaces, of works of art, of the means of instruction and amusement, as well as of those material requisites of a civilized life, the supply of which requires united action, such as gas and water, and railways?

The answers he gave were unequivocally negative, inspiring modern economic arguments against state ownership. First, ‘governmental enterprises’ were supposed to be extremely difficult to control. Second, government-appointed executives leading those state enterprises would necessarily underperform. Finally, and most importantly, it was argued that in governmental undertakings “creative ideas and experiments in business technique” would not materialise. In fact, by stifling innovation at the firm level, SOEs would in turn impact on the national economy, to the point of becoming value-destructing forces (*ibid.*, p. 593):

There is therefore strong *prima facie* cause for fearing that the collective ownership of the means of production would deaden the energies of mankind, and arrest economic progress [...] it might probably destroy much that is most beautiful and joyful in the private and domestic relations of life.

Marshall’s assertive conclusions stood in striking contrast with the characterisation of SOEs given by the German economist and sociologist Werner Sombart. In *Der moderne Kapitalismus* (1928) he discussed how those *Staatsbetriebe* were effective “places of learning” for technical skills but also for organisational and social capabilities (Reinert 1999, p. 308). According to Sombart, SOEs:

served to set, not only a prototype example of industry, but also the pace and pattern for the new form of organisation. It was the state-owned enterprises which, due to the demands they created, often served as catalysts for the development of capitalist industries. These enterprises are so essential that they cannot be left out of an account of the development of capitalism, which – although their conceptual roots lay elsewhere – they furthered in thousands of ways.

In aftermath of World War II, leading economic thinkers concluded that nationalisations of the utilities and of certain pivotal sectors were not only an inevitable, but also a desirable evolution for capitalist economies.

For instance, in *Capitalism, Socialism and Democracy* (1942, p. 231) Schumpeter had “no objection to make as an economist” to the nationalisation of vast areas of the economy – the central bank, major insurance companies, railways, coal mining, electricity production and distribution, iron and steel, constructions, land – despite

reducing this to a mere political option, without outlining any theoretical connection between public ownership and the process of ‘creative destruction’ discussed only few sections earlier in the book.

Moreover, as Shleifer (1998) noted, in the late 1940s, three future recipients of ‘The Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel’ were arguing the case for public ownership as a useful instrument to intervene in addressing economic problems.

Arthur Lewis (1949, pp. 101-102) maintained that nationalisation would enhance the efficiency of certain sectors (i.e. mining, land, insurance, telephone services, motor car), including those “which supply services widely used by other industries, such as railways, steel, banking, or chemicals”, because in those industries “efficiency depends on unitary control”. Furthermore, he suggested that partial nationalisations of other industries would be “useful both as a check on private enterprise and as an outlet for experiment, and may be used widely” (*ibid.*, p. 105).

A similar argument was developed by Maurice Allais (1948), who indicated that managerially autonomous and profit-oriented SOEs could function as ‘witnesses’ (*entreprises témoins*), working to increase the degree of competition within each industry.

In the same spirit, James Meade (1948, pp. 67-68) favoured competition between “competitive and socialized sectors of the same industry”, while asserting the economic rationale for a nationalisation of the steel and chemical sectors to be organised under state monopolies on the grounds that “their monopoly organization is necessary because it provides important technical economies of production”.

2.3. Modern economic theories on SOEs

In the second half of the 20th century, the theoretical debate on state ownership intensified, as SOEs increased their quantitative and qualitative presence in Western and developing economies (Toninelli, 2000; Amatori et al., 2013). A summary of the most relevant theories reported below, with their strongest and weakest elements, is provided in Table 2.1.

For instance, SOEs have been attributed a potential macroeconomic role in fostering economic growth and taming the business cycle. Towards the end of the post-war era of Keynesian demand-management policies, Tinbergen (1967) and Sylos Labini (1972) were claiming an important countercyclical function for investments performed by nationalised enterprises.

SOEs have also been considered, although without unanimous agreement (Balassa, 1987), as instruments for long-term economic development through the establishment of ‘national champions’ in capital-intensive industries with dynamic increasing returns (Jones, 1982; Kaldor, 1980; Chang & Singh, 1992).

Nevertheless, most of the theoretical discussions over SOEs have been framed in microeconomic terms. The conventional interpretation has largely been dominated by ‘market failure’ theories (Stiglitz, 2000; Atkinson and Stiglitz, 2015), conceptualising SOEs as a deviation from an optimal economic system composed by price-taking private enterprises. SOEs are thus assimilated to other instruments that the government can deploy to ‘fix’ market failures.

The most relevant example of market failure associable to SOEs is the case of natural monopoly, arising in activities where only a single supplier can efficiently operate, due to high fixed costs and intrinsic economies of scale. In those cases, the monopolist’s desired output for a certain good or service might be less than the appropriate ‘socially optimal’ quantity. This may result in the undersupply of goods and services or in episodes of ‘moral hazard’ in production (Baumol, 1984). At the same time, by dominating the market and exploiting consumers, the monopolistic firm can impose higher prices and cause a net welfare losses. The involvement of SOEs could therefore be justified as a way of forcing the dominant firm to increase the supply of that good or service, at a lower price. For instance, the volume *Public Enterprise Economics* (Bös, 1986, p. 13) – conceived as a manual on SOEs – began by declaring “this is a book about prices”. The defining essence of SOEs would therefore be the subsidisation of public utilities – electricity, gas, water supply and others – presenting a tendency towards natural monopoly.

A second case of market failure can be traced in the absence of sufficient investments in risky economic activities with low or deferred returns. Capital market failures may

appear due to the limited dimensions of national financial markets and to the short-sighted attitude of its operators (Stiglitz & Weiss, 1981; Greenwald et al., 1990). SOEs may be established to collect and rationalise scarce financial (but also technical) resources, in coherence with a more ‘developmentalist’ vision mentioned above³⁸.

A third type of market failure occurs in cases of *positive externalities* (Stiglitz, 1987a), the misalignment between private and social returns of an economic activity, giving rise to the necessity of providing essential public goods (Stiglitz & Rosengrad, 2015). For instance, private actors find it particularly difficult to appropriate the returns of producing scientific knowledge through basic R&D activities. As a consequence, the state should intervene in the provision of basic scientific research – a ‘public good’ – which might otherwise be undersupplied. Notable scholars have long recognised the necessity for governments to finance basic research via universities and governmental agencies (Nelson, 1959; Arrow, 1962b; Stiglitz, 1999), but none of them has ever theorised a distinct role for commercial SOEs as a complementary instrument for performing basic – let alone more applied – R&D activities³⁹.

On the contrary, SOEs have also been portrayed as creators of *negative externalities*. Economic externalities might be negative (e.g. pollution, traffic congestion) when the individual initiative damages society at large. For instance, Jefferson (1998) has treated SOEs as wasteful recipients of public subsidies, which distort the efficient resources allocation, causing inflationary and crowding-out effects.

Although the conventional literature on market failures has recognised a positive role for the government to address them, its leading authors have expressed caution on the degrees and forms of involvement, based on the incentives and on the limited information that governments would face, concluding that “it may be foolhardy for the government to go where the private market fears to tread” (Stiglitz, 1989a, p. 202). With specific reference to the issue of state involvement in production activities, Stiglitz (1989b, p. 40) explicitly stated:

³⁸ Historical examples of SOEs which performed this function have been the steel-making company Posco in South Korea (Amsden, 1989) or Brazil’s aircraft producer Embraer (Goldstein, 2002).

³⁹ Despite the existence of a broad range of empirical cases studies on R&D performed by SOEs, based on national (Ruiqi et al., 2017; Choudhury & Khanna, 2014; Antonelli et al., 2014) and sectoral cases (Sterlacchini, 2012; Mazzucato & Semieniuk, 2018), no systematic theorisation has been attempted on this issue.

the fact that there is a market failure, even if it calls for some form of government intervention, does not necessarily call for government *production*.

It is therefore argued that the government could attain the same objectives, with less distortive consequences, through *provision* and *regulation*, without becoming involved in *direct production* by setting up SOEs.

This proposition follows from the ‘Fundamental Privatization Theorem’, proposed by Sappington & Stiglitz (1987). Under certain specific conditions (i.e. those underpinning the two fundamental theorems of welfare economics), the government can optimally solve market failures by designing appropriate schemes of auction for the private provision of goods and services. When those necessary prerequisites (e.g. perfect information, price-taking firms, etc.) are not satisfied, in particular when rapid adaptation to novel and complex events is required, then ‘privatization failures’ may arise and “public *provision* is more likely to be the preferred mode of organization” (*ibid.*, p. 581). At the same time, the two authors expressed caution on the implications of their theory relative to the role of state-owned *production* entities in addressing the privatisation failures (*ibid.*, p. 568).

A further exemplary description of the market failure approach to state ownership is provided by Laffont & Tirole (1993, pp. 637-638):

Is public or private ownership more likely to promote social welfare? This ancient and central question in economics has generated a fair amount of conventional wisdom on the benefits and costs of public production of goods and services.

The authors then embarked on a cost-benefit analysis of “government intervention in production” when a market failure appears. In deciding whether intervention is preferred to non-intervention and, in the first case, if state ownership is preferred to regulation, they adopt a principal-agent approach. While assessing the “relative cost efficiency of the public and private sectors” they come to admit that “theory alone is thus unlikely to be conclusive in this respect [...] A richer approach than ours would call for a comparative analysis of alternative forms of public enterprises” (*ibid.*, pp. 654-655).

For all other cases not referable to market failures, conventional theory assigns no distinctive economic functions to SOEs. On the contrary, it postulates their sub-optimal nature, which lowers the aggregate productivity of the economic system. Managerial

inefficiencies are considered intrinsic to SOEs (Boardman & Vining, 1989; Vining & Boardman, 1992; Shirley & Walsh, 2000), so that their distortive presence in competitive and complete markets should be rectified through either privatisation or closure (World Bank, 1988; Vickers and Yarrow, 1991; World Bank, 1995; OECD, 2000; Megginson and Netter, 2001).

The most compelling arguments against SOEs are based on agency theories (Jensen & Meckling, 1976; Fama, 1980), where the performance of agent-managers ends up being sub-optimal, due to a structural lack of incentives for the principal-owners (i.e. citizens) in monitoring the management of SOEs. Other authors (Boycko et al., 1996) have argued that their inefficiency stems from another agency problem: the obligation to pursue the short-term electoral objectives of politicians, such as overmanning and ‘white elephants’ investments. Even in this case, they argue: “privatization works because it controls political discretion” (*ibid.*, p. 318).

SOEs have also been accused of having a structural tendency to work with a ‘soft budget constraint’ (Kornai, 1986), meaning that they can continue to operate, despite being unprofitable, only because they are provided additional resources from the government purse. Under this perspective, the system of ‘too little stick and too much carrot’ creates the wrong incentives for them to function efficiently.

These critical approaches to SOEs do nonetheless present several controversial simplifications. First, in most of this literature, as evident even from recent reviews (Putniņš, 2015; Peng et al., 2016), state ownership is compared to private ownership in a simplistic dichotomous way. This conceptual approach does not seem to capture the everlasting array of ‘hybrid’ institutional configurations in the ownership continuum – a subsidised 100% state monopolist and a listed majority-owned SOEs are rather different types of state-controlled enterprises (Bruton et al., 2015; Vining and Luring, 2020). Secondly, agency theories rather trivialise the actual functioning of SOEs. For example, their ‘politicisation’ appears very limited in state-controlled listed companies. When operating under domestic or international competition, managers of SOEs share the same interests and incentives of their colleagues in private companies.

2.4. Performance evaluation of SOEs

A final, but critical issue concerning modern analyses of SOEs involves the concept of 'performance' and how to evaluate it. The performance evaluation of SOEs is intimately connected with the legitimacy of such organisational form of industrial enterprise, as opposed to the standard privately-owned model. Neoclassical theories tend to conflate performance evaluation with a *static* analysis of their efficiency, to be measured by short-term financial indicators of profitability and productivity (Aharoni, 2000). Such approach is consistent with the theoretical claim that the profit-seeking nature of private firms is a driving incentive for seeking the highest technical and managerial efficiency.

This literature started to flourish at the end of the 1980s, at the peak of the privatisation phase, when the need for justifying private divestiture of SOEs was pressing. Most of these econometric studies were based on comparisons between SOEs and privately-owned companies (Boardman & Vining, 1989; Vining & Boardman, 1992; Majumdar, 1998; Dewenter & Malatesta, 2001; La Porta et al., 2002), or between companies that were privatised and therefore changed their ownership structure from state-owned to privately-owned (Galal, 1994; Megginson et al., 1994; Martin & Parker, 1995; Newbery & Pollitt, 1997; La Porta & López-de-Silanes, 1999; Villalonga, 2000).

Two main problems arise with this strand of empirical studies. First, the financial performance of SOEs and privately-owned enterprises (POEs) is difficult to compare in separate national contexts, due to the heterogeneity of size, market conditions, degree of economic development (Chang, 2007). Secondly, and most importantly, comparing SOEs and POEs on the basis of their short-term financial performance is methodologically misleading as it implies that there should be no fundamental distinction between them (Aharoni, 1981). In fact, SOEs should by definition incorporate a policy mandate that might not guarantee the maximisation of profits, without this implying any dysfunctional or inefficient managerial conduct. The point was stated clearly by Meade in 1948 (p. 167) with respect to the policy mandate of SOEs in regulating prices and output in natural monopolies:

Since the actual profit or loss made in socialized industries will in any case depend not only upon technical efficiency but also upon the application of the pricing rules, it will not be possible to use resulting profits as a measure of efficiency of management.

Therefore, as Florio & Fecher (2011, p. 364) more recently argued, performance evaluation of SOEs should not be merely focused on the "narrow dimensions of

profitability and simplistic measures of productivity within one sector”. On the opposite, it should be based on their effective achievement of policy objectives that qualify their state-owned nature – among them one could list the development of certain technologies, the preservation of strategic productions or services, the diversification into new activities, their contribution to creating positive externalities (e.g. the establishment of industrial eco-systems).

2.5. The renewed analytical interest for SOEs in the 21st century

In a special report titled ‘The visible hand’, The Economist (2012, p. 1) recognised that the evolution of SOEs in certain national contexts has given birth to a new economic model defined as ‘state capitalism’:

The crisis of liberal capitalism has been rendered more serious by the rise of a potent alternative: state capitalism, which tries to meld the powers of the state with the powers of capitalism. It depends on government to pick winners and promote economic growth. [...] Elements of state capitalism have been seen in the past [...] but never before has it operated on such a scale and with such sophisticated tools.

Similarly, in *Reinventing State Capitalism*, Musacchio and Lazzarini (2014, p. 2) have defined the new phenomenon of state capitalism as:

the widespread influence of the government in the economy, either by owning majority or minority equity positions in companies or by providing subsidized credit and/or other privileges to private companies. The new varieties of state capitalism differ from the more traditional model in which governments own and manage state-owned enterprises (SOEs) as extensions of the public bureaucracy.

The OECD has concurrently devoted more attention to SOEs, updating its guidelines on the corporate governance of SOEs (OECD, 2015a), producing a series of publications based on case studies (OECD, 2015b; 2015c), and collecting qualitative as well as quantitative empirical evidence (Christiansen, 2011; Kowalski et al., 2013; OECD, 2014; OECD, 2016a; OECD, 2017a; OECD, 2018a; Prag et al., 2018; OECD 2022a; OECD 2022b).

The Interest for “the return of public enterprises” (Florio, 2014) has motivated the launch of a series of research projects led by the *Centre International de Recherches et d'Information sur l'Economie Publique, Sociale et Coopérative* (CIRIEC) and several dedicated special issues on the ‘Annals of Public and Cooperative Economics’, on the ‘Journal of Economic Policy Reform’, on ‘Structural Change and Economic Dynamics’

and on the ‘Journal of Economic Policy Reform’⁴⁰, as well as the publication of *The Routledge Handbook of State-Owned Enterprises* (Bernier et al., 2020) and of *The Oxford Handbook of State Capitalism and the Firm* (Wright et al., 2022).

In this recent revival of SOEs studies, a particular interest has been devoted to the innovation and industrial policy role of SOEs. Florio and Fecher (2011) have advocated a better understanding of SOEs’ missions, governance mechanisms, entrepreneurship and innovation potential. Relatedly, Belloc (2014) has argued that the conventional wisdom on innovation in SOEs has to be reconsidered, outlining a theoretical sketch that looks at SOEs as producers of technological innovation, with a descriptive comparison of R&D expenditure between state-owned and fully private enterprises. Bernier (2014) has suggested to expand the literature on entrepreneurship in the public sector (Diefenbach, 2011) to the case of SOEs. Tõnurist & Karo (2016) have proposed a taxonomy enlisting the necessary conditions or constraints that SOEs might face in implementing innovation policies. Finally, in the Routledge Handbook on SOEs (Part VII), Castelnovo and Florio (2020), Landoni (2020) and Del Carmen Sánchez-Carreira et al. (2020) have attempted a new conceptualisation of SOEs as drivers of innovation and knowledge creation. Mamica & Dolfsma (2022) and Wang & Hua (2022) have similarly explored those issues in the Oxford Handbook of State Capitalism and the Firm (Part IV). The theoretical outline of those works appears still preliminary, with little empirical support, but it has contributed to highlighting a new analytical framework for SOEs.

The innovation-entrepreneurial perspective on SOEs implies a significant theoretical challenge to neoclassical economic theory, which upholds the principle of private ownership – with its implicit profit-oriented incentives – as a necessary, although not sufficient, condition for efficiency, entrepreneurship and innovation (Shleifer, 1998, p. 135). Ever since Marshall (1907, p. 22), government involvement in the production of goods and services was considered as “an anti-social destruction of the springs of

⁴⁰ In chronological order: (2011). The future of public enterprises. Special issue. *Annals of Public and Cooperative Economics*, December, 82(4): 361-373; (2014). Critical Issues in Public Enterprise Reform. Special issue. *Journal of Economic Policy Reform*, 17(3); (2015). Renewal of Public Enterprises and New Forms of Governance. *Annals of Public and Cooperative Economics*, 86(4); (2022). Global State-Owned Enterprises in the 21st century: Rethinking their contribution to structural change, innovation, and public policy, *Structural Change and Economic Dynamics*; (2022). How do State Owned Multinational Corporations Behave Abroad? *Journal of Economic Policy Reform*.

knowledge” which eventually stifles competition and innovation, especially when a country approaches the technological frontier (Acemoglu et al., 2006, p. 40). SOEs would therefore represent “inappropriate institutions” that trap societies in relatively backward technologies.

Area	Theoretical elements	Policy justification	Strong elements	Weak elements
Macroeconomic (Developmentalism)	Long-term economic growth	Yes	It addresses the causes of 'economic backwardness'.	It applies mostly to developing economies.
Macroeconomic (Keynesianism)	Countercyclical role	Yes	Public investments are more effective when implemented through SOEs.	Some SOEs might not require 'extensive' investments at any point in time.
Microeconomic (Market failure)	Natural monopolies	Yes	The introduction of SOEs might be more effective than regulation in setting prices and quantities at 'socially optimal' levels.	It limits state ownership to certain sectors, without providing justifications for SOEs operating in competitive manufacturing sectors.
Microeconomic (Market failure)	Constrained capital markets	Yes	SOEs might tackle the lack of capital, channelling available resources in nurturing skills and technical knowledge.	It does not apply to countries with advanced capital markets (which nonetheless might suffer from the lack of patient finance).
Microeconomic (Market failure)	Public goods provision in cases of positive externalities	Yes	SOEs might solve the private-public misalignment of interests in several economic areas (R&D, infrastructures, etc.).	It implies a rigid distinction between the private and public sector, which might not be completely adequate in the case of SOEs.
Macroeconomic (Government failure)	Soft budget constraint	No	It is concerned with financial incentives and with the efficient allocation of resources within SOEs.	SOEs are only rarely and partly funded by state budgets.
Microeconomic (Government failure)	Principal-agent problem	No	The difficulty of controlling the managerial operations of SOEs, or their tendency to be captured by factional short-term political interests.	The 'corporatisation' of SOEs reduces the distinction with private companies, on which the agency problem might nonetheless apply.
Microeconomic (Market creation)	Innovation and knowledge creation	Yes	SOEs as innovative organisations and producers of knowledge under an innovation and industrial policy perspective.	Little empirical elaboration has been produced and a general theoretical framework is missing.

Table 2.1: Modern theoretical approaches to the study of SOEs in the economic literature. Source: Author's elaboration.

2.6. What is missing from the economic literature on SOEs

Even beyond its contested political nature, the issue of state ownership has long interested and divided economists. The recognition of SOEs as a deviation from the privately-owned enterprise benchmark has represented a common underlying factor among both detractors and proponents of state ownership.

Critics of state ownership developed theories to demonstrate the superior static allocative efficiency of a private enterprise system. Supporters of SOEs instead recognised their function in solving market failures and increasing the overall welfare of the economic system. More recently, SOEs have been seen as potential innovation and industrial policy instruments to increase the dynamic efficiency of the economic system.

However, the economic literature on SOEs has mostly focused on individual SOEs or on the abstract nature of state ownership, without addressing the role of a SOSOEs in a given national context, also in light of recent transformations (see Chapter 1).

3. Literature review on evolutionary theories of innovation

“Every new extension of Governmental work in branches of production which need ceaseless creation and initiative is to be regarded as *prima facie* anti-social, because it retards the growth of that knowledge and those ideas which are incomparably the most important form of collective wealth.”

Alfred Marshall, *The Social Possibilities of Economic Chivalry* (1907)

With the advent of the Industrial Revolution in the 18th century, new innovative techniques and organisational changes in production processes induced a *quantitative* expansion of industrial and commercial activities, but also a remarkable process of *qualitative* transformation. The latter has been broadly disregarded by prevailing economic theory⁴¹, while Schumpeter and neo-Schumpeterian economists have outlined an evolutionary theory of economic change driven by innovation.

⁴¹ Traditional growth theory has been mostly focused on the study of quantifiable variables, usually included in a production function with various degrees of sophistication: from the first exogenous models of Solow (1956; 1957), to the contemporary (Kaldor, 1956) and subsequent generation of models with

3.1. Schumpeter's pivotal definition of innovation

Schumpeter pioneered our modern understanding of the role of innovation as the engine of economic development within the capitalist system. In *Theory of Economic Development* (1934, p. 66) innovation was defined as “the carrying out of new combinations”, a multidimensional and qualitative phenomenon, concerning organisational processes within firms and transformations of markets and sectors. Schumpeter asserted that the concept of innovation entailed five defining cases:

(1) The introduction of a new good — that is one with which consumers are not yet familiar — or of a new quality of a good. (2) The introduction of a new method of production, that is one not yet tested by experience in the branch of manufacture concerned, which need by no means be founded upon a discovery scientifically new, and can also exist in a new way of handling a commodity commercially. (3) The opening of a new market, that is a market into which the particular branch of manufacture of the country in question has not previously entered, whether or not this market has existed before. (4) The conquest of a new source of supply of raw materials or half-manufactured goods, again irrespective of whether this source already exists or whether it has first to be created. (5) The carrying out of the new organisation of any industry, like the creation of a monopoly position (for example through trustification) or the breaking up of a monopoly position.

In his later *Capitalism, Socialism and Democracy* (1942, pp. 82-83), Schumpeter reinstated the centrality of innovation:

The fundamental impulse that sets and keeps the capitalist engine in motion comes from the new consumers' goods, the new methods of production or transportation, the new markets, the new forms of industrial organization that capitalist enterprise creates.

He further assimilated the evolutionary nature of innovation to the process of 'Creative Destruction' that defines what capitalism is all about:

The same process of industrial mutation – if I may use that biological term – that incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one. This process of Creative Destruction is the essential fact about capitalism.

3.2. Evolutionary theories of innovations: firms, systems and mission-oriented policy

From the 1970s, neo-Schumpeterian authors have embarked on developing an evolutionary theory of the capitalist firm based on Schumpeter's understanding of

endogenous technical change (Romer, 1986; 1990), learning-by-doing (Arrow, 1962a) and the inclusion of human capital (Lucas, 1988) and R&D (Griliches, 1979) variables. For a complete review, see Barro & Sala-i-Martin (2004).

technological and organisational innovation (Freeman, 1997; Nelson and Winter, 1982; Dosi et al., 1988). Given that “firms are the main locus of technological accumulation” (Dosi et al., 1994, p. 26), these authors started to analyse the ability of firms to innovate, as learning organisations building and nurturing ‘dynamic capabilities’ (Teece & Pisano, 1994; Teece et al., 1997). Organisational capabilities and technology are found to be extremely localised and firm specific (Dosi, 1988; Antonelli, 1995). This follows from the fundamental distinction between codified information – publicly available and freely transferable – and specific or ‘tacit knowledge’ (Polanyi, 1967; Senker, 1995).

Technological knowledge is mainly nested within productive organisations and has to be cultivated through learning and search activities. The prevailing form of search for companies in ‘science-based’ sectors (Pavitt, 1984) is formalised in-house R&D (Mowery, 1980), while other industries rely on more informal sources of innovation, such as the interaction between users and producers (Lundvall, 1985; Lundvall et al., 1988), design and interactive learning (Arrow, 1962a; Stiglitz, 1987b; Lundvall, 1992a). Furthermore, the improvement of technological capabilities at the firm level has been recognised to be essential for the development of national technological capabilities in an industrial policy perspective (Lall, 1992; Bell and Pavitt, 1995).

SOEs have not received any distinct treatment in the evolutionary literature on innovation. The unifying object of analysis of those theories remained the private profit-seeking enterprise (Nelson, 1981), although Nelson and Winter (1982, p. 364) noted that most privately-owned enterprises are private but for the name, as they depend “on a variety of forms of governmental support”. Freeman (1994) suggested that innovative firms are organisations that learn from their own experiences, from external sources and from other – mostly public – organisations. It is unclear how SOEs would classify within the innovation ecosystem, whether they could fall under the group of innovative firms or if they would simply represent one of the many organisations belonging to the public sector. Similarly, Lazonick (1991) argued that the innovative enterprise is a business organisation capable of confronting the collective, cumulative and uncertain nature of the innovation process, without suggesting a distinction based on different ownership configurations.

From Schumpeter's definition of innovation as an "organic process" within a system, neo-Schumpeterian authors have also recovered the notion of innovation in relation to its ecosystem. As noted by Freeman (1995), the idea of National System of Innovation finds its origins in Friedrich List's *The National System of Political Economy* (1841). In his treaty, the founding father of the German Historical School of economics delineated the constituting elements of a national system of innovation and production, in which scientific and technical knowledge had a dominant role in determining the industrial development of a country (*ibid.*, p. 113):

In order to explain these phenomena, we must refer to the progress which has been made in the course of the last thousand years in sciences and arts, domestic and public regulations, cultivation of the mind and capabilities of production.

List foresaw in public policies and institutions such as "educational establishments (especially technical schools), industrial exhibitions, offers of prizes, transport improvements" (*ibid.*, p. 247) a prime role in producing 'productive powers' which were essential for "promoting internal industry" and thus the manufacturing strength of the nation.

The modern concept of National System of Innovation (NSI) initially appeared in a 1982 OECD paper (Freeman, 2004) and found its first application with the study of Japan's technological and economic development (Freeman, 1987). The comparison between Japan and the Soviet Union pointed towards an overestimation of R&D expenditure as a quantitative indicator of innovation. From that example came the necessity to emphasise qualitative factors affecting the diffusion of innovation within a national system, such as user-producer linkages (Lundvall, 1992b) and the integration of R&D with commercial production. Freeman (1987) concentrated particularly on the interaction between learning processes and the production system, looking at the role of Japan's MITI through the lens of innovation theory, while Nelson (1986; 1988) focused on how fundamental institutions (i.e. universities, technical societies, government laboratories) create and diffuse technical knowledge within the system.

In the seminal volume *Technical Change and Economic Theory* (Dosi et al., 1988), the whole Part V is dedicated to the emerging concept of NSI. Only few years later, the first thematic monographs were published: the more theoretical book of Lundvall (1992a) and the prevalently empirical one by Nelson (1993), presenting a series of

national case studies. Finally, the increased attention for the ‘flows of knowledge’ within a system approach led the OECD (1997) to embrace the concept as an essential analytical framework for the study of innovation and technology. The common denominator of those studies is the acknowledgment of an existing heterogeneity among different national systems of innovation and production (Lundvall et al., 2002), in terms of their characteristics and performances (Patel & Pavitt, 1994).

The literature on National Innovation Systems has nonetheless overlooked the role of SOEs. The public sector in its various forms (i.e., universities, public research laboratories, government agencies, etc.) is presented among the characteristic elements of the innovation system (Gregersen, 1992), but SOEs have not assumed an established and independent role in it.

Nelson (1994) listed a variety of relevant supporting institutions for the development of a well-functioning innovation system, without explicitly reserving a role for SOEs. In his comparative study of national cases, he implicitly ruled out a specific function for SOEs within the innovation system (Nelson, 1993, p. 20):

There are certain matters we are sure about [...] one is that in manufacturing at least, the efforts of governments and universities may support, but cannot be a substitute for the technological efforts of firms.

In other cases⁴², it is less clear whether SOEs would fall under the firm sector, without any discrimination from the privately-owned ones, or if they should be indistinctly included in the public administration, with no distinct agency of their own.

Lastly, the literature on mission-oriented innovation policy (Ergas, 1987) has examined extensively the formulation of modern R&D programmes (Nelson, 1987; Mowery, 2010; Foray et al., 2012; Mazzucato, 2018). Recent studies have discussed the role of public procurement (Edquist et al., 2012) and the importance of public sector capabilities (Kattel and Mazzucato, 2018) in mission-oriented innovation policymaking, without considering the distinguishing role that SOEs could play in the practical implementation.

⁴² In its case study on Italy’s NSI, Malerba (1993) highlights some of the largest and most technologically advanced SOEs, operating in the ‘R&D Core’ of Italian industry. However, the author does not delineate a specific analysis on them.

3.3. The missing role of SOEs in evolutionary theories of innovation

Evolutionary economic theories on innovation have eluded the issue of SOEs in their accounts of the firm as a place of learning and in their conceptualisation of National Systems of Innovation. Such analytical gaps are particularly remarkable, given that those theories were developed throughout the 1970s and the 1980s, a period which saw the peak and the initial decline of SOEs in the Western world.

Consequently, economic literature lacks a Schumpeterian-evolutionary understanding of SOEs, where these are conceived as learning organisations with dynamic capabilities constituting distinct elements of the national system of innovation, with a potential policy instrumentality as ‘bridging institutions’ (Freeman, 1997) between the enterprise sector and national public policies.

4. A retrospective on the concept of entrepreneurship in economics

“The state in its public capacity shrank from such an undertaking”⁴³

Tacitus, *Histories*, Book IV

Entrepreneurship has been the subject of a flourishing production of textbooks (Westhead & Wright, 2013; Hisrich et al., 2016), several academic journals⁴⁴ and a wide range of quantitative indicators intended to capture it (OECD, 2017b). Sometimes, the substantive ‘entrepreneurship’ is mutated into the adjective ‘entrepreneurial’ and then associated to institutions other than industrial enterprises, such as ‘entrepreneurial society’ (Gavron, 1998; Audretsch, 2007) or ‘entrepreneurial state’ (Mazzucato, 2013).

The English word ‘entrepreneurship’ originates from the term ‘entrepreneur’, a loanword from the French language. In its 1573 *Dictionnaire français-latin* Jean Nicot translated the word ‘*entreprise*’ (i.e. enterprise) with the Latin ‘*inceptum*’, which itself is the past participle of the verb ‘*inceptare*’, meaning ‘to begin’. In their gargantuan

⁴³ Author’s translation from Latin.

⁴⁴ Among them: *The Journal of Entrepreneurship*, *The Journal of Entrepreneurship, Management and Innovation*, *The Journal of Entrepreneurship, Business and Economics*, *The International Journal of Entrepreneurship and Innovation*.

Encyclopédie, the two distinguished scholars of the French Enlightenment, Diderot & D’Alambert (1755), defined the ‘entrepreneur’ as follows:

*ENTREPRENEUR, It is generally said about someone who assumes a work upon himself: we refer to an entrepreneur in manufacturing products, an entrepreneur in buildings, as a manufacturer, a mason*⁴⁵.

The entrepreneur makes its first appearance in economic theory with the French physiocrat Richard Cantillon. In his *Essai sur la nature du commerce en général* (1755), Cantillon argued that the nation’s exchange and commercial activities could only be conducted through the mediation of the entrepreneurs, who bore all the uncertainty associated with the constraints of markets and the volatility of prices (p. 18):

The circulation and exchange of food commodities and manufactured goods, as well as their production, is conducted in Europe through entrepreneurs, and under uncertainty.⁴⁶

On those premises, the French classical economist Jean-Baptiste Say placed the entrepreneur at the centre of his economic theory. In his *Traité d’économie politique* (1803, pp. 49-50) Say introduced a fundamental distinction between the entrepreneur and the capitalist, arguing that the industrial process involved three distinct operations, normally pertaining to different persons. The realisation of a manufactured product required: the preliminary knowledge of the scientist (*savant*) who studied the “law of nature” and captures its secrets; a risk-taker who applies that knowledge engaging in a useful productive activity (*entrepreneur d’industrie*); and the manual worker (*ouvrier*) who physically gave shape to the product, following the instructions of the first two. Say’s entrepreneur was not a social class defined on sociological characteristics, but a very personified economic agent with a specific function in the productive system. Thus, although the two figures often coincided, the entrepreneur did not necessarily need to be a capitalist. The latter was defined as (*ibid.*, p. 363):

⁴⁵ Author’s translation from original French: “*ENTREPRENEUR, il se dit en général de celui qui se charge d’un ouvrage: on dit un entrepreneur de manufactures, un entrepreneur de bâtimens, pour un manufacturier, un maçon*”.

⁴⁶ Author’s translation from original French: “*La circulation et le troc des denrées et des marchandises, de même que leur production, se conduisent en Europe par des entrepreneurs, et au hazard*”.

CAPITALIST. Someone who owns capital and extracts a profit for himself when it is made valuable, or an interest when it is lent to an industrial entrepreneur, who uses it and makes it valuable and profitable.⁴⁷

As such, Say's capitalist seemed more akin to the modern equity investor. This contrasted with the 'productive' figure of the industrial entrepreneur, someone who was engaged in the creation of new products with the acquired knowledge and the necessary capital, bearing the risks and enjoying the gains associated with it (*ibid.*, p. 370):

INDUSTRIAL ENTREPRENEURS. They contribute to the production applying the acquired knowledge, the service of capital and of natural elements, to the realisation of products which humankind deems valuable [...] Sometimes they are both capitalists and entrepreneurs. The difficulty in the entrepreneur's task is to create products whose value is equal or higher than their production costs.⁴⁸

Decades later, with the marginalist revolution in economics undergoing, the entrepreneur was still considered to be a defining feature of the capitalist firm, within the tradition of the French political economy.

Léon Walras, an ancestor of modern neoclassical economics, wrote in his *Éléments d'économie politique pure, ou théorie de la richesse sociale* (1873) that the entrepreneur should be considered as a fourth character, distinct from the landowner (*propriétaire foncier*), the worker (*travailleur*) and the capitalist (*capitaliste*), who strictly owned the capital⁴⁹. As in the case of Say, be it agricultural, commercial or industrial, Walras's entrepreneur was a character (*personnage*) – an individual or even the whole enterprise (*société*) – who combined and organised different activities, with the objective of obtaining a profit, selling goods for higher or equal prices than their costs (*ibid.*, p. 233). Walras also complained that such scientific distinction between the mere ownership of capital and the effective entrepreneurial activity was largely neglected by

⁴⁷ Author's translation from original French: "CAPITALISTE. Est celui qui possède un capital et qui en retire un profit quand il le fait valoir par lui-même, ou un intérêt quand il le prête à un entrepreneur d'industrie qui le fait valoir, et dès-lors en consomme le service et en retire les profits."

⁴⁸ Author's translation from original French: "ENTREPRENEURS D'INDUSTRIE. Ils concourent à la production en appliquant les connaissances acquises, le service des capitaux et celui des agents naturels, à la confection des produits auxquels les hommes attachent une valeur. [...] ils sont alors à la fois capitalistes et entrepreneurs. Ce qui fait la difficulté de la tâche de l'entrepreneur, c'est de créer des produits qui valent autant ou plus que leurs frais de production."

⁴⁹ Although the expression used by Walras (1873, p. 228) is "capitaliste, le détenteur des capitaux proprement dits", with "capital" typed in plural. Thus, its proper meaning is closer to 'financial assets' (e.g. equity shares, financial resources, etc.). This is also typical of Say, suggesting that in most cases, both authors considered the capitalist function as being similar to that of a financier.

English-speaking economists⁵⁰. The problem was partly one of linguistic nature⁵¹, as the term ‘entrepreneur’ could only partially be translated with the corresponding word ‘undertaker’, which would assume different connotations: ‘master’ in manufacturing, ‘farmer’ in agriculture and ‘merchant’ in commerce.

In the English-speaking tradition, Frank Knight (1921, p. 232) was perhaps the first notable economist to investigate the concept of entrepreneurship in a modern sense. Knight associated entrepreneurship with the uncertainty of production due to the impossibility of universal foreknowledge:

It is this *true uncertainty* which by preventing the theoretically perfect outworking of the tendencies of competition gives the characteristic form of ‘enterprise’ to economic organization as a whole and accounts for the peculiar income of the entrepreneur.

Despite recognising the separation between ownership and entrepreneurship, Knight’s entrepreneur remained mostly a concern of individuals with the adequate personal attitudes to face the uncertainty of production and competition in the market.

This was in line with the characterisation that Schumpeter gave earlier⁵² to the “entrepreneurial function” in *Theory of Economic Development* (1934, p. 75), where he maintained the distinction between capitalists and entrepreneurs:

A shareholder *may* be an entrepreneur. He may even owe to his holding a controlling interest the power to act as an entrepreneur. Shareholders *per se*, however, are never entrepreneurs, but merely capitalists, who in consideration of their submitting to certain risks participate in profits.

Schumpeter defined the capitalist as a financier that enables the financing of “the new combination” of production (*ibid.*, p. 69):

To provide credit is clearly the function of that category of individuals which we call “capitalists”.

Instead, the entrepreneur was identified as the physical person that incorporated the function of “innovator” (*ibid.*, p. 74):

⁵⁰ Walras further noticed (1873, p. 228) the confusion that some French economists made by reducing the entrepreneur to a simple employee specialised in managing the firm.

⁵¹ Still in 1803, the French liberal economist Jean-Baptiste Say was wittingly remarking that the English language had no word for defining the *entrepreneur d’industrie* [industrial entrepreneur], while Italian had four different words for it: *imprenditore*, *impresario*, *intraprenditore*, *intraprensore*.

⁵² The original German version of *The Theory of Economic Development* was published in 1911.

The “new combination of means of production” [...] may be described as the fundamental phenomenon of economic development. The carrying out of new combinations we call “enterprise”; the individuals whose function it is to carry them out we call “entrepreneurs.”

Here Schumpeter already suggested that private ownership and monetary compensation might not constitute essential prerequisites for innovation, while the entrepreneurial function could be preserved even under other forms of industrial organisation (*ibid.*, p. 94):

Only with the first groups of motives is private property as the result of entrepreneurial activity an essential factor in making it operative. With the other two it is not. Pecuniary gain is indeed a very accurate expression of success, especially of *relative* success, and from the standpoint of the man who strives for it, it has the additional advantage of being an objective fact and largely independent of the opinion of others. [...] Nevertheless it is true that the second and third groups of entrepreneurial motives may in principle be taken care of by other social arrangements not involving private gain from economic innovation. What other stimuli could be provided, and how they could be made to work as well as the “capitalistic” ones do, are questions which are beyond our theme.

Schumpeter’s perplexity over private ownership as a prerequisite for innovation and entrepreneurship was further reinforced in *Capitalism, Socialism and Democracy* (1942), where he argued that with the growth of large and complex corporations the entrepreneurial function had become obsolescent and depersonalised, as innovation was reduced to a routine operation in specialised research laboratories of large corporations.

He pointed for instance to the production of electric power (*ibid.*, p. 229), where “the perceptible slackening of entrepreneurial effort” had required “state leadership and state control”. Likewise with the “socialization of the iron and steel industry” (*ibid.*, p. 231), which he thought could:

be ‘administered’ henceforth – the administration including, of course, a huge research department. Some gains would result from coordination. And there is hardly much danger of losing the fruits of any entrepreneurial impulses.

This echoed the argument put forward by Berle & Means (1932) in *The Modern Corporation and Private Property*, where they suggested that the modern “quasi-public

corporation” had made an essential element of its governance the separation between ownership and control⁵³ (*ibid.*, p. 9):

The explosion of the atom of property destroys the basis of the old assumption that the quest for profits will spur the owner of industrial property to its effective use. It consequently challenges the fundamental economic principle of individual initiative in industrial enterprise.

The ‘depersonalisation’ of routine and search operations within large corporations through the establishment of a technostructure and the practice of industrial planning within firms would be further stressed by Galbraith in *The New Industrial State* (1967). Similarly, Penrose (1959) and Chandler (1977), remarked that all the entrepreneurial features of the modern ‘managerial corporation’ were essentially governed through a complex administrative structure, populated with professional managers.

4.1. The missing public entrepreneurship perspective on SOEs

The concept of entrepreneurship is central in understanding the dynamics of modern capitalism. French classical economists introduced a separation of roles between the entrepreneur and the capitalist, Schumpeter developed it further to illustrate the peculiarity of the ‘entrepreneurial function’ in the process of capitalist development and its subsequent ‘obsolescence’.

Two important implications arise from this. First, private ownership of a business undertaking would not constitute an essential prerequisite for entrepreneurship. Second, the depersonalisation of the entrepreneurial function into routines performed by specialised structures, shifts the attention away from the individual person to the organisation and its collective capabilities.

Under these perspectives, the analytical category of entrepreneurship would be far from incompatible with the conceptualisation of SOEs. However, very limited systematic attempts have been made to reconcile the concept of entrepreneurship and SOEs into a separate and standing theory of ‘public entrepreneurship’.

⁵³ Fama & Jensen (1983) have also addressed this distinguishable element of modern corporations, under the theoretical framework of agency theory.

Incidentally, one of the first mentions of the public entrepreneurship concept was based on a case study of a public utility (Ostrom, 1965). At the beginning of her PhD thesis, the author argued (*ibid.*, p. xvi):

The traditional literature of political science and economics has given little consideration to the strategy used by individuals in organizing public enterprises to provide public goods and services. Economists have long been concerned with entrepreneurship, but have largely confined their analysis of entrepreneurship to the private market economy. Political scientists most often take a Governmental agency as given and rarely investigate the problems of undertaking new public enterprises.

Thereafter, the concept of public entrepreneurship has been extended to the public sector as a whole (Lewis, 1980), where ‘governmental enterprises’ might be included as one of many forms of public organisations (Klein et al., 2010). Nevertheless, Ostrom’s original approach to public entrepreneurship seemed to be limited to the efficient provision of public goods and services.

What appears to be missing is a distinctive theory of public entrepreneurship in industrial SOEs, one which considers the ‘state as a producer’ (Sekera, 2020), accounting for the specific features that characterise SOEs, as distinct from other public sector organisations.

This perspective on SOEs would further qualify the entrepreneurial conceptualisation of the state (Mazzucato, 2013; 2016a; Block and Keller, 2015), which has only marginally focused on the organisational form of the state-owned company. For instance, Mazzucato & Penna (2016) have analysed the market-creating role of state investment banks under a Polanyian framework (Polanyi, 1944).

SOEs might also assume the role of a “demiurge”, in line with the definition provided by Evans (1995, p. 79):

The role of demiurge takes the role of producer further. When the state decides to play demiurge, it becomes involved in directly productive activities, not only in ways that complement private investments but also in ways that replace or compete with private producers. The label, which equates the state with a mythological creator of material things, is meant to capture the extraordinary faith in the state’s productive capacity that is implied by replacing rather than complementing private capital.

This might happen if SOEs are found to contribute to the production and diffusion of technological knowledge and organisational innovation within the economic system, operating as market-creating organisations (Mazzucato, 2016b).

5. Towards a public entrepreneurship conceptualisation of SOSOEs

This chapter has outlined a selective review of the most relevant socio-economic literature on SOEs and on Schumpeterian-evolutionary theories of innovation. It has also presented a historical retrospective of the concept of entrepreneurship. The purpose of these reviews was to highlight existing voids in the literature and to combine useful analytical intuitions into a new theoretical framework for studying SOSOEs.

The economic literature on SOEs has widely analysed the theoretical justifications and policy functions of SOEs, but it has neglected the increasingly relevant configuration of state ownership into SOSOEs. As such, there is no established theory that looks at the interdependencies and policy opportunities implicit in the coordination of different SOEs within a given economic context.

Schumpeterian-evolutionary theories have analysed how innovation takes place within firms and how knowledge is created and diffused within national systems. Nevertheless, SOEs have largely been overlooked or implicitly assimilated to the ‘firms’ category. At the same time, although the public sector – through its various institutions (e.g. university, public R&D laboratories, government agencies, etc.) – has been studied as a constituting element of NSI, SOEs were never distinctively included, despite their hybrid nature of productive entities and potential policy instruments.

Finally, a theory of public entrepreneurship about SOEs – so far not yet explored – could be justified and developed from Schumpeter’s intuitions on (I) the separation of the capitalist function from the entrepreneurial function and (II) the depersonalisation of entrepreneurship and its embedded nature in collective organisations.

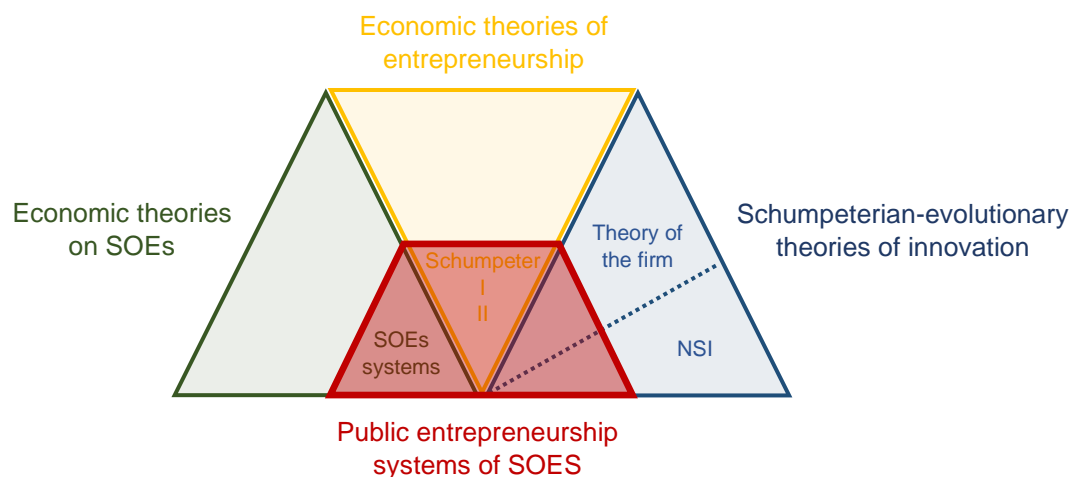


Figure 2.1: Combination of missing and building concepts into a public entrepreneurship theoretical framework for systems of SOEs. *Source:* Author's elaboration.

By addressing the three block of literature mentioned above – 1) economic theories on SOEs, 2) Schumpeterian-evolutionary theories of innovation, 3) economic theories of entrepreneurship – this thesis aims to cover existing analytical gaps and to propose a public entrepreneurship conceptualisation of SOSOEs.

Part I

Chapter 3

Methodological approach

1. General methodology: a hybrid case study analysis

The research questions of this thesis are assessed through a case study research methodology (Yin, 2011; 2014). The subject of this thesis – systems of SOEs – is particularly suited to address three typical motives for a case study analysis: a) understanding how a process works in a real-life setting; b) dissatisfaction with existing analytical approaches and interpretations; c) absence of received theory for an observable phenomenon. The case study developed below is structured as a hybrid combination of standard case study designs.

First, it is a multiple-case comparative study of two cases in the same national context, but in two different time periods: the IRI case presents an embedded design with multiple levels of analysis; the current Italian case has a holistic and single level of analysis. An advantage of multiple cases, particularly fitting for this research, is that they can be structured around the generalisation of a concept for which a variety of theoretical options is assumed to exist.

Second, the IRI case, despite being focused on its organisational and economic elements investigated over a restricted and more homogeneous time period (1948-1992), remains a historical case study with a non-excisable diachronic nature. The case on the current Italian system concentrates on the analysis of the contemporary situation.

Third, the case study is partly exploratory, as its ventures into describing the unfamiliar elements of SOSOEs, yet it remains fundamentally explanatory, focusing on assessing hypotheses and building theory over an unexplored subject (Eisenhardt, 1989; Eisenhardt & Graebner, 2007).

Fourth, the IRI case has been analysed and developed in greater details through different dimensions, as it provides the richest and most critical elements to address the second empirical research question (RQ2).

The two selected cases respond to three criteria highlighted by Pettigrew (1990) on how to sample cases in longitudinal comparative case study research: a) extreme situations; b) polar types; and c) high experience levels of the phenomenon under study. At the same time, the comparability between the two systems is justified by common elements such as the similar size and degree of sectoral diversification, as well as the identical juridical nature of the composing units of the system – i.e. joint-stock state-owned companies. A further level of comparability is represented by the historical legacy of the IRI system on the current Italian one.

Nevertheless, because of the structural and longitudinal differences between the two cases under investigation, and due to the further investigatory role attributed to the IRI case, the methodological approaches pursued for two case studies differ significantly.

2. The methodology of the IRI case

The IRI case study is an attempt to move away from a pure historical reconstruction of its evolution, towards the theorisation of an ‘economics of IRI’, implying the study of its organisational structure and dynamics, as well as its economic function in the national productive system.

A methodological precondition for abstracting from a pure diachronic study of the subject is to define a reasoned periodisation. In this specific case, focusing the analysis over the period 1948-1992 is useful in so far as it increases the homogeneity of IRI’s historical phases – as the pre-war IRI under the Fascist regime or the post-1992 IRI under liquidations were two completely different organisations: the first differed in terms of the political context (dictatorship as opposed to liberal democracy), the second operated under a distinct mandate (privatisation as opposed to a policy-oriented management of the state holding company). At the same time, ending the periodisation with the critical year 1992 enables a better comparability with the current system, as it reduces the historical distance and concerns productive activities with technological proximity.

The case study is an empirical investigation built on a triangulation of multiple sources of evidence. It started with the analysis of available documentation (e.g., published reports and records) and secondary literature on IRI, followed by the realisation of extensive interviews with experts, senior policymakers and former IRI officials. These two sources provided a background knowledge of the topic and guided the more in-depth archival research.

The list of documents is surveyed in Chapter 4, but the richness of content and sources provided by the Saraceno Report (1956) and the Marsan Report⁵⁴ (1992) have been fundamental in shaping the research. The first is the last of a three-volume publication by the Ministry of Industry, covering the establishment of IRI and its development until the year 1954. It contains the most complete collection of figures, economic and industrial facts, legal documents and other useful data on IRI up to that point. These are reliable official figures, as they were released by the Institute's Studies Service, of which Professor Saraceno was Central Director. The Marsan Report remained an unpublished internal document, elaborated by Veniero Ajmone Marsan, who replaced Professor Saraceno as the Central Director of the Studies Service. The Marsan Report is a reappraisal and a continuation of the Saraceno Report, covering the evolution of IRI and its companies until 1982. These two documents have underpinned the research with an unmatched source of official figures and references.

I have conducted ten open-ended interviews, most of which during the fieldwork period in Rome (between October and December 2018). The choice of an open-ended structure was based on two premises. First, they were considered as a way of guiding the research towards further sources and other individuals to interview. Second, the interviewees belonged to different – although overlapping – categories: current and past policymakers involved with IRI or with related aspects of Italy's economic policy; former senior officials of IRI; scholars and experts on issues concerning IRI and its activities. See Table 3.1 for a complete summary of the interviews and details of the individuals interviewed.

⁵⁴ I am indebted to Anna Coen for gifting me with a physical copy of the unpublished report, which belonged to his husband Franco Russolillo (former IRI official).

The interviews on the IRI subject were nonetheless characterised by the pervasiveness of response biases. As the subject referred to distant experiences in the past in which the interviewees were sometimes personally involved, lapses of memory and ideological biases tended to emerge frequently. At the same time, the high status of some interviewees created difficulties in getting them to stick to the questions and to address the points precisely and coherently.

Despite that, the two interviews with Romano Prodi – who held the position of IRI's Chairman from 1982 to 1989 (and in a later phase from 1993 to 1994) – were extremely illuminating on the internal functioning of IRI. Some key passages of these interviews have been reported in the following chapters and in the Appendix.

The other interviews had nonetheless a strong informative function in providing guidance and hints for the prosecution of the archival research, as well as for the theoretical interpretation of the facts.

Date	Names	Category	Positions held	Quoted in the text
28 February 2018, 1 st March 2018, 2 nd March 2018	Massimo Mucchetti	Expert	Economic journalist, MP and Chairman of the Industry Committee at the Italian Senate (2013-2018)	No
10 October 2018	Giorgio La Malfa	Policymaker	Economist, Minister of Budget and Economic Programming (1980-1982)	No
22 October 2018	Franco Russolillo	IRI official	Deputy Central Director of IRI's Institute	No
30 October 2018	Giuseppe Guarino	Policymaker, Expert	Legal scholar, Minister of State Holdings (1992-1993), Member of IRI's Committee of Auditors	No
13 November 2018	Pierluigi Ciocca	Scholar, Policymaker	Economist, Deputy General Director of the Bank of Italy (1995-2006)	No
18 November 2018	Filippo Cavazzuti	Policymaker, Expert	Economist, Undersecretary of the Treasury (1996-1998)	No
19 November 2018	a) Romano Prodi; b) Alessandro Ovi; c) Giuseppe Paratore	a) Policymaker, IRI official, expert; b) IRI official; c) IRI official	a) Economist, Chairman of IRI (1982-1989; 1993-1994), Prime Minister of Italy (1996-1998; 2006-2008) b) Central Director of IRI's Institute c) IRI's senior official	Yes
9 May 2019	a) Fabiano Fabiani; b) Angelo Airaghi	a) IRI official; b) IRI official	a) Central Director of IRI's Institute, CEO of IRI's companies b) Senior Executive in IRI's companies	No
11 September 2019	Romano Prodi	Policymaker, IRI official, expert;	Economist, Chairman of IRI (1982-1989; 1993-1994), Prime Minister of Italy (1996-1998; 2006-2008)	Yes
7 February 2020	Domenico De Masi	IRI official, expert;	Sociologist, Senior executive and consultant of IRI's companies	Yes

Table 3.1: List of interviewees for the IRI case study.

Archival records have represented the richest and most original source of data collection. The great bulk of the research has been conducted at the Central State Archives in Rome, where IRI’s entire archival collection is deposited. Other two key archives – Svimez and Istat – were consulted for the research on the IRI part. Svimez is a renowned think tank for the promotion of the industrialisation of the South of Italy, founded by IRI’s senior officials in 1946, which disposes of the most complete list of publications and statistics on Italy’s regional socio-economic development. Istat is the Italian Office of National Statistics, whose central office in Rome is the repository of national statistical reports – especially on industry figures – available only in printed copy at its library.

The archival research was conducted intensively over the fieldwork period (October-December 2018), and on different occasions over 2019, late 2021 and early 2022. At the Central State Archives, I have primarily analysed annual reports and four-year plans of IRI and its subsidiaries, as well as internal documents of the IRI companies and of the Institute’s offices.

This was instrumental in gathering qualitative data about the internal organisation of IRI (Chapter 4), the external public missions of IRI (Chapter 6) and its specific industrial sub-cases (Chapter 7). References to specific archival documents have been mentioned in footnotes, when explicit.

Variables	Used for
Revenues	Chapter 5
Exports	Chapter 5
Value added	Chapter 5
Employment	Chapter 5; Chapter 6
Investments	Chapter 5
Assets	Chapter 5
Stock market	Chapter 5
R&D personnel	Chapter 6
R&D expenditure	Chapter 6
Patents	Chapter 6
Endowment fund	Chapter 5
Mezzogiorno	Chapter 6
Sources of IRI’s financing	Chapter 5
Destination of IRI’s financing	Chapter 5
Financial figures	Chapter 5
Sectoral composition	Chapter 5
National market shares	Chapter 5

Table 3.2: Main variables of the IRI Database.

However, the most original outcome of the archival research was the creation of the most complete database on IRI ever compiled. It contains quantitative time series on IRI's main variables, matched with corresponding national figures – from available online database and from the research conducted at Svimez and Istat – to obtain national shares and other key ratios. The complete list of the sources for each macro-variable and other details on the figures are reported in a dedicated section of the Appendix (Boxes A3.1 to A3.17). The 'IRI Database' underpins the entire IRI case study, providing essential empirical evidence for Chapter 5 and Chapter 6 (Table 3.2). Quantitative analyses of data from the IRI Database have been limited to descriptive statistics, which was considered better suited to address the broad research aim of the case study. The completeness of the database nonetheless could allow further statistical investigations on more specific questions.

3. Methodology on Italy's current SOSOEs

The case study on the current system of SOEs – developed in Chapter 8 – takes the year 2018 as the reference point. This is because the empirical research was initiated in 2019, when only 2018 official figures from the companies' annual reports and other statistical sources were available.

The sources of evidence for this case study have been official documentation and semi-structured interviews. The case study has been built following a mixed methods approach of quantitative and qualitative data analysis – where the quantitative part was limited to data collection and descriptive statistical elaboration.

Official corporate documents – annual reports, presentations, multiannual industrial plans, etc. – have been instrumental in two ways. First, they provided the necessary background knowledge for understanding key dimensions and characteristics of the single SOEs (especially in preparation for the interviews with their managers). Second, by extrapolating the essential financial and economic figures from the mentioned documentation, it was possible to compile a cross-sectional database of the top 20 Italian SOEs ranked by revenues.

This database, despite being limited to the year 2018, is the most complete collection of financial and economic data on the current system of Italian SOEs, as it reports

figures on: revenues, net profits, dividends, fixed investments, research and development expenditures, employees, market capitalisation. The way in which the database was compiled offers the possibility for future yearly replications.

The most original part of this research comes from the qualitative evidence collected through semi-structured interviews with the top managers of the SOEs. Between October 2019 and April 2020, I have conducted 12 interviews with the top managers – mostly CEOs and Chairpersons – of 10 different SOEs and one with a group of executives from the state-owned investment bank CDP (see Table 3.3 for a summary). No previous study has ever been carried out interviewing such a broad range of top SOEs executives in the same national context. In this case, the sample can be considered extremely representative: the 10 SOEs covered with the interviews represent 8 out of the largest 10 by revenues.

The interviews were conceived, organised and carried out with a research group of distinguished economic and legal scholars⁵⁵, resulting in the publication of a policy report⁵⁶.

The semi-structured nature of the interviews was chosen to preserve comparability among organisations differing in terms of size, industry and shareholding structure. At the same time, it allowed a substantial degree of freedom for delving into certain topics when the single interviewee displayed a particular knowledge or willingness to explore them further.

The interviewees agreed to answer to the following set of questions under Chatham House Rule:

1. What is the mission of your company? Who decides it and how?
2. What are your relations – formal and informal – with the public shareholder and with the other sectoral Ministries?

⁵⁵ The research group was composed by Fabrizio Barca, Giovanni Dosi, Simone Gasperin, Federico Maria Mucciarelli, Edoardo Reviglio, Andrea Roventini, Francesco Vella, Edoardo Zanchini.

⁵⁶ The policy report, titled '*Missioni strategiche per le imprese pubbliche italiane*' (Strategic Missions for Italian Public Enterprises), was published by the think tank *Forum Disuguaglianze Diversità*. The report was presented on 1st July 2020, with the Minister of Economy and Finance and other industry leaders as official discussants.

3. What distinguishes your SOE from a hypothetical privately-owned company operating in the same industry?
4. How is the SOE's relationship with private-sector competitors and suppliers?
5. Are there any interactions with other SOEs on joint industrial initiatives? If so, what kind of?
6. What, if any, impact do government policies have on your managerial conduct?
7. What are the weak and strong elements in preserving the management's autonomy?
8. What is the time horizon within which you operate?
9. How would you conceive a policy coordination from the public shareholder aimed at satisfying objectives of general interest?

Date	SOEs	Sector	Role of interviewees
16 October 2019	Leonardo	Aerospace, electronics and defence	Chief Executive Officer
24 October 2019	GSE	Energy efficiency	Chief Executive Officer and Management Team
6 November 2019	Saipem	Engineering for energy systems	Chairman
21 November 2019	Fincantieri	Shipbuilding	Chairman and Senior Advisor to the President
16 January 2020	Saipem	Engineering for energy systems	Chief Executive Officer
6 February 2020	Snam	Natural gas and hydrogen systems and networks	Chief Executive Officer and Management Team
18 February 2020	Enel	Electric energy production and distribution	Chief Executive Officer and Management Team
24 February 2020	Ferrovie dello Stato	Railway network and transport services	Central Director of the Strategy, Planning, Innovation and Sustainability Division
10 March 2020	PagoPA	Digital payments and services	Chief Executive Officer
20 March 2020	CDP	Financial services	Management Team
7 April 2020	Terna	Electric energy transmission	Chief Executive Officer
9 April 2020	Poste Italiane	Postal and insurance services	Chief Executive Officer

Table 3.3: List of interviews for the case study on the current Italian SOSOEs.

The similar social position of the interviewees, the specificity of the questions, the highly-recognised status of the research group and the adoption of Chatham House Rule have helped to reduce the interviews' response bias to a minimum, creating a heterogeneous but highly comparable set of answers. A cross-comparison of the content of the interviews have enabled the emergence of recurring analytical elements, which are discussed in Chapter 8 and reported as quotes when relevant.

4. Concluding remarks on methodology

The multi-layered and two-fold nature of this research has implied the choice of a hybrid methodological strategy that could better capture the complexity and heterogeneity of the subject.

The adoption of a multiple case study methodology – with the flexibility implied by its nature and the possibility of assessing different sources of evidence and analysing both quantitative and qualitative data – has facilitated a more comprehensive assessment of the empirical question (RQ2), while providing elements for the addressing the theoretical one (RQ1).

Part II

Chapter 4

The IRI system of state-owned enterprises

1. A preliminary periodisation for the analysis and its temporal focus

In the past there have been several attempts to analyse IRI's peculiar model and role in the Italian economy. The 'IRI formula' attracted a lot of interest from foreign scholars who sought to objectively understand the function of IRI in the context of Italy's extraordinary economic development (Lutz, 1962; Posner and Woolf, 1967). Shonfield (1965) assimilated the Italian state holding system to the planning processes that characterised 'modern capitalism' in Western Europe. Holland (1972) went even further, providing a characterisation of IRI as 'The State as Entrepreneur' and seeking to translate the IRI model in the UK context⁵⁷. In a later period, a comprehensive assessment of IRI – in relation to other state holding companies – was provided by Kumar (1993).

Economic analyses and debates on IRI in the Italian context were instead mostly performed by IRI-affiliated economists, with only some notable exceptions (Rossi, 1953; Archibugi & Lombardini, 1963; Colitti, 1972). Professor Saraceno (1956; 1975a) and Marsan (1992) – both high-ranking officials of IRI – provided the most appraised and quoted economic accounts of IRI. The seminal 'Saraceno Report' on IRI was even sponsored by then President of the Republic, the notable liberal economist Luigi Einaudi⁵⁸, as a necessary condition for a reform of its statute (Einaudi, 1954). The legal and institutional functioning of IRI was also studied by distinguished law scholars (Guarino, 1963, 1974; Cassese, 1962; Cassese et al., 1972).

⁵⁷ Holland's work on IRI represented the intellectual the intellectual basis for the establishment of the UK National Enterprise Board (NEB) in 1975.

⁵⁸ Professor Luigi Einaudi welcomed the institution of IRI in 1933 on the pages of *The Economist* (1933), writing as foreign correspondent on Italy.

Since its privatisation and liquidation, historical accounts on IRI and its companies⁵⁹ have flourished. In particular, it is worth mentioning the gargantuan six-volume ‘History of IRI’ by the Italian publisher Laterza (Castronovo, 2012; Amatori, 2013; Silva, 2013; Artoni, 2014; Russolillo, 2015; Ciocca, 2015).

The prevailing economic history literature on IRI conforms to a historical interpretation of its trajectory defined in terms of a parabola (Bianchi, 1987; Osti, 1993; Barca & Trento, 1997; Pini, 2000; Troilo, 2008; Amatori & Toninelli, 2013; Amatori et al. 2013; Ciocca, 2015; Amatori, 2020). These authors tend to highlight the existence of a golden era that approximately corresponded to the years of post-war reconstruction (1948-1953) and of the so-called ‘economic miracle’ (1954-1962), gradually degenerating into inefficiencies and political capture in the 1970s and 1980s, which inevitably led to the unavoidable reform and liquidation of IRI. Amatori (2000; 2020) provides the most compelling narrative: IRI operated at its best until when it was ‘isolated’ from political intrusions and its companies were ‘in the right hands’, while the introduction of policy mandates throughout the 1960s and 1970s degenerated IRI into inefficiencies and waste – thus providing justifications for its dismantling.

This interpretation – with related periodisation – does not appear satisfactory in light of the countervailing evidence that will be exposed in the next chapters. The simplistic ‘parabola narrative’, while placing an excessive emphasis on the relations with the political system and a misleading focus on IRI’s overall financial performance⁶⁰, fundamentally ignores the technological-industrial evolution of the IRI Group and the external impact of IRI’s operations on the national economic structure. The limitation of the conventional interpretation on IRI’s history derives from the lack of holistic ‘economic’ analyses that combines a comprehensive collection of quantitative figures with the reconstruction of IRI’s most relevant industrial operations.

⁵⁹ IRI’s individual key subsidiaries have been the subject to a series of comprehensive business history studies: Bottiglieri (1987) on STET, Galisi (2011) on Fincantieri, Zamagni (2009) on Finmeccanica, Castronovo (2003) on Ansaldo, De Blasi & Gnesutta (2009) on Alitalia, Giovannelli (2018) on Italtat and Italmobiliari.

⁶⁰ IRI’s proclaimed insolvent status in the early 1990s has proven to be factually incorrect (Mucchetti, 2014). Chapter 5 illustrates how IRI’s negative financial performance in the decade 1975-1985 was mostly dependent on external factors, namely the 1973 oil shock and the global steelmaking crisis.

This chapter and the following ones (Chapters 5, 6, 7) aim to outline an analysis of 'economics of IRI', with reference to its most relevant period 1948-1992. An alternative periodisation is suggested (Table A4.1), based on different legal and political configurations:

- A first period, going from IRI's foundation in 1933 until 1940, when Italy entered World War II. Within this period, it is useful to distinguish between two phases. The first (1933-1936), when IRI was created mainly to restructure the three largest national banks and to return the industrial assets they owned to the private sector. The second (1937-1939), when IRI was turned into a permanent state holding entity with a clear industrial policy mandate inscribed in its new 1937 Statute. Gasperin (2022) discusses IRI's industrial operations in the 1930s.
- A second period, covering the war years (1940-1945), when most of IRI's engineering companies were converted to military productions. From 1943 until the end of World War II, IRI was split into an 'IRI South' based in Rome, under the control of the Allied forces, and an 'IRI North' based in Milan and controlled by the occupying Fascist authorities.
- A third transitory period from 1946 until 1948, when its continued existence in the new democratic regime was debated, until the Constitutional Assembly resolved to preserve it. In 1948, IRI was given a new Statute, which lasted for more than four decades, with only some minor modifications.
- The fourth period, from 1948 until 1992, during which IRI affirmed its role under the new democratic regime. Despite the evolution of its governance and structure, this long phase was characterised by the continuity of its policy function throughout the decades.
- The fifth and final period began in 1992, when IRI was transformed into a joint-stock company 100% owned by the Treasury. In the following years, its companies were either privately sold or listed on the stock exchange. In 1999, IRI was put under liquidation (in 2002) and shares of the remaining controlled companies were transferred to the Treasury.

The first period had its own peculiar dynamics in the context of the Fascist regime. During the transitory second and third periods IRI was essentially conditioned by the external events, so that it did not have agency of its own. Likewise in the fifth period, coinciding with the privatisation phase, whose specific focus is beyond the purpose of this analysis.

This study concentrates on the 1948-1992 period, due to the coincidence of some factors: post-war stability of the democratic regime; acceptance by the broad political spectrum of IRI's existence and its normalisation in the economic life of the Country; IRI's self-awareness as an industrial group rather than a simple financial holding; lastly, the availability of figures and documents on IRI and its companies.

This chapter explains the structure and internal organisation of the IRI system of SOEs in its multilevel and multisectoral configuration. Each shareholding level – the operating companies, the sectoral subsidiaries, and the public law entity at the apex – is analysed in sections 3, 4 and 5 separately.

2. The multilevel structure of IRI as the analytical focus

In the period under investigation (1948-1992), IRI could be defined as a *diversified and integrated state holding industrial group*. It was an 'industrial group', not merely a financial holding, because the relations between its internal shareholding levels were assimilable to a business organisation. It was 'diversified' because IRI was involved in a broad range of sectoral economic activities. It was 'integrated' because the interactions between the three main shareholding levels and the sectoral activities were structured and constant. Finally, it was a 'state holding' organisation due to the public law nature of the controlling shareholding entity.

The analytical approach adopted in this chapter – which facilitates the unfolding of IRI's heterogenous and polycentric constitution – is to dissect and investigate IRI's three-tier shareholding structure.

The IRI Group was composed by:

- a) **Operating companies** – in a later phase (1983), some among the largest (e.g. Ansaldo, Selenia-Elsag, Aeritalia, Italtel, etc.) were reorganised under 'groupings' or clusters, themselves controlling lower-level operating companies.

- b) An intermediate shareholding level represented by **sectoral financial holdings** or **sector leader companies**, composed by – and controlling – sectoral clusters of operating companies.
- c) The **parent company**, a public law entity at the apex of the shareholding hierarchy.

Outside of this scheme, a variety of solutions was allowed, such as direct ownership relations between the parent company and operating companies, inter-sectoral shareholding networks, or the joint ownership of companies with third-party shareholders. Nevertheless, IRI's shareholding structure was fundamentally based on the three above-mentioned levels, as illustrated by Figure 41 in a stylised graphical form.

In what follows, the term 'Group' will be used to indicate the state holding company in its entirety, while the public law entity at its apex will be referred to as the 'Institute'⁶¹. The term 'IRI', as customary in the existing literature as well as in IRI's official documents, could apply to both the Group and the Institute, depending on the context.

⁶¹ Corresponding to the translation from the Italian '*Istituto*' in IRI's extended name '*Istituto per la Ricostruzione Industriale*' (Institute for the Industrial Reconstruction).

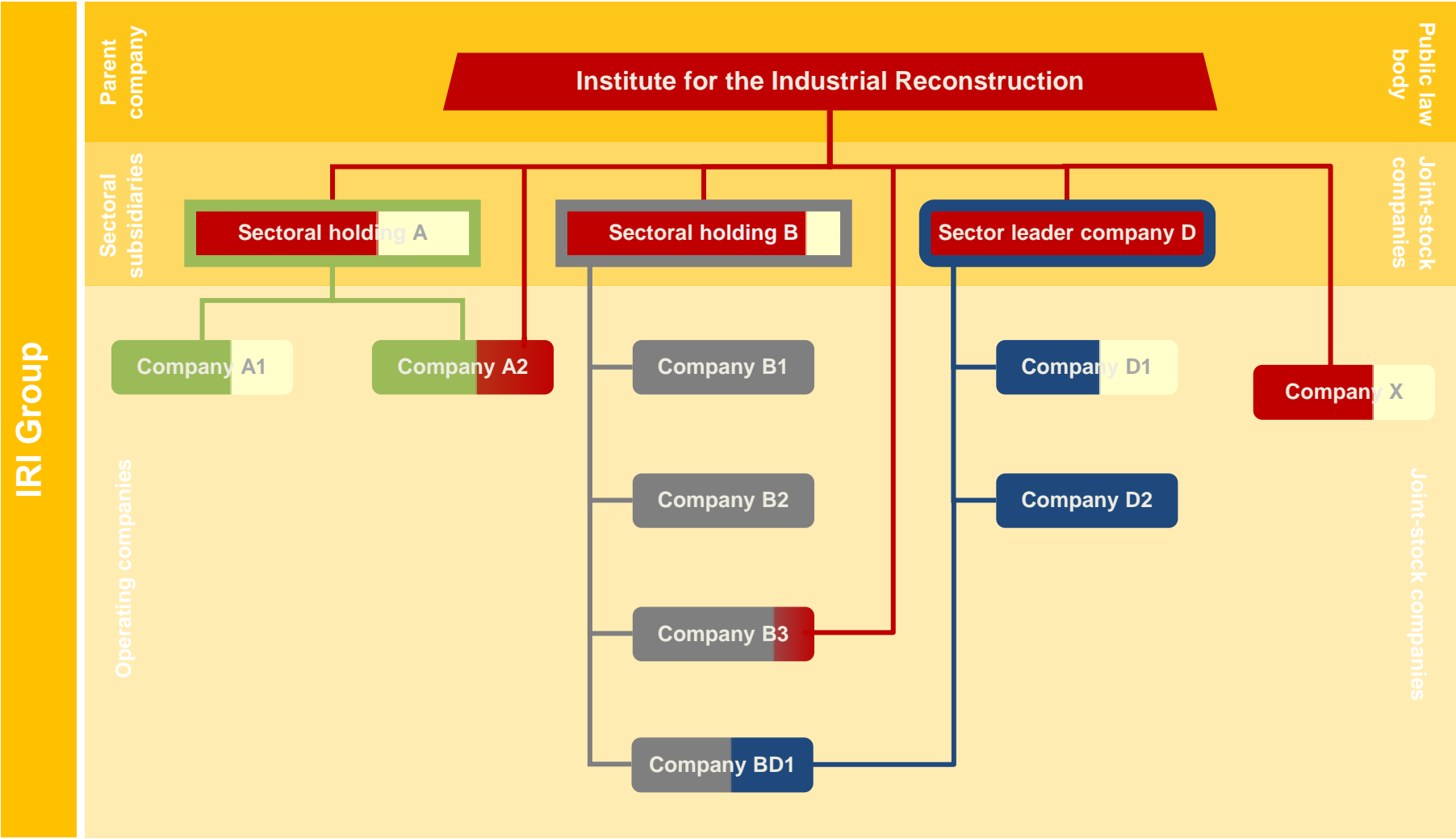


Figure 4.1: Stylised graphical representation of IRI's multilevel shareholding structure. Source: Author's elaboration.

3. The operating companies

The cellular components of IRI were the operating companies⁶², directly controlled by either the parent company, or by sectoral subsidiaries, often jointly with mixed shareholding arrangements. Their number varied significantly across IRI's existence, due to the combination of acquisitions and divestments or to the establishment of new IRI-owned enterprises. At the peak of its expansion in 1982, the IRI Group counted more than 600 operating companies.

These IRI-owned companies were formally incorporated into private commercial law as other joint-stock companies, with the only difference that their ownership prerogatives were ultimately exercised by the Institute – a public law entity (Guarino, 1974, p. 254).

IRI's industrial companies did not enjoy fiscal favours or other explicit preferential treatments – e.g. public procurement preferences, subsidised inputs, special concessions, and others – on the basis of them being controlled by a state entity. In the case of companies operating in regulated sectors – for instance in maritime transport, telephones, motorways – a regulated regime of ministerial controls and directives applied, although purely on the basis of their concessionaire status. The same legal discipline would have applied had those companies been entirely privately-owned.

The only major formal distinction from similar private counterparts, was their incorporation under a separate business association called 'Intersind', taking place from 1960⁶³. This implied separate but often pioneering approaches to industrial relations and collective bargaining with respect to the rest of the private business sector (Ricciardi, 2013; Sapelli, 1996).

⁶² IRI's banks are deliberately left out in this analysis, for a series of reasons. First of all, they were neither integrated with the business activities of the industrial companies, nor they displayed any preferential treatment for IRI's companies (Conte and Piluso, 2013). Second, following the Banking Act of 1936 (Royal Decree n. 375, 12 March 1936), Italy's banking system was regulated by rigid norms on the specialisation of credit that limited the autonomy of the so-called 'credit institutes', precluding commercial banks from engaging in investment banking activities.

⁶³ The 'unhooking' of IRI's companies from the business employer's federation Confindustria happened in 1956, pursuant to article 3 of Law n. 1589 (22 December 1956), applying to all companies controlled by national public law entities.

3.1. The ranking and size of IRI's companies

IRI-owned companies ranked among the largest industrial enterprises in Italy, constituting key pillars of the national economic structure. Table A4.2 lists IRI's largest SOEs ranking among the largest 500 Italian companies⁶⁴ in terms of total revenues (with reference to the year 1991⁶⁵). As reported in Table 4.1, IRI accounted for 54 of the top 500 companies (10.8% of the total), although the concentration of IRI companies was higher in the first positions (IRI controlled 10 of the 50 largest national companies ranked by revenues).

	IRI-owned companies by revenues (1991)		IRI-owned companies by value added (1991)	
	Number	Share	Number	Share
Top 10	2	20.0%	6	60.0%
Top 50	10	20.0%	14	28.0%
Top 100	14	14.0%	23	23.0%
Top 250	36	14.4%	37	14.8%
Top 500	54	10.8%	53	10.6%

	IRI-owned companies by revenues (1981)		IRI-owned companies by revenues (1971)	
	Number	Share	Number	Share
Top 10	2	20.0%	3	30.0%
Top 50	12	24.0%	12	24.0%
Top 100	20	20.0%	18	18.0%
Top 250	44	17.6%	32	12.8%

Table 4.1: Number and share of IRI-owned companies among Italy's largest companies ranked in revenues terms for the years 1971, 1981 and 1991, and in value added terms for the year 1991. *Source:* Author's elaboration from Mediobanca (1992; 1982; 1972).

The presence of IRI-owned companies in top positions persisted through time, as confirmed by the revenues rankings compiled for the years 1981 and 1971 (Table 4.1).

In the 1991 list of companies ranked by value added, the pattern of concentration of IRI-owned companies in the top subgroups appeared even more pronounced: their share of the top 100 and top 50 subgroups was 23% and 28% respectively. Even more

⁶⁴ The list is based on an annual survey of Italy's largest industrial companies, compiled by the bank Mediobanca from 1966 onwards. Mediobanca's ranking of 'the 1898 main Italian companies' includes industrial units at a comparable level of aggregation, corresponding to a homogeneous area of activity. For instance, the FIAT Group appeared in this list with its various specialised subsidiaries: FIAT Auto (car making), Iveco (commercial vehicles), La Rinascente (retail), Comau (industrial automation), Cogefar-Impresit (civil engineering). Industrial groups at a superior level of aggregation, including the public corporations ENEL (electrical energy) and Ferrovie dello Stato (national railways), were not included in this classification.

⁶⁵ The year 1991 has been taken as a reference because it is the latest before IRI's transformation into a joint-stock company in 1992.

strikingly, 6 of the 10 largest Italian companies belonged to the IRI Group when measured in value added terms.

Aside from their numerical count, the concentration of IRI-owned companies at the top of Italy’s industrial structure was even more significant when considered in terms of their nominal value (Table 4.2). The revenues shares ranged between 20.7% for the top 100 subgroup and 24.6% for the top 10 group. However, the difference was particularly striking in terms of the value-added share for the top 100 and the top 50 subgroups, respectively 40.8% and 46.1% – almost 20 percentage points higher than the ranking based on the numerical count. The top 10 reported an identical 60% share.

Year 1991	Revenues share	Value added share	Employees share
Top 10	24.6%	60.6%	49.8%
Top 50	23.7%	46.1%	39.1%
Top 100	20.7%	40.8%	34.8%

Table 4.2: IRI-owned companies as a share of the top 10, top 50 and top 100 Italian industrial companies with respect to total revenues, value added and employees in 1991. Source: Author’s elaboration on Mediobanca (1992). Notes: The shares for revenues and value added have been calculated from nominal values (lire), while the employees share has been calculated with respect to the total number of employees.

This discrepancy between revenues and value-added rankings for the top 50 and top 100, already visible for the numerical counting, implied a higher economic weight of IRI-owned companies ranking between the 10th and 100th positions⁶⁶ occupied by medium-to-large size companies.

Finally, the employment share of IRI-owned companies⁶⁷ followed a similar pattern. With reference to the 1991 ranking, they represented 34.8% of the top 100, 39.1% of the top 50, and 49.8% of the top 10 subgroups respectively. In the same year, the IRI Group counted 39 companies with more than 1,000 employees, of which 13 companies with more than 5,000 employees and 6 companies with more than 10,000 employees (Table A4.2).

⁶⁶ Corresponding to companies with value added ranging between 1,221 million and 181 million euros in 2018 prices.

⁶⁷ Re-ranked according to the total number of employees.

3.2. The heterogeneous shareholding structure of IRI's companies

The joint-stock nature of IRI-owned companies allowed a variegated set of shareholding configurations (see Table 4.3 for a summary):

- a. 100% ownership.
- b. Majority ownership of non-listed companies with industrial partners as minority shareholders.
- c. Majority ownership of listed companies with retail and institutional investors as minority shareholders.
- d. Minority ownership of listed and non-listed companies without managerial control.

These shareholding arrangements as well as the degree of ownership in each single company could change overtime, based on IRI's decisions in relation to the evolving financial results and market conditions affecting the companies.

a. 100% ownership.

This 100% ownership configuration was adopted for small and medium subsidiaries of IRI-owned companies with modest external financing needs that could be more easily provided by the IRI Group. Alternatively, 100% ownership was typical in relatively larger companies in cases of absent, low or deferred expectations of profitability, which made them less attractive to private equity investors.

Three different motivations relating to the origin of their financial underperformance can explain IRI's 100% ownership of commercial companies. First, some of them were industrial pivots with structural overcapacity, which nonetheless employed a considerable amount of workers and activated significant external economies through long supply chains. Examples of this were the Italcantieri and CRDA's shipyards, the large mechanical-engineering companies of Ansaldo and, after the 1973 oil crisis, the car making company Alfa Romeo. Second, as presented in Chapter 7, IRI became the only shareholder of technologically promising 'national champions' that needed patient and committed financing for their long-term development. IRI and its financial holdings supported companies which needed to implement costly capital and research investments in the fields of electronics (Selenia and Italtel) and industrial automation

(Elsag). The same happened with the leading companies in aerospace (Aeritalia) and semiconductors (SGS-ATES), which were progressively abandoned by private industrial partners. Third, 100% ownership could be motivated for companies undergoing a profound redefinition of their economic role (e.g. the shipping companies, from passenger transport to freight), or suffered from cyclical or structural crises (e.g. the steelmaking companies during the global sectoral crisis between 1975 and 1985).

Degree of ownership	Cases	Rationale
a. 100% ownership	<ul style="list-style-type: none"> • Small and medium companies, often subsidiaries of IRI-controlled companies 	<ul style="list-style-type: none"> • Modest need for financing, easily provided by the parent company
	<ul style="list-style-type: none"> • Large systemic companies suffering from structural overcapacity 	<ul style="list-style-type: none"> • Preserving and reinforcing strategic industrial players with significant external economies
	<ul style="list-style-type: none"> • Large systemic companies needing financial resources for capital and research investments in excess of their revenues 	<ul style="list-style-type: none"> • Supporting the development of strategic 'national champions' in technologically advanced sectors
	<ul style="list-style-type: none"> • Large systemic companies undergoing cyclical crises related to changing technological and market conditions 	<ul style="list-style-type: none"> • Facilitating the structural transformation and adaptation of systemic companies in their respective sectors
b. Control or majority non listed ($\geq 50\%$)	<ul style="list-style-type: none"> • Equal or IRI-dominated new initiatives with third parties • Acquisition of a control stake by IRI of existing companies • Selling of a minority stake of previously 100% IRI-owned companies to third parties 	<ul style="list-style-type: none"> • Joint development of technologies and productions, sharing know-how and cumulated knowledge • Entry and development of new sectors • Rationalisation of domestic production in given sectors • Elaboration of joint commercial strategies to conquer and reinforce competitive positions in certain market segments
c. Control or majority listed ($\geq 30\%$)	<ul style="list-style-type: none"> • Profitable large companies (or financial holdings) with mostly domestic investors as third parties shareholders 	<ul style="list-style-type: none"> • Provision of a further source of finance deleveraging IRI's indebtedness while reducing overall needs for state grants • Private shareholders could monitor and improve the financial performance of the listed companies (from the 1980s)
d. Minority non-listed ($<50\%$) or minority listed ($<30\%$)	<ul style="list-style-type: none"> • Non-listed subsidiaries of IRI-controlled companies 	<ul style="list-style-type: none"> • Financing support • Technological and commercial synergies with IRI-controlled companies
	<ul style="list-style-type: none"> • Profitable listed companies over which IRI did not exercise its managerial control 	<ul style="list-style-type: none"> • Financial investment with positive expected returns
	<ul style="list-style-type: none"> • Minority stakes in companies involved in restructuring (SPI) 	<ul style="list-style-type: none"> • Financial support to SMEs in depressed areas
	<ul style="list-style-type: none"> • Minority stakes in high-tech small companies 	<ul style="list-style-type: none"> • Financial support aimed at technology development

Table 4.3: Ownership configurations of IRI's joint-stock companies. *Source:* Author's elaboration.

b. Majority ownership of non-listed companies.

This second category concerned non-listed companies controlled by IRI or by its subsidiaries, in which industrial partners had a minority or equal stake. When IRI was initially established, only a few companies had this shareholding configuration. Therefore, the first joint-ventures with industrial partners were experimented in the late 1930s, becoming more and more frequent from the 1960s (see list in Table A4.3).

This shareholding option assumed three different forms: equal or IRI-dominated new initiatives with third parties; IRI's acquisition of a controlling stake in existing companies; IRI selling a minority stake of previously fully-owned companies to third parties.

Several purposes were served⁶⁸ – sometimes simultaneously – by this mixed-ownership shareholding arrangements. First, it could be done with the aim of developing technologically advanced activities by sharing existing technical know-how and exploiting cumulated knowledge – such as with the electronics company Selenia, with the electromechanical company Asgen or in the field of stainless steel with the joint-venture Terninoss. Second, it could be motivated by the need to build technological and productive capabilities in new sectors – as it was with the nuclear engineering company NIRA, or with the joint-venture FOS to manufacture optical fibre cables. Third, it could be part of a strategy aimed to rationalise domestic productions or to reinforce the supply structure of the national industry – as in the case of IRI's joint-ventures with the FIAT Group in rolling stock manufacturing (Omeca), aircraft (Aeritalia), naval engines (Grandi Motori Trieste). Fourth, it could be functional to the elaboration of commercial strategies, often with an international reach, aimed at consolidating and expanding existing competitive positions in various activities – this was the case of the food companies (Alemagna, Star, Cirio), of the semiconductor company SGS-Thomson, of the telecommunications equipment manufacturer Italtel, of the aircraft company ATR, of the shipping companies, and others.

⁶⁸ See Chapter 7 for a more detailed analysis of the following cases.

c. Majority ownership of listed companies.

When IRI acquired the assets of the three holding banks in 1933, some of their controlled companies were already listed on the stock exchange and none of them were subsequently delisted. Consequently, IRI had become the largest investor in the national stock market. In the post-war period, the presence of IRI-controlled listed companies remained fairly constant in both numerical terms and relative to the national stock market capitalisation⁶⁹. Table 5.1 reconstructs the listing and de-listing process of IRI-controlled companies.

In the late 1940s, a considerable number of operating companies were listed on the Milan stock exchange: Società Idroelettrica Piemonte (SIP), Unione Esercizi Elettrici (UNES), Società Meridionale di Elettricità (SME)⁷⁰ in the electric energy sector; Dalmine, Terni and Ilva in the steelmaking sector; Ansaldo in the mechanical-shibuilding sector; Manifatture Cotoniere Meridionali in the textile sector; and Monte Amiata in the mining sector.

Throughout the 1950s and 1960s a new series of companies were floated: the telecommunication engineering group Società Impianti Telefonici – SIT (1952); the cement-making Cementir (1955); the national flag carrier Alitalia (1968); the telephone service company Italcable (1968). In the early 1970s, IRI floated the three banks. In 1968 and 1974 respectively, IRI acquired the control of the food companies Motta and Alimont, which were already listed on the stock market.

Following a 10-year stagnation of stock market activities in the period 1974-1984⁷¹, from 1985 IRI listed a new series of companies – Sirti (telecommunications engineering), Aeritalia (aerospace), Ansaldo Trasporti (railway engineering), Autostrade (motorways), Elsag Bailey (industrial automation) – reducing its controlling stakes in favour of third-party minority investors.

⁶⁹ See Chapter 5 for a quantitative estimate and analysis on the subject.

⁷⁰ The minority stake of Società Meridionale di Elettricità (SME) remained a financial investment until 1951, when IRI increased its share and assumed the effective control of the electric energy company.

⁷¹ The national stock market capitalisation in the 1974-1984 period amounted to an average of 4.8% relative to Italy's GDP, compared to 12.5% in the previous 10 years and to 14.3% in the 1985-1992 period (author's elaboration on IRI Database).

IRI's listed companies were typically large firms generating secure financial returns, but requiring considerable financing for their investment programmes. As long as market conditions remained favourable, stable profitability prospects attracted third-party investors, mostly retail and domestic in nature.

The divestment or new issuing of shares represented a supplementary and often significant financing option for IRI-owned companies, which could deleverage IRI's overall indebtedness while reducing the dependence on state grants (see Chapter 5 on IRI's financing). During the 1980s, the greater involvement of private shareholders was also justified on the ground that it created the right set of incentives to improve the financial performance of IRI's companies.

IRI anticipated the current prevailing model of state-controlled yet listed companies, which has become the typical organisational form of modern SOEs, with two substantial differences. First, IRI's listed subsidiaries remained constituent elements of the IRI Group. Their floatation on the stock market was compatible with IRI's coordinated intra-group industrial strategies. Modern SOSOEs rarely present a similar degree of integration and coordination, even when the ultimate shareholder is a distinct and autonomous public agency (see Chapter 8). Second, private shareholders of IRI's listed subsidiaries were prevalently domestic individuals or national institutional investors. The nature and nationality of IRI's minority shareholders facilitated a coincidence of interests with the strategic long-term economic objectives of IRI's companies.

d. Minority ownership of listed and non-listed companies.

Below the 50% threshold for non-listed companies and below the 30% threshold for listed companies with a fractioned ownership structure, IRI's participation simply represented a form of equity financing. These were defined as 'related' companies, outside the consolidated perimeter of the IRI Group. At least four different examples of this can be identified.

First, they could be non-listed subsidiaries of larger IRI-controlled companies or financial holdings. This shareholding configuration allowed the possibility for commercial and technological synergies that IRI's companies could exploit with their

partners, without having to assume managerial responsibilities. Second, IRI's minority ownership in listed companies was uncommon, with one notable exception. Until its ultimate divestment in 1981, IRI retained a minority stake in Montecatini⁷² – the leading national chemical group and Italy's largest company by market capitalisation in 1948 – amounting to 11.6% at the moment of IRI's establishment in 1933. IRI maintained a significant degree of influence within Montecatini's governance⁷³ as its main shareholder⁷⁴, not least by contributing to several rounds of recapitalisations. Third, through the financial holding SPI⁷⁵, IRI acquired minority stakes of small and medium companies in areas that needed a restructuring and reconversion of productive activities with the aim to finance and provide technical support to new entrepreneurial initiatives. Fourth, in 1987 IRI created a venture capital company called Iritech, whose aim was to encourage the development of industrial initiatives with a high technological content, through equity financing of new joint-ventures or existing start-ups, Italian and foreign.

3.3. Sectoral diversification and heterogeneity in the market environments of IRI's companies

The IRI Group was composed by juridically autonomous companies operating in a broad range of financial, manufacturing, transport, services and infrastructure activities. Table A4.4 maps IRI's sectoral diversification at the 'division' level of granularity, using the modern ISIC Rev.4 standards. IRI-owned companies operated in at least one division for every section classified between A and M, an estimate of 39 out of 75 in total (and 15 divisions out of 24 relating to the manufacturing section C).

⁷² Renamed Montecatini-Edison in 1966 (later Montedison), following the merger with the company Edison, whose electric energy assets were nationalised in 1963.

⁷³ Throughout the 1950s and in the early 1960s, Professor Pasquale Saraceno – one of IRI's most senior officials – represented IRI in the board of Montecatini as a company auditor.

⁷⁴ During his interview for the Economic Commission of the Constitutional Assembly in 1946, Luigi Morandi (CEO of Montecatini) admitted that Montecatini was effectively controlled by IRI (Ministero per la costituente (1946, p. 100): "There is IRI with its 8% and another 7, 8, 10% by its controlled banks or financial holdings. IRI attends the boards with its roughly 20% of shares, the rest is practically distributed among 57,000 shareholders. Thus, who controls IRI also controls Montecatini. Yet, it is a company that has nothing to do with IRI, it stands by itself and does not need to be accountable to anyone" (author's translation from Italian).

⁷⁵ SPI has currently evolved into the state-owned development agency Invitalia.

In certain sectors, the involvement of IRI was a legacy of its foundation and remained *constant* throughout its entire existence. This was the case of IRI-owned companies operating in:

- Maritime transport – Tirrenia, Adriatica, Italia, Lloyd Triestino
- Shipbuilding – Ansaldo, CRDA⁷⁶
- Steelmaking – Ilva⁷⁷, Dalmine, Terni
- Electromechanical engineering – Ansaldo
- National telephone services – SIP⁷⁸

In other cases, IRI *abandoned* sectors in which some of its companies were involved, based on autonomous decisions or because forced by external policy events (such as the nationalisation of the electric energy sector in 1962). Divestments of companies were made in:

- Textile (throughout the 1930s) – Châtillon
- Electric energy (in 1962) – SIP, SME⁷⁹
- Mining (in the 1970s) – Monte Amiata
- Paper manufacturing (in 1980) – Celdit
- Chemistry (in 1981) – Montecatini-Montedison
- Car making (in 1986) – Alfa Romeo

Finally, the holding configuration and the juridical nature of IRI allowed an internal diversification process which implied *entering* into new sectors, through the acquisition of existing companies or by establishing new initiatives. Under the first category fell the acquired activities in:

- Air transport (in late 1940s) – Alitalia
- Food and retail (starting from the 1960s) – Alivar, Supermercati
- Civil and telecommunications engineering (end of 1960s) – Condotte, Sirti

⁷⁶ Until their incorporation into the sector leader company Fincantieri in 1984.

⁷⁷ Between 1961 and 1988, Ilva assumed the name Italsider.

⁷⁸ SIP was founded as the national telephone company in 1964 from the merger of five regional concessionaires, three of which belonged to IRI from its foundation.

⁷⁹ Before the nationalisation of the electric energy sector in 1962, SIP and SME were two electric energy conglomerates controlled by IRI's sectoral subsidiary Finelettrica.

- Operation of airports (in the 1970s) – Aeroporti di Roma
- Semiconductors (in early 1970s) – SGS

In other circumstances, the entry of IRI into new sectors was the outcome of a diversification strategy in:

- Cement (early 1950s) – Cementir
- Industrial machinery (from the 1950s) – Italmianti, Elsag
- Diesel engines (from the late 1960s) – Grandi Motori Trieste
- Structural metal products (from the 1960s) – Angen
- Electronic systems (from the early 1950s) – Selenia
- Electronic components (from the late 1950s) – ATES

New initiatives were also undertaken in civil engineering, with the notable example of the motorways network from the late 1950s, through the company Autostrade.

Other companies were established and developed in various service activities such as:

- Printing and publishing (in the 1950s) – ILTE, Edindustria
- Radio and TV broadcasting (early 1950s) – RAI
- Informatics (from the late 1960s) – Italsiel, Sogei

Lastly, dedicated companies were launched in the areas of:

- Technical and managerial training (in the 1950s) – IFAP and ANCIFAP
- Scientific and industrial research (from the early 1960s) – CSELT, CETENA, CSM

The national relevance of IRI in these sectors depended on the size of its companies and on the nature of the corresponding markets in which they operated (Table 4.4). On this basis, IRI's industrial companies could be divided into two main categories: public services under monopolistic concessions and activities performed under varying degrees of oligopolistic competition, either domestic or international or both.

The first *monopolistic* category included the telephone company SIP, the motorways concessionaire Autostrade, the maritime transport company Tirrenia, the Radio and

TV broadcasting company RAI (until the mid-1980s), the airport company Aeroporti di Roma, the air transport company Alitalia (on domestic routes).

Market concentration	Description	Examples
Monopolistic	Concessionaries of industrial activities in essential public services	SIP (telecommunications), Tirrenia (maritime transport), Autostrade (Motorways), RAI (radio and TV broadcasting), Alitalia (air transport), Aeroporti di Roma (airports)
Dominant oligopoly	Dominant market share in the domestic context with little or no competition from abroad	Fincantieri (shipbuilding), Ansaldo Energia (power plants engineering), Italtel (telecommunications equipment), Aeritalia (aerospace), Italtstrade (civil engineering)
Concentrated oligopoly	Significant but not dominant market share in the domestic context with either domestic or foreign competition	Alfa Romeo (automotive), Ansaldo Trasporti (rolling stocks and Railway systems) Italsider (steelmaking), Cementir (cement), Italsiel (informatics), Elsig (industrial automation)
Competitive oligopoly	Significant market share in the domestic context with a high degree of competition from abroad	Alivar, Italgel (food processing), SGS-ATES (semiconductors), Italmimpianti (industrial engineering), GS Supermercati (retail)

Table 4.4: Different degrees of market competition under which IRI's companies operated. Source: Author's elaboration.

The second category presented at least three further differentiations, according to the varying degrees of market concentration and competition (see Chapter 5 for figures on national market shares): *dominant oligopoly*, when a company had a dominant market share in the domestic context and incurred little competition from abroad (e.g. shipbuilding companies or the manufacturer of telecommunications equipment, Italtel); *concentrated oligopoly*, when the company had a significant national market share but was challenged by either domestic or foreign competition (e.g. the steelmaking company Italsider or the automotive company Alfa Romeo); *competitive oligopoly*, when the company still had a significant market share in the domestic context but was subject to a high degree of both domestic and foreign competition (e.g. the semiconductor company SGS-ATES or the food processing company Alivar).

By combining the degree of ownership with the market environment faced by the individual companies, it is possible to display the variegated galaxy of IRI's companies. Figure 4.2 classifies some of IRI's most relevant companies, mapping the heterogenous and unrelated combinations between their shareholding arrangements and market conditions.

As indicated above, changes in the ownership nature had more to do with the financial performance of the company, which in turns was often influenced by the cyclical or structural dynamics of the sector. Therefore, for each market environment, IRI's companies displayed different ownership configurations, with a hinted tendency to list monopolistic concessionaires⁸⁰, as they were better able to secure a regular stream of earnings for private investors.

This picture complicates the simplistic dichotomy public-private enterprise, in two different ways. First, the state controlled natural monopolies activities with IRI's listed joint-stock companies, rather than through nationalised corporations. This assured a higher degree of managerial and technical efficiency, while providing an attractive destination for national private savings. Second, IRI owned a considerable amount of large and systemic oligopolistic companies, which is difficult to interpret through the lens of conventional market failure economic theory.

⁸⁰ The same applies to the three commercial banks, here not included.

Degree of ownership

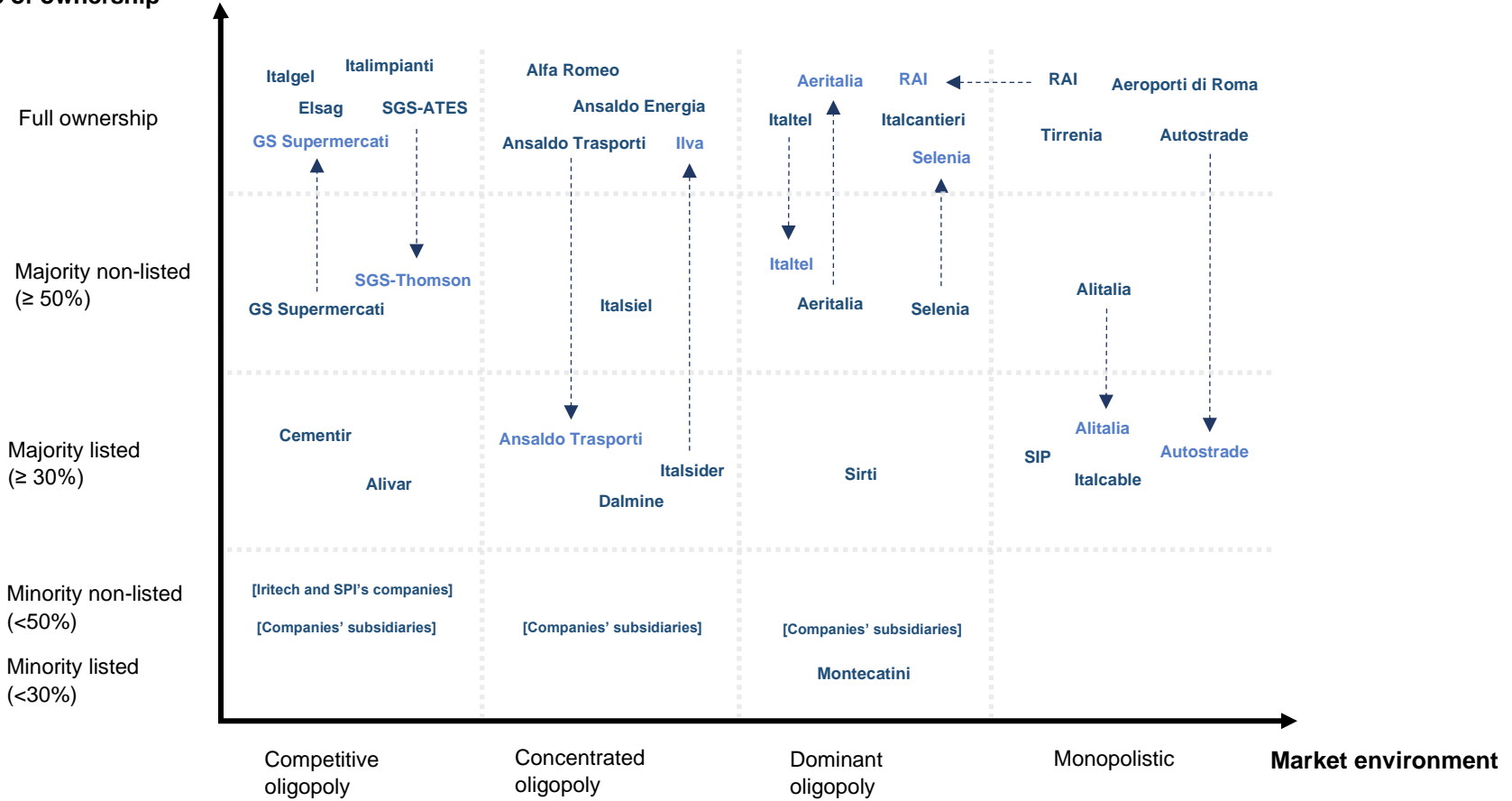


Figure 4.2: IRI's main companies classified by degree of ownership and market environment in which they operated. Source: Author's elaboration. Note: Arrows indicate changes of ownership or market conditions through time.

4. The sectoral subsidiaries

At the moment of its establishment in 1933, IRI had a direct shareholding relation with its controlled subsidiaries. In subsequent years, a more coherent organisation for its broad and heterogeneous portfolio of assets was introduced. The direct ownership of industrial activities with similar technical characteristics was transferred to newly-established sectoral subsidiaries, creating an intermediate shareholding level between the apex holding entity – the Institute – and the industrial companies.

This did not imply the introduction of a different legal regime: IRI's sectoral subsidiaries were established as joint-stock financial holdings or multidivisional companies operating under private law. They could be either non-listed and 100% owned by IRI⁸¹, or listed on the stock exchange, allowing the participation of third-party shareholders through the issuing of shares and convertible obligations. IRI's direct shareholding in the sectoral subsidiaries was almost always higher than 50%⁸².

The number and importance of IRI's sectoral subsidiaries increased through time, so much that they came to be defined as the “unitary entities of state-participated companies”⁸³. Within IRI, they progressively assumed a more central role in elaborating the Group's four-year industrial plans.

Furthermore, IRI's sectoral subsidiaries developed into large domestic players. In 1998, among Italy's top 20 largest industrial groups⁸⁴ (Table 4.5), IRI's sectoral subsidiaries occupied 7 positions, accounting for 29% of total revenues and 31.8% of total employees within this group.

With reference to the year 1990, Figure 4.3 provides a quantitative description of IRI's sectoral subsidiaries, in terms of their revenues, exports, investments, R&D expenditures and total number of employees.

⁸¹ With the exceptions of the informatics subsidiary Finsiel, participated by IRI and by the Bank of Italy with a 83% and 17% stake respectively, and of the TV broadcaster RAI, participated by SIP until 1975, when IRI assumed RAI's full ownership.

⁸² When the electric energy conglomerate SME was turned into a financial holding in 1963, IRI owned 41.5% of its shares, which was nonetheless sufficient for granting an effective control.

⁸³ As defined by an esteemed legal scholar, Professor Massimo Severio Giannini, in a hearing at the Italian Senate (Senato della Repubblica, 1982a, p. 96).

⁸⁴ Ranked in terms of revenues.

Ranking	Name	Sector	Revenues	Employees
1	FIAT Auto (FIAT Group)	Automotive	27,506	128,925
2	ENEL	Electric energy	26,820	109,860
3	STET (IRI)	Telecommunications	22,964	129,492
4	Agip Petroli (ENI)	Oil and gas (Downstream)	16,010	24,956
5	Montedison (Ferruzzi Group)	Chemical	15,732	38,254
6	Enichem (ENI)	Chemical	13,424	42,784
7	SNAM (ENI)	Gas infrastructures	12,999	16,783
8	Agip (ENI)	Oil and gas (Upstream)	10,957	9,628
9	Ilva (IRI)	Steelmaking	10,609	50,244
10	Pirelli	Tyres and cables	10,024	64,854
11	Finmeccanica (IRI)	Aerospace, electronics and others	8,927	56,015
12	Olivetti	Electronics and informatics	8,607	46,484
13	Iritecna (IRI)	Civil and industrial engineering	6,023	28,151
14	Alitalia (IRI)	Air transport	5,868	28,983
15	SME (IRI)	Food and distribution	5,831	22,411
16	Ferrovie dello Stato	Railways	4,363	170,741
17	La Rinascente (FIAT Group)	Retail	4,123	15,563
18	RAI (IRI)	Television	3,953	15,956
19	Standa (Fininvest Group)	Retail	3,615	16,979
20	Magneti Marelli (FIAT Group)	Industrial components	3,287	25,997

Table 4.5: Italy's largest industrial groups in 1991. Source: Author's elaboration based on Mediobanca (1992). Notes: Revenues are reported as million euros in 2018 prices.

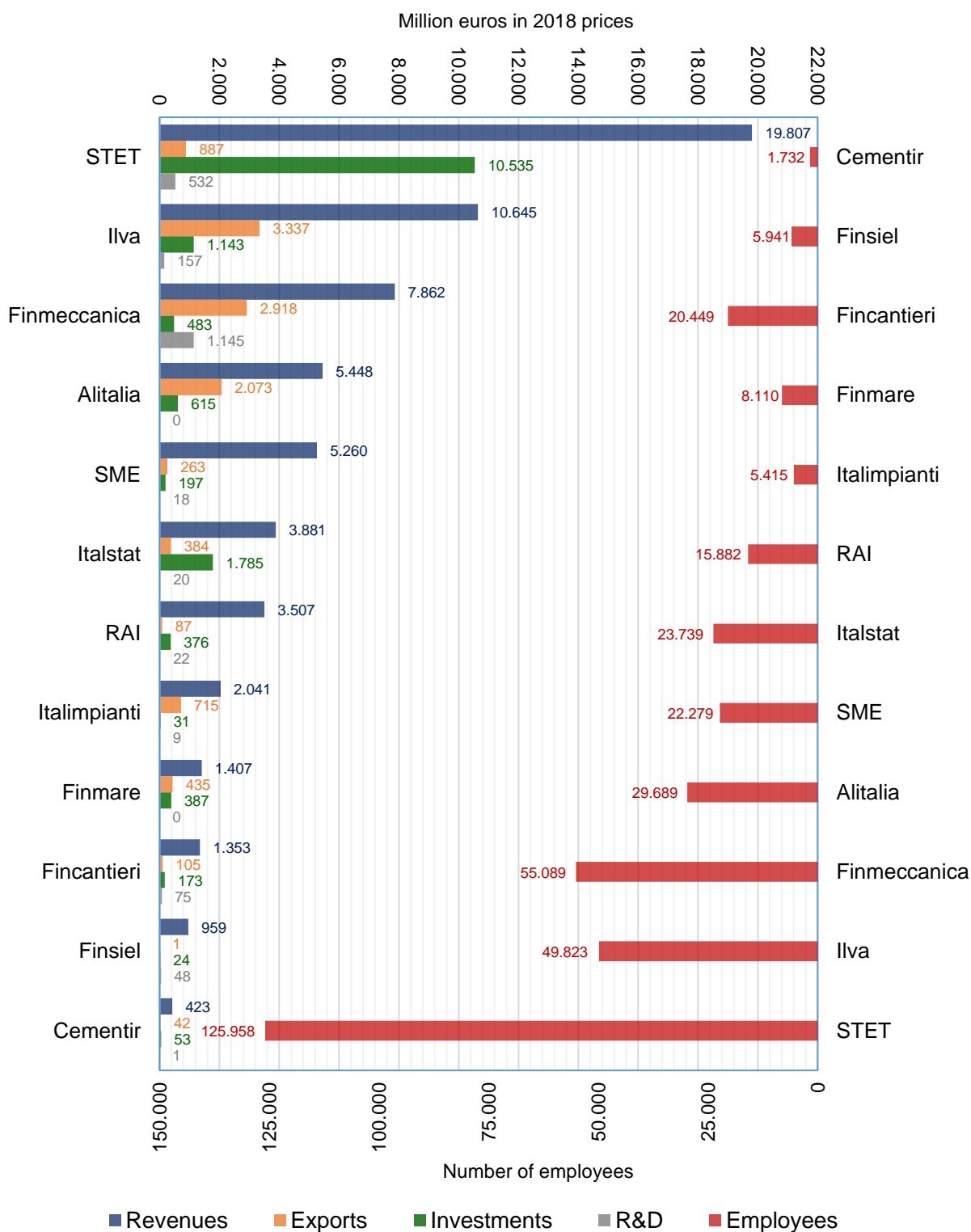


Figure 4.3: Main figures on revenues, exports, investments, R&D expenditure and employees for each of IRI sectoral subsidiary in 1990. Source: Author’s elaboration on IRI’s 1990 annual report. Notes: Monetary vales are reported as million euros in 2018 prices. Top-left axis: revenues (blue), exports (orange), investments (green), R&D expenditure (grey). Bottom-right axis: employees (red).

4.1. Sectoral financial holdings and sector leading companies

IRI's sectoral subsidiaries were initially conceived as 'sectoral financial holdings'⁸⁵, having a coordinating role on intra-group strategies and financial operations. Their creation was functional to reorganise IRI's vast and heterogeneous array of shareholdings. Table 4.6 lists IRI's most important sectoral financial holdings⁸⁶ by year of establishment and main sectors in which they operated.

Sectoral financial holding	Established	Liquidated (L) or divested (D)	Sectors
STET	1933	1997 ¹ (L)	Telecommunications, electronics
Finmare	1936	1999 (L)	Maritime transport
Finsider	1937	1988 ² (L)	Steelmaking
Finmeccanica	1948	2000 ³ (D)	Mechanical engineering, electronics
Finelettrica	1952	1965 (L)	Electric energy
Fincantieri	1959	1984 ⁴ (L)	Shipbuilding
SME	1963	1996 (D)	Food and distribution
Italstat	1968	1991 ⁵ (L)	Civil engineering and infrastructures
Finsiel	1981	1992 ⁶ (L)	Software and informatics

Table 4.6: IRI's sectoral financial holdings. *Notes:* ¹Merged into the multidivisional company Telecom Italia; ²Transformed into Ilva; ³Controlling stake transferred to the Treasury; ⁴Transformed into a multidivisional company; ⁵Merged into Iritecna; ⁶Merged into STET.

The other intermediate shareholding level introduced by IRI were the so-called 'sector leader companies'. These were typically multidivisional companies (with controlled subsidiaries), but less horizontally diversified than the sectoral financial holdings. Table 4.7 lists IRI's most important sector leader companies⁸⁷ by year of establishment and the sectors in which they operated. An illustrative summary of IRI's sectoral financial

⁸⁵ Where the 'Fin' prefix stands for '*Finanziaria*' (financial holding).

⁸⁶ The list excludes IRI's commercial banks (Banca Commerciale Italiana, Credito Italiano, Banco di Roma, Banco di Santo Spirito), together with the two investment banks Mediobanca and Cofiri, as they either controlled other banking institutions or had only minority stakes in industrial companies. Iritecna and SPI, despite being financial holdings, had mostly minority stakes in a broad range of unrelated companies. Finally, the other small financial holding SOFIN (as it was called since from 1981, previously known as Società Finanziaria di Partecipazioni Azionarie, established in 1968 to manage IRI's small shareholdings) is also left out from the list of sectoral subsidiaries, as their shareholdings were unrelated and considered to be non-strategic. SOFIN's main role was to prepare their liquidation or transfer to other owners.

⁸⁷ The list excludes the training companies IFAP-ANCIFAP (see Chapter 6), the chemical giant Montecatini (of which IRI was the majority shareholder, with a non-controlling stake), IRI's smaller shareholdings such as the publishing company Edindustria, the farm company Maccaresse, the glass-making company Saivo and other temporary direct holdings such as the infrastructure company Italstrade, the textile companies Fabbricone and Manifatture Cotoniere Meridionali, the mining company Monte Amiata.

holdings and sector leader companies⁸⁸ is provided in the Appendix (Boxes A4.1 to A4.15).

Sector leader company	Established	Liquidated (L) or divested (D)	Existing today	Sectors
Autostrade	1950	1999 (D)	Yes	Motorways
RAI	1952	2000 ¹ (D)	Yes	Radio and TV broadcasting
Alitalia	1957	2000 ¹ (D)	Yes	Air transport
Fincantieri	1984	2002 ² (D)	Yes	Shipbuilding
Italmimpianti	1989	1991 ³ (L)	No	Industrial engineering
Ilva	1989	1995 (D)	Yes	Steelmaking
Cementir	1989	1992 (D)	Yes	Cement production
Iritecna	1991	1993 (L)	No ⁴	Civil and industrial engineering

Table 4.7: IRI's sector leading companies. Source: Author's elaboration. Notes: ¹The controlling stakes of RAI and Alitalia (until its privatisation in 2008) were transferred to the Treasury; ²Fincantieri was incorporated in the financial holding 'Fintecna' (100% controlled by the Treasury) at the moment of IRI's liquidation together with its remaining assets. ³Merged in Iritecna in 1991; ⁴Iritecna's assets were transferred to a liquidating financial holding denominated 'Fintecna' (currently 100% owned by CDP).

4.2. The role of IRI's sectoral subsidiaries

With the establishment of an intermediate shareholding level, IRI could decentralise and delegate to its sectoral subsidiaries the coordination and control of companies characterised by a similar degree of specialisation.

Sectoral subsidiaries were attributed the *technical* responsibility of promoting common industrial strategies and the application of new production techniques within the individual units. They also had a prominent role in the *commercial* field, promoting specialised trading companies and foreign sale offices to expand their activities in international markets. Thirdly, sectoral subsidiaries played an important *financing* role within IRI: by issuing convertible obligations or tradable shares on the stock market, they could raise supplementary financing resources to be deployed as direct loans or capital injections to their controlled operating companies (see Chapter 5).

IRI's sectoral subsidiaries progressively assumed a more central role in the *planning and decision-making process* of the IRI Group. As recalled by a former IRI Chairman⁸⁹:

⁸⁸ Some of these companies were already operative as autonomous companies directly controlled by IRI (i.e. Autostrade, RAI, Alitalia) or by its subsidiaries (i.e. Italmimpianti, Cementir under Finsider). They are included here in the list of IRI's sectoral subsidiaries for two main reasons. First, due to their growing quantitative importance. Second, because of their broad sectoral specialisation, which progressively gave them prominence and autonomy within IRI, as documented by their increasing role, as part of IRI's planning and control process.

⁸⁹ Interview with Romano Prodi (11 September 2019), author's translation from Italian.

Within IRI the financial holdings were extremely important. They discussed with the Chairman and with the Executive Committee, they referred to the Board of Directors, but they had always enjoyed strength and autonomy within IRI's decision-making process. [...] This was not common to other State-holding bodies such as Eni, but given the variety of IRI's sectoral interests, large sector leader companies such as Alitalia, or the financial holdings Finmeccanica, Finsider, etc. they had a strong autonomy. IRI was not a monolithic entity. And it would have been impossible, given the dimension and the difference among those companies.

The creation of an intermediate shareholding level with dedicated roles did not imply the abdication of the general orientation and supervisory prerogatives pertaining to the Institute (Saraceno, 1956; 1982). In fact, the relationship between sectoral subsidiaries and the apex was dialectical and coordinated. For instance, the appointment of managers in the boards of operating companies was a joint decision. Furthermore, long-term sectoral programmes were elaborated together and implemented by the sectoral subsidiaries through the controlled operating companies.

The organisation of IRI's companies into sectoral subsidiaries facilitated the exploitation of a wide range of competitive opportunities. This was particularly relevant for the national context, as the large relative dimension of IRI's activities in certain sectors implied that its industrial programmes translated into systemic industrial operations for the national economy.

a. Consolidation into globally competitive national champions

IRI's sectoral subsidiaries established themselves as national champions, consolidating pre-existing dispersed IRI-owned companies but also through subsequent external acquisitions and internal growth. By the early 1990s, IRI controlled 12 large players with leading technological and market positions in their respective industrial sectors – at the national but also international level. See Table 4.8 for a summary of their distinguishing competitive positions and Chapter 7 for a more detailed description of their technological and industrial competitiveness.

Distinguishing features	
STET	Sixth largest telecommunications group in the world, first in Europe on mobile services (mid-1990s).
Ilva	Seventh largest steelmaking group in the world (8% of total crude steel output in EEC).
Finmeccanica	Ranking in the global top three positions in commuters aircraft, civil radars for aeronautics, railway signalling, postal automation, continuous processes.
Alitalia	Fourth largest European airline and integrated operator of the main national airport system.
SME	First national group in retail and catering services, sixth in food processing.
Italstat	First national group in civil engineering, largest European builder and operator of toll motorways (10% EEC's share).
RAI	National public broadcaster with international leadership in digital satellite transmissions.
Italmipianti	Global leadership in industrial engineering (steelmaking and industrial machines).
Finmare	Leading national shipping company (21% of national fleet).
Fincantieri	Fourth largest shipbuilder of merchant ships globally (leadership in the cruise segment).
Finsiel	Second largest European producer of software products.
Cementir	Third largest national producer (2% of total EEC output).

Table 4.8: Distinguishing features of IRI's sectoral subsidiaries (early 1990s). Source: Author's elaboration.

b. Exploitation of industrial synergies and knowledge spillovers across sectors

The progressive specialisation of IRI through sectoral subsidiaries facilitated the pursuit of industrial synergies across sectoral subsidiaries, as it was clearly outlined in IRI's four-year plans⁹⁰:

The IRI Group, considering its multi-sectoral and multi-businesses characteristics, has the opportunity to reinforce its own competitive position through an optimal management of existing interrelations among the areas of presence and the development of connected synergies. [...] IRI is particularly focused on [...] the implementation, whenever the interrelations assume a structural configuration, of operations that redefine its own corporate and organisational assets and, in other cases, through the promotion of transversal collaborations.

IRI's reconfiguration through sectoral subsidiaries encouraged the activation of industrial synergies through the exploitation of sectoral complementarities.

A paradigmatic case, described in Figure 4.4, can be traced in the promotion of Alfa Romeo's Spider *Duetto* in the US, performed by the pilot Consalvo Sanesi on the first-class deck of the ocean liner *SS Raffaello*. This was done in 1966 on a typical route from Genoa to New York. The ocean liner belonged to the shipping company Italia di Navigazione. It was the largest ship of Finmare's fleet, commissioned to the

⁹⁰ P. 143 from 'Programma del gruppo 1988/1991' (Archivio storico IRI, Bilanci). Author's translation.

Fincantieri's shipbuilding company Cantieri Riuniti dell'Adriatico and completed in 1965. *SS Raffaello* was realised with Ansaldo's (a subsidiary of Fincantieri) naval engines and with steel plates from Finsider's Italsider, which also supplied Finmeccanica's car making company.

Another example of industrial synergies activated across IRI's sectoral subsidiaries can be taken from the 1984 purchase of ten MD-80 airplanes by Alitalia (Figure 4.5). Aeritalia (the aircraft manufacturing company of Finmeccanica) was the largest European supplier to McDonnell Douglas, providing the MD-80 model with the fuselage structure. At the same time, Alitalia was operating its fleet from the Fiumicino Airport in Rome (jointly-controlled with Italstat), on which the STET company Selenia had installed its air traffic control radars, made with electronic components manufactured by STET's semiconductor company SGS.

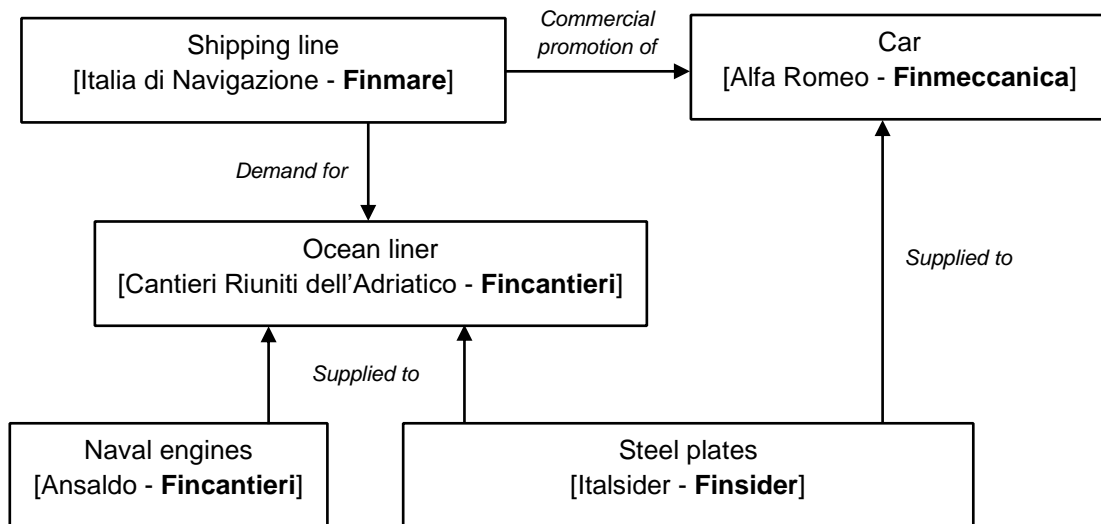


Figure 4.4: Example of industrial synergies activated among IRI's sectoral subsidiaries (late 1960s). Source: Author's elaboration.

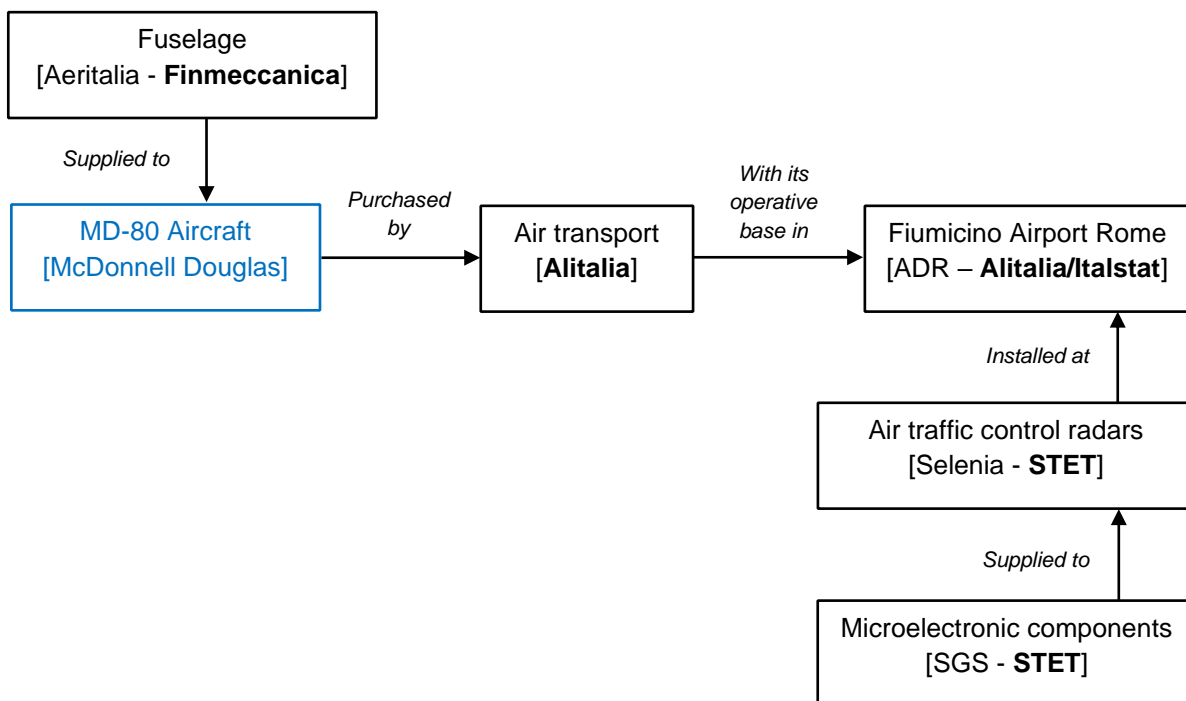


Figure 4.5: Example of industrial synergies activated among IRI's sectoral subsidiaries (mid-1980s). Source: Author's elaboration. Notes: The blue box indicates a non-IRI company.

Moreover, companies belonging to the same sectoral subsidiary enjoyed a facilitated flow of knowledge spillovers. This happened through the planned internal circulation of technical and managerial personnel, but also with the transfer of companies from one sectoral subsidiary to another – as testified by the electronics companies (Selenia, ATES and Elsag), whose direct control was shifted from Finmeccanica to STET (in 1969), due to the technological proximity with telecommunications activities. The diffusion of knowledge spillovers was also formally promoted by the joint-subscription of initiatives in the fields of training and research. IRI's companies dedicated to technical and managerial training programmes – IFAP and ANCIFAP – were participated by all of IRI's sectoral subsidiaries. In the research area, most sectoral subsidiaries established inter-companies R&D centres, whose research results were made easily available to other sectoral subsidiaries (see Chapter 6 for a more detailed discussion).

c. Vertical integration within sectoral subsidiaries

IRI's specialisation into large and relatively homogeneous subunits favoured a functional specialisation through vertical integration within the sectoral subsidiaries. This tended to prevail in the telecommunications, steelmaking and shipbuilding subsidiaries (Table A4.5).

Initially organised around three telephone service companies, since the 1950s STET progressively incorporated manufacturing, engineering, research, training and other auxiliary activities. By the early 1970s, STET was a fully integrated telecommunications group with activities in telephone services (SIP), in manufacturing of telecommunications components and equipment (SGS-ATES and SIT-Siemens), and in telecommunications infrastructures (Sirti), with autonomous research capacity (CSELT).

The Finsider group, began its vertical integration process with the establishment of a mining company (Ferromin) and with a producer of steelmaking refractory materials (SANAC), followed by a company specialised in manufacturing special cement for industrial uses (Cementir). It also established a centralised company (Sidercomit) dedicated to the purchasing of steel-related products and raw materials. It further reorganised the modest fleet of bulk carriers into a single shipping company for the

supply of raw material and the transport of finished products (Sidermar). By the early 1960s, Finsider disposed of a company specialised in plant engineering for steelmaking processes (Italimpianti) and a research centre on metal materials (CSM). Finally, in 1974 it incorporated a leading national manufacturer of industrial machines for steelmaking use (INNSE).

Fincantieri was already quite vertically integrated at its foundation in 1959, but it subsequently established a research centre on maritime technologies (CETENA) and acquired autonomous production capacities in large diesel engines (GMT, Sulzer) and medium size high-speed engines (Isotta Fraschini).

d. Horizontal diversification within sectoral subsidiaries

Horizontal diversification in new activities was prevalent within Finmeccanica, SME, Italtat and also STET (Table A4.6).

At its foundation, Finmeccanica was primarily involved in shipbuilding (separated to Fincantieri in 1959), electromechanical, industrial machinery, military productions (transferred to the smaller State-holding entity EFIM in 1973) and car making (with Alfa Romeo, sold to FIAT in 1986). However, from the very beginning Finmeccanica diversified into new activities: electronic systems (Microlambda in 1951, later Selenia), electronic components and semiconductors (Marconi Italiana in 1948, followed by ATES in 1959 and by SGS-Thomson in 1989), civil and military aircraft manufacturing (Aerfer in 1955, followed by Aeritalia in 1969 and Alenia in 1990), industrial automation (Nuova San Giorgio in 1954, followed by Elsag in 1969 and Elsag Bailey in 1989). In the 1960s, Finmeccanica expanded its role in the railway sector (with the rolling stock manufacturer Omeca), establishing Ansaldo Trasporti in 1980 to promote its further specialisation in railway signalling systems. It also acquired technological and manufacturing capabilities in nuclear power plant engineering (with Ansaldo Meccanico Nucleare in 1966). By the early 1990s, Finmeccanica had radically transformed its composition, becoming a high-tech manufacturing conglomerate diversified in: aerospace, defence electronic systems, electric energy engineering, industrial automation, railway signalling systems, biomedical machines and semiconductors.

SME's diversification was mainly the result of the forced divestment of its electric energy companies, following the nationalisation of the sector in 1962. With the financial compensation it received, SME went through an initial phase (1963-1968) where it invested in manufacturing productions (acquiring Alfacavi and Celdit in 1964), retail distribution (Generale Supermercati in 1966) and other non-controlling assets of IRI's telecommunications and steelmaking companies. This was followed by a later phase (1968-1977) in which it acquired controlling stakes in food processing companies and catering activities. From 1978, with the divestment of all its assets in non-food manufacturing companies, public utilities, miscellaneous services and minority stakes, SME limited its diversification process to the food processing, retail and distribution sectors, with a moderate vertical diversification initiated with the establishment of a research centre on food technologies (CRAI, in 1978) and with a company specialised in plant engineering for food processing (Tecnal, in 1979).

The diversification of Italstat coincided with its creation as a holding company for large infrastructure projects (with Condotte d'Acqua and Italstrade in 1970-71), and progressively continued with initiatives in the construction of public buildings (IPI and Svei in 1972, Italposte in 1974, REP in 1974), followed by the establishment of an engineering service company (Italtekna in 1974), and completed with the attribution of concessionary responsibilities over Rome's airports (Aeroporti di Roma in 1974) and Italy's main network of motorways (Autostrade in 1982).

Finally, from the 1960s STET underwent a clear horizontal diversification process in international landline and satellite telecommunications (Italcable in 1965 and Telespazio in 1961), in information systems (with Siemens Data in 1969 and Italdata in 1974) but also in electronics, industrial automation and semiconductors with the transfer of Finmeccanica's companies ATES, Elsag and Selenia in 1969 (until 1989). It is also worth noting STET's operations in the early 1990s, with the incorporation of Finsiel in 1992, the investment in the multimedia services sector (Stream, in 1993) and the spin-off of its mobile telecommunications company (Telecom Italia Mobile, in 1995).

e. Internal cross-subsidisation through the switching of funds

The reorganisation of IRI's multisectoral shareholdings into sectoral subsidiaries facilitated the cross-subsidisation of its activities. The higher profit margins in certain

sectors could be internally reinvested to finance long-term restructuring processes or extra development costs in other sectors.

The cross-subsidisation of activities was encouraged *across* but also *within* sectoral subsidiaries. For instance, during the 1970s and most of the 1980s, the telecommunications sectoral holding STET could channel some of the monopolistic profits accruing from its telephone service company (SIP) towards the electronic manufacturing companies (Italtel, SGS-ATES, Selenia, Elsag) to finance their extra R&D and capital expenditures. At the same time, the Institute at the apical level of the state holding company could redeploy available resources from profitable sectoral subsidiaries – such as in the steelmaking (Finsider) and electric energy sectors (Finelettrica) in the 1950s and early 1960s – towards the mechanical-shipbuilding activities of the sectoral holding Finmeccanica.

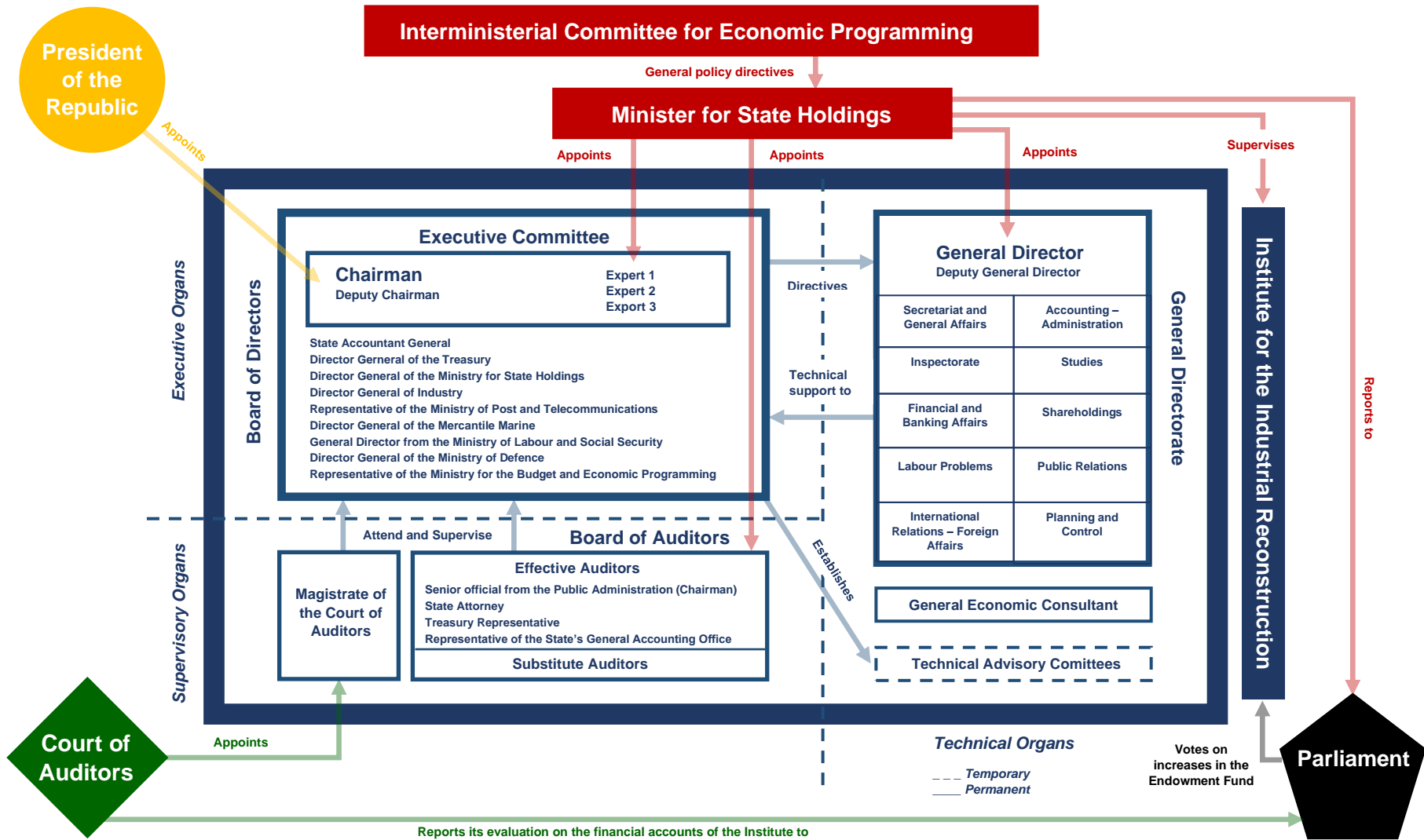


Figure 4.6: Graphical representation of the Institute's organisational system (around the late 1970s). Source: Author's elaboration.

5. The Institute

At its shareholding apex, the IRI Group was controlled by a public law entity – the ‘Institute’ – whose establishment in 1933 coincided with the creation of the state holding company itself. The Institute’s organisational roles and its internal-external operating processes are discussed below and in greater detail in the Appendix (Figure 4.6 provides a graphical representation).

5.1. Constituent elements of the Institute

The Institute had its origins in a legal act⁹¹, and its subsequent transformations were shaped by legislative decrees or by other external legal modifications (see Table A4.7 for a summary). The 1948 Statute⁹², defining the Institute’s constitution until 1992, was largely based on its earlier 1937 version⁹³, which confirmed IRI’s permanent status as a formal instrument of national economic policy. Article 1 of the 1948 Statute enshrined the essence of the Institute⁹⁴:

The Institute for the Industrial Reconstruction (IRI) is a public law financial corporation, with headquarters in Rome.

IRI shall manage the holdings and assets in its possession.

It is the responsibility of the Council of Ministers to provide the general orientation to be followed by the Institute in the public interest.

The Institute’s statutory definition contained an interpretative tension over three main elements. First, the Institute’s public law nature relative to its privately-oriented management. Second, its mixed configuration as a financial corporation but also as a parent holding company. Third, the meaning of its external obligations and general policy orientation.

a. Public law nature and private law discipline

Contrary to its formal definition as a public law entity⁹⁵, the Institute did not operate under public law norms. In fact, as explained by Falsone (2018), article 2093 of the

⁹¹ Royal Decree Law n. 5 (23 January 1933).

⁹² Promulgated with the Legislative Decree n. 51 (12 February 1948).

⁹³ Promulgated with the Decree of the Head of Government (31 December 1937).

⁹⁴ Author’s translation from Italian.

⁹⁵ The Institute’s legal nature as a ‘public law corporation’ was already defined with its 1933 establishing decree.

Italian Civil Code⁹⁶ foresees that, unless specified, private law rules specified in the Civil Code apply to public corporations that operate in the economic sphere. Therefore, despite its formal ‘public law’ nature, the Institute’s activity was subject to private law principles⁹⁷.

As outlined in an internal 1949 document⁹⁸, this implied that the Institute possessed its own assets and was led by an autonomous management, which could perform undelegated tasks of its own⁹⁹. While public administration procedures required formal administrative approvals, most of IRI’s operations could be executed autonomously with no *ex-ante* authorisation (only an *ex-post* financial control by auditors).

The Institute’s accounts were compiled according to the commercial economic principles of a private enterprise (according to articles 2423 and 2424 of the Civil Code). The Institute’s financial accounts were not *ex-ante* budgets. Instead they amounted to *ex-post* financial statements with profits and losses accounts and balance sheet statements. Article 6 of Law n. 42 (7 February 1991) later formalised that the Institute and other public holding corporations had to compile their financial accounts according to Civil Code norms¹⁰⁰, following the discipline on listed joint-stock companies¹⁰¹.

Finally, the Institute’s personnel, from the senior management to the lowest ranks, was employed under private contracts, whose terms and conditions were associable to the employees of the IRI-owned banks.

b. Financial corporation but also parent company of an industrial holding

In the 1948 Statute, the Institute was defined as a “public law financial corporation”. The specification ‘financial’ was added to stress the primary function the Institute had

⁹⁶ Originally promulgated in 1942.

⁹⁷ As mentioned before, this was even more valid for IRI’s sectoral subsidiaries and operating companies, as they had a joint-stock legal nature.

⁹⁸ ‘Information concerning Iri, Italian Institute for Industrial Reconstruction’ (Archivio storico IRI, Serie Nera, Busta STO/522).

⁹⁹ The long-standing 1948 Statute was more general and granted greater autonomy to the Institute compared to its 1937 version (Ministero dell’Industria e del Commercio, 1955b), which required the authorisation of the Finance Minister and of the Head of Government for the most relevant financial operations (articles 10 and 11).

¹⁰⁰ Articles 2423, 2424, 2425, 2425-bis of the Italian Civil Code.

¹⁰¹ Article 1 from the Decree of the President of the Republic n. 137 (31 March 1975).

covered until that moment (Ministero dell'Industria e del Commercio, 1955b): the financing of its controlled companies and sectoral subsidiaries.

However, the very second comma of article 1 added that the Institute's role was to "manage its controlling assets". This also qualified the Institute as a parent entity, with managerial duties, of a consolidated industrial holding.

In the following decades, the Institute preserved this hybrid configuration. As for any other private conglomerate with a holding structure, the Institute remained a financial corporation in so far as it raised extra-financing sources on behalf of its controlled companies. At the same time, the Institute operated as a parent holding company mandated with the strategic orientation of its subsidiaries.

c. General orientation and public interest

The public nature of the Institute was affirmed by its external obligation to pursue "the public interest". This general orientation was supposed to be specified by the political governing authority. It could only apply to the public law entity (i.e. the Institute) and not to its operating joint-stock companies.

The statutory definition of the public interest to be pursued by the Institute was deliberately general and unspecified, meaning that it ought to reflect the government's policy orientation. Initially, the governmental body in charge of outlining IRI's general orientation through the Institute was the Council of Minister, later supplanted by the Ministry of State Holdings (in 1956) and since 1967 by a dedicated permanent Interministerial Committee for Economic Programming (see Appendix).

5.2. The Institute's configuration, responsibilities and functions

With the legal specification of its role within the system of State Holdings and its association to the plurennial economic policy plans of the Country, the Institute assumed a clear definition of its configuration, responsibilities and functions within the multilevel governance of IRI¹⁰².

The Institute's *configuration* was as follows:

¹⁰² For a more detailed discussion on the Institute's role see Petrilli (1967), Guarino (1974), Saraceno (1982).

- a) The Institute was a public legal person, as specifically defined by law. It nonetheless operated under the same principles of private law companies; thus, it was not subject to administrative law procedures.
- b) Its board members were nominated by the State for a renewable three-year period. They were not defined as public officials. Therefore, their responsibility towards the Institute was subject to the discipline of the Civil Code. They were also exempt from the norms on accounting responsibility.
- c) The Institute did not produce annual budgets. Instead, it reported its financial accounts as any other private company, comprising assets and liabilities as well as profits and losses statements¹⁰³. The Institute's annual financial reports were submitted for approval, together with the report of the Board of Directors and of the Board of Auditors, to the Treasury¹⁰⁴. Annual accounts were communicated to the Council of Ministers¹⁰⁵ and presented to both Chambers of Parliament as an annex to the National Accounts¹⁰⁶ for the year.
- d) The Institute disposed of an endowment fund¹⁰⁷ – similar to the share capital of private companies – which could be periodically increased, upon decision of Parliament.
- e) In terms of its internal organisation and functioning – not disciplined by external legal sources – the Institute possessed autonomous or private negotiating powers, not administrative ones.
- f) The Institute was included among the non-state entities which could nonetheless enjoy legal advocacy by the State Attorney for its legal controversies¹⁰⁸.

The Institute's main *responsibilities* were as follows:

¹⁰³ Article 16 of the 1948 Statute.

¹⁰⁴ To the Ministry of State Holdings, following Article 5 of Law n. 556 (21 July 1959).

¹⁰⁵ To the Ministry of State Holdings, following Law n. 1589 (22 December 1956).

¹⁰⁶ As an annex to the budget of the Ministry of State Holdings, containing the financial accounts and a policy report on IRI as one of the 'state holding management entities', following article 10 of Law n. 1589 (22 December 1956).

¹⁰⁷ Article 2 of the 1948 statute.

¹⁰⁸ P. 2 from 'Il controllo sugli enti sovvenzionati dallo Stato – Periodo 1942-1950. Estratto dalla Relazione della Corte dei Conti al Parlamento. Volume secondo. Presentata alla Presidenza della Camera il 4 giugno 1953' (Archivio Storico IRI, Serie Nera, Busta STO/522).

- a) The Institute did not exercise any direct managerial role on its subsidiaries, it could only influence their corporate governance through the prerogatives deriving from being the controlling shareholder.
- b) The Institute responded to the economic policy orientation provided by the Government.
- c) The Institute outlined pluriannual industrial plans¹⁰⁹, in line with national economic programmes, indicating future investments and financing sources, together with sectoral guidelines and other plans to address labour problems, R&D programmes and investments in the underdeveloped South.
- d) The overall financial conduct of the Institute had to be subject to the maximum degree of 'economic efficiency'¹¹⁰ (*economicità*), which corresponded to the maximum level of profitability, once the investments with deferred returns and the costs for the operations of public interest were taken into account.

The main *functions* that the Institute performed were as follows:

- a) The Institute had external public purposes. It was the place – within the IRI Group – where national economic policy objectives found a synthesis with the corporate management of operating companies¹¹¹. The Institute's function was to transform the state holding company into a policy instrument.
- b) The relations between the Institute and its subsidiaries were regulated by Civil Code norms, as in other private holding entities. In particular, the Institute appointed the board members of its subsidiaries, imparted general directives and provided the necessary supporting services¹¹².
- c) The Institute had a responsibility for the general orientation of the IRI Group. Moreover, the Institute could also promote new initiatives in other sectors and stimulate sectoral synergies among its subsidiaries¹¹³. The Institute's technical services – the Inspectorate and the Studies ones above all – played a key role

¹⁰⁹ From 1956 onwards, with IRI's first four-year plan for the period 1957-1960.

¹¹⁰ Article 3 of Law n. 1589 (22 December 1956).

¹¹¹ As explained by Professor Siro Lombardini, former Minister for State Holdings (1979-1980), in a hearing to the Italian Senate (Senato della Repubblica, 1982c, p. 218).

¹¹² As clarified by Professor Pasquale Saraceno in a hearing to the Italian Senate (Senato della Repubblica, 1982b, p. 127 and p. 164).

¹¹³ This point was stressed by IRI's Chairman Giuseppe Petrilli in a hearing to the Italian Chamber of Deputies (Camera dei Deputati, 1962).

in facilitating the central control and strategic orientation of the state holding group (Petrilli, 1967, pp. 85-88).

- d) The Institute had the superior control of IRI's financing structure, due to the direct shareholding relations with its subsidiaries and to the autonomous capacity of raising extra-financing sources by issuing long-term obligations (with an activable state guarantee¹¹⁴), potentially convertible in shares of IRI's companies.
- e) The multi-sectoral structure of IRI allowed an internal switching of funds at the level of the Institute, with more profitable activities – such as steelmaking (until the early 1970s), telephone services, electric energy (until 1962), motorways concessions – able to subsidise sectors with a lower or deferred profitability. As specified by IRI's Chairman Giuseppe Petrilli (Camera dei Deputati, 1962, p. 367), this could happen only for the share of profits that concerned the shareholding participation of the Institute in its subsidiaries¹¹⁵.
- f) The Institute had the statutory responsibility¹¹⁶ of promoting technical and managerial training programmes for the personnel of both IRI and non-IRI companies (see Chapter 6).
- g) From the 1960s, the Institute assumed a coordinating role¹¹⁷ with respect to the international relations and export policy of the IRI Group. The Institute inaugurated representative offices in Brussels, Moscow, Beijing, Tokyo and Washington (see Chapter 7). It maintained direct relations with the European Economic Community and other international economic organisations. It sponsored international programmes for technical cooperation with developing countries (see Chapter 6).
- h) The Institute also coordinated the R&D policy of the IRI Group (see Chapter 6). Following the 1964 conference, 'Research and Development in the IRI Group',

¹¹⁴ Articles 3 and 4 of the 1948 Statute.

¹¹⁵ This mechanism is typical of any holding organisation. Within IRI, it could take place also within the sectoral subsidiaries, as it happened with STET, which reinvested the profits of its telephone service company SIP into the development of research (CSELT) and manufacturing activities in the field of electronics (Selenia, Elsag, SGS-ATES).

¹¹⁶ Following article 24 of the 1948 Statute, 15% of the Institute's annual profits had to be devoted to fund technical and managerial training.

¹¹⁷ In 1960 the Institute established the External Relations Division (International Relations Service from 1962), while in 1962 it introduced the Division for the International Technical Cooperation.

the Inspectorate began to supervise IRI's R&D activities. In 1975, the division 'organisation and research' was transferred to the Studies and Programming Service, which then assumed the responsibility for coordinating IRI's R&D programmes with IRI's overall four-year plans.

- i) From the 1950s, the Institute adopted an integrated strategy of internal corporate communication for the IRI Group (Lavista and Ricciardi, 2013). In 1957, the Institute founded a publishing company (Edindustria) which began the publication of the bimonthly house organ '*Notizie IRI*' (IRI News), containing figures, analyses and news on IRI's activities, with the aim to cultivate an internal *esprit de corps*.
- j) In the 1960s, the Institute formalised an external public relations approach for the IRI Group. In 1962, it established a Public Relations Service¹¹⁸, which underwent subsequent transformations and changes in its attributions, but remained broadly responsible for IRI's promotional, public relations and press scopes.

5.3. The statutory bodies and roles of the Institute

The Institute's governance – as defined by the 1948 Statute with later modifications introduced by national legislation or by internal deliberations – was characterised by a set of executive, supervisory and consulting bodies and roles, whose organisation and main responsibilities are summarised in Table 4.10. Details for each body and role are exposed in a separate section in the Appendix.

The ultimate decision-making body of the Institute – and of the entire IRI Group – was the Board of Directors. This was composed by senior civil servants – representing the plurality of ministerial interests – and by five externally appointed members.

The latter constituted the Executive Committee, the core management of IRI, which operated on a more frequent basis upon delegation from the Board. Members of the Executive Committee were IRI's Chairman and Vice Chairman, which in turn had autonomous managerial roles. IRI's Chairman concentrated in the same person the function of a CEO and Chairman of a modern company. The other three members of

¹¹⁸ 'Ordine di servizio [9 aprile 1962]' (Archivio storico IRI, Ordini di servizio).

the Executive Committee were experts on financial and industrial affairs. The Chairman and Vice Chairman were appointed for a three-year renewable period by the President of the Republic, upon proposal of the Prime Minister¹¹⁹. The three experts of the Executive Committee were appointed by the Prime Minister¹²⁰, for a three-year renewable period.

All these bodies and roles had executive functions but also incorporated the public law nature of the Institute. The appointed figures received a political legitimization from the highest ranks of government and from the head of state (in the cases of the Chairman and Vice Chairman). Ministerial representatives on the Board of Directors were also the political emanation of appointed Ministers.

Another executive role was played by the General Director of the Institute and by its Deputy. They were the highest-ranking officials of the Institute's technostructure and attended the meetings of the Board of Directors. Despite their technical nature, they had significant delegated power over the Institute's internal organisation and on IRI's overall management. The General Director was appointed by the Council of Ministers¹²¹, but without fixed term and upon the recommendation of IRI's Chairman. The Deputy General Director was appointed directly by IRI's Chairman.

Executive bodies and appointees were supervised by the Board of Auditors (chosen among senior officials from the public administration) and by a representative of the national Court of Auditors (appointed by its President). Their role was to operate an overall control over the Institute's accounting, administrative and financial management.

Finally, the Institute could dispose of temporary Technical Advisory Committees on *ad hoc* issues regarding IRI's industrial activities. Established by the Board of Directors, they were composed by experts from within IRI, from other companies as well as from academia. A special consulting role was attributed to the General Economic Consultant, personified during its entire existence (1966-1991) by Professor Pasquale

¹¹⁹ By the Minister of State Holdings from 1956.

¹²⁰ By the Minister of State Holdings from 1956.

¹²¹ By the Minister of State Holdings from 1956.

Saraceno, who had worked for IRI at leading executive levels ever since its establishment in 1933.

5.4. The technostructure of the Institute

The Institute’s technostructure was the central brain for the elaboration of IRI’s strategies as well as its administrative backbone. It represented a unique pool of technical and managerial competences, organised under an agile structure divided into specialised ‘Services’ (later called ‘Divisions’).

5.4.1. The Institute’s personnel

The post-war Institute inherited the structure it had assumed in the 1930s and most of its personnel, except for some distinguished new hirings in the years 1945-1946¹²². From 102 employees in 1934 (Saraceno, 1956, p. 195), in 1949 they had grown to 152¹²³. Their number quadrupled in the following three decades, but less than doubled with respect to the total number of employees in the IRI Group (Table 4.9). Over the period 1950-1990, the personnel of the Institute reached a maximum of 606 units in 1985, but remained always an infinitesimal share of the IRI Group – between 0.07% and 0.14% of the total.

	1950	1955	1960	1965	1970	1975	1980	1985	1990
Number of employees	151	150	242	321	440	410	483	606	567
Share of the IRI Group	0.07%	0.07%	0.09%	0.11%	0.13%	0.08%	0.09%	0.13%	0.14%

Table 4.9: Number of employees of the Institute (1950-1990). Source: Author’s elaboration based on Del Canuto (1990).

The Institute’s employees were not civil servants. Their contractual conditions were entirely assimilated to those working for IRI-controlled banks¹²⁴. The hierarchical structure of the Institute was also borrowed from the banks.

¹²² Notably among them Gaetano Cortesi, Leopoldo Medugno (both hired in 1945) and Venerio Ajmone Marsan (hired in 1946), who became leading officials of the Institute in the 1960s (see Table A4.11).

¹²³ Of which only 17 with senior executive functions (including the General Director) and 26 officials with middle-management positions. ‘Personale addetto ai servizi ed uffici dipendenti al 10.4.1949’ (Archivio storico IRI, Serie Nera, Busta STO/522).

¹²⁴ Following an internal decision of IRI’s Chairman (20 February 1947), ‘Delibera presidenziale [20 febbraio 1947]. Trattamento del personale’ (Archivio storico IRI, Ordini di servizio).

Body	Function	Responsibilities and composition
Board of Directors	Executive-Political	<ul style="list-style-type: none"> • Ultimate decision-making body of the Institute (and of IRI) • Composed by appointed executives (Chairman, Vice Chairman and three experts) and by ministerial representatives (senior civil servants)
Executive Committee	Executive-Political	<ul style="list-style-type: none"> • Lean decision-making body of the Institute, in charge with its daily management • Composed by appointed executives (Chairman, Vice Chairman and three experts)
Chairman	Executive-Political	<ul style="list-style-type: none"> • Leading executive figure of IRI • Appointed by the President of the Republic for a three-year renewable period
Vice Chairman	Executive-Political	<ul style="list-style-type: none"> • Supplementary role with respect to the Chairman's functions • Appointed by the President of the Republic for a three-year renewable period
Board of Auditors	Supervisory	<ul style="list-style-type: none"> • Internal control over the Institute's accounting, administrative and financial management • Composed by officials from the public administration
Representative of the national Court of Auditors	Supervisory	<ul style="list-style-type: none"> • Internal control on behalf of the national Court of Auditors over the Institute's financial management • A magistrate of the national Court of Auditors appointed by its President
General Director	Executive-Technical	<ul style="list-style-type: none"> • Leading executive figure of the Institute, head of the Institute's technostructure • Appointed without fixed term by the Council of Ministers, upon proposal of IRI's Chairman
Deputy General Director	Executive-Technical	<ul style="list-style-type: none"> • Supplementary role with respect to the General Director's functions • Appointed without fixed term by the Institute's Chairman
Technical Advisory Committees	Consulting	<ul style="list-style-type: none"> • Temporary advisory committees on <i>ad hoc</i> matters • Established by the Board of Directors
General Economic Consultant	Consulting	<ul style="list-style-type: none"> • Consulting and diplomatic role for the Institute and for the IRI Group • Established by the Chairman (position held by Professor Saraceno from 1966 to 1991)

Table 4.10: Main statutory organs of the Institute. *Source:* Author's elaboration.

The first employee of the Institute, the head of the structure, was the General Director (*Direttore Generale*), immediately followed by the Deputy General Director (*Vice Direttore Generale*). Central Directors (*Direttore Centrale*) headed the Institute's Services (*Servizi*), supported by Central Co-Directors (*Condirettore Centrale*). Central Directors and Central Co-Directors constituted the top management of the Institute, reporting directly to the General Director and representing the Institute in the boards of IRI's sectoral subsidiaries and leading companies. Between them and the middle management stood the Deputy Directors (*Vice Direttore*), with the responsibility of heading sub-units within the Services. The Institute's middle management was composed by Procurers (*Procuratore*) and Functionaries (*Funzionario*) in descending order¹²⁵, with delegated tasks from the top management.

The educational profile of the typical official of the Institute was in economics and commerce or law, as opposed to the more variegated backgrounds – mostly in industrial engineering – of the leading executive figures in IRI's companies (Felesini, 2013).

Most senior officials pursued a long-term internal career within IRI, having been hired in junior positions at a relatively young age, demonstrating the interest of the Institute in developing its internal competences. Four different generations can be identified from Table A4.11, which illustrates the profiles of the Institute's most prominent senior executives.

The *first generation* was represented by young economic experts hired in IRI's first years (1934-1937), who immediately reached senior executive positions, working closely with Chairman Alberto Beneduce¹²⁶ and General Director Donato Menichella¹²⁷ during the 1930s. In the aftermath of the conflict, they became the leading officials of

¹²⁵ The figure of Inspector (*Ispettore*) was introduced later as an intermediate level between Functionary and Clerk, the lowest rank.

¹²⁶ Alberto Beneduce (1877-1944) was among the most respected financial experts in Italy, having chaired important financial and insurance corporations (INA, ONC, CREDIOP, ICIPU, IMI), and serving as Labour Minister in the socialist-reformist government of Ivanoe Bonomi (1921-1922). Beneduce was the founding Chairman of IRI. During the Fascist years he remained under the persistent control of the secret police. For further details on Beneduce's biography see Franzinelli & Magnani (2009).

¹²⁷ Donato Menichella (1896-1984) was a leading expert on banking issues and main author of the Banking Law of 1936, which underpinned the functioning of Italy's banking system until 1990. He was IRI's first General Director. From 1948 until 1960 he served as Governor of the Bank of Italy. For further details on Menichella's biography see Banca d'Italia (1986).

IRI's technocracy. The *second generation* was characterised by those who were hired at the end of the war or in the years that followed (until the mid-1950s). Most of them started as clerks or middle managers, assuming top executive responsibilities by the late 1950s or early 1960s. Because of their pluriannual experience within the Institute, they acquired a consolidated knowledge of the sectors and activities in which IRI was involved and they were subsequently appointed in leading executive positions of IRI's subsidiaries or other non-IRI companies in later years. The *third generation* of those hired from the mid-1960s went through similar internal careers, from junior to top positions within the Institute, without ending up in leading executive positions of operating companies in later years, due to IRI's privatisation throughout the 1990s. The *fourth generation* of the Institute's top executives rose to prominence in late 1970s-early 1980s, in parallel with the third generation, coming from previous executive experiences in operating companies controlled by IRI and other public or private groups. They were typically hired at the Institute to hold senior positions and concluded their careers as business executives, often of state-controlled groups.

The responsibilities of the Institute's officials were not reduced to the daily management of its internal Services. They had also another key role in the internal governance of the IRI Group. The Institute's Central Directors and Central Co-Directors were typically appointed in the boards of executives and in the boards of auditors of IRI's sectoral subsidiaries and leading operating companies¹²⁸. In several circumstances, the same person was sitting in the boards of two different subsidiaries. By virtue of this, the Institute's officials could perform a double linking function, between the hierarchical shareholding levels (i.e. between the Institute and its main subsidiaries) and among different sectoral holdings or companies, reinforcing the internal coherence of the IRI Group. As appointed members of the boards, they represented the interests of the specific companies, but also those of the controlling public shareholder at the apex of the holding structure, facilitating the flow of internal knowledge as well as the coordination of IRI's industrial initiatives.

¹²⁸ The remuneration they received as members of the boards was limited to reimbursement costs and could not be cumulated on top of the salary that they were already receiving as employees of the Institute.

Lastly, despite their formal status as private-sector employees, those who worked at the Institute were pervaded by the awareness of working to advance the nation's economic development. A few examples, from different sources, can portray the prestige and the sense of public devotion that implied working for the Institute.

In his *memoires*, Guido Carli¹²⁹ – former Governor of the Bank of Italy and champion of IRI's privatisation from the late 1980s – used the following words to describe the beginning of his career at the Institute in 1937 (Carli, 1993, p. 23):

We considered with great pride our affiliation to the *Istituto per la Ricostruzione Industriale* [...] everything inspired even the youngest collaborators to consider themselves part of a great project¹³⁰.

Similarly, Sociology Professor Domenico De Masi¹³¹ reported that within the Institute:

There was a sense of pride for being better than the private sector, not least because there was a public mission: modernising the Country [...] IRI carried a great prestige for doing more modern things than any other, plus it paid as much as the private sector.

Other similar feelings pervaded the conscience of former IRI General Director Leopoldo Medugno in 1980, when writing to Professor Saraceno¹³² he expressed his “great” concern about the future of IRI's electronics activities because:

great [was] the love for the Institute

Finally, in the words of Giuliano Amato¹³³, the sense of driving the socio-economic progress of the Country had always characterised the spirit of the Institute's officials:

Having frequently met IRI's officials, also those of later generations, my impression is that they have never lost the connection between their own responsibility and the national responsibility. This has always seemed to me the distinctive trait of a responsible and conscious entrepreneurship [...] this is a great quality that has never been diffused outside the public enterprise.

¹²⁹ Guido Carli (1914-1993) was one of Italy's most influential economic policymakers in the post-war decades. He was Governor of the Bank of Italy from 1960 to 1975, President of the Association of Industry (Confindustria) from 1976 until 1980 and Treasury Minister from July 1989 to June 1992.

¹³⁰ Author's translation from Italian.

¹³¹ Interview with Domenico De Masi (7 February 2020), author's translation from Italian. Professor De Masi (1938-) was a leading figure within IFAP – IRI's centre for managerial training – and a consultant for IRI's companies on business organisation and industrial relations.

¹³² From a 1980 letter to Professor Saraceno 'Dr. Medugno, Leopoldo' (Archivio storico IRI, Pasquale Saraceno, Busta 62), author's translation from Italian.

¹³³ Speech by Giuliano Amato, former Treasury Minister (1987-1989) and Prime Minister of Italy (1992-1993), during the conference 'Gli anni della programmazione ed il ruolo dell'IRI nell'economia italiana' (Rome, 28 February 2019). Author's translation from Italian.

5.4.2. The Institute's organisation into specialised Services

The legal status of public law economic entity allowed the Institute to adopt a corporate-like configuration. In 1948¹³⁴, the Institute was organised into different functional offices called 'Services' (*Servizi*), headed by Central Directors or Central Co-Directors under the coordination of the General Director.

In the following decades, the growing complexity of functions and the multiple initiatives of the IRI Group across various sectors imposed a reorganisation of the Institute's internal structure. A first major restructuring of the internal Services in 1957 was consciously justified by IRI's Chairman¹³⁵ as functional to:

Attributing to the Institute the possibility and means to perform with full functionality those roles of impulse, guidance and control over the various sectors in which the Group is articulated, which – notwithstanding the fundamental principle of autonomy and responsibility of the single sectoral holdings and companies – will have to underpin our future activity, to assert and consolidate the prominent position of our Institute in the general economy of the Country.

The reorganisation and empowerment of the Institute's Services was thus functional to the consolidation of the IRI Group as an integrated industrial entity. The Institute was assuming a more pervasive role in coordinating the various sectoral programmes under a four-year plan for the IRI Group (see section 5.5.).

A second major transformation took place in 1977¹³⁶, following the indications of a McKinsey report¹³⁷, when the Institute was reorganised into 'Divisions' (*Direzioni*, instead of 'Services') and 'Committees' (*Comitati*). The objective was to "attain a unitary strategy and management of the Group", through a higher degree of horizontal integration among the Institute's offices and the reinforcement of vertical linkages with the technical structures of IRI's subsidiaries (for instance, facilitating the interchange of officials across the various levels and structures of the IRI Group). In the late 1980s,

¹³⁴ Following the deliberation from IRI's Chairmen on 1st July 1948 'Delibera presidenziale del 1° luglio 1948' (Archivio storico IRI, Ordini di servizio).

¹³⁵ Author's translation from 'Ordinamento degli uffici [23 ottobre 1957]' (Archivio storico IRI, Ordini di servizio).

¹³⁶ 'Ordine di servizio [10 novembre 1977]' (Archivio storico IRI, Ordini di servizio).

¹³⁷ 'Riorganizzare gli uffici dell'Iri per rendere più attivo ed incisivo il ruolo dell'Istituto nei prossimi anni', a report commissioned to McKinsey & Company, Inc. in February 1977, from 'Ordine di servizio [10 novembre 1977]' (Archivio storico IRI, Ordini di servizio).

new deliberations from the Chairman introduced the distinction between ‘Central Divisions’ and ‘Functional Units’.

The responsibilities and evolution of the Institute’s main offices, briefly summarised in Table 4.11, are described in further details in the Appendix. It is nonetheless important to focus the distinctive importance of the two most influential offices – at least until the early 1980s – in the Institute’s structure: the Studies and Inspectorate Services.

Office	Established in	Responsibilities
Secretariat and General Affairs	1933	Permanent: <ul style="list-style-type: none"> • Secretariat and administrative services • Relations with other Institute's offices Temporary: <ul style="list-style-type: none"> • Legal affairs • Public relations and press office • Coordination office
Accounting-Administration	1933	Permanent: <ul style="list-style-type: none"> • Accounting and budget of the Institute Temporary: <ul style="list-style-type: none"> • Technical support in compiling IRI's consolidated accounts • Management of the Institute's issued bonds
Studies	1953 (operative since 1933)	<ul style="list-style-type: none"> • Elaboration of IRI's four-year industrial plans • Preparation of IRI's annual reports • Examination of the financial and industrial plans of IRI's subsidiaries • Elaboration of studies and technical reports on economic and industrial issues
Inspectorate	1937	Continuative: <ul style="list-style-type: none"> • Revision and examination of the companies' financial accounts • Formulation of IRI's consolidated financial accounts • Participation to the companies' Board of Auditors Occasional: <ul style="list-style-type: none"> • Technical and financial inspections of IRI's companies
Financial and Banking	1944	<ul style="list-style-type: none"> • Management of the banking shareholdings • IRI's financial operations (issuing of bonds, acquisition and divestment of shares, operations on the financial markets)
Shareholdings	1948 (abolished in 1977)	<ul style="list-style-type: none"> • Management and supervision of IRI's non-banking shareholdings (responsibilities transferred to the Planning Division)
Labour Problems	1955	<ul style="list-style-type: none"> • Industrial relations • Professional training
Public Relations	1957	<ul style="list-style-type: none"> • Public relations • Organisation of conferences and publication of IRI's house organ
International Relations – Foreign Affairs	1962	<ul style="list-style-type: none"> • International relations of IRI • Export promotion and responsibility of IRI's foreign branches
Planning and Control	1984	<ul style="list-style-type: none"> • Strategic planning of IRI (from Studies) • Examination and evaluation of the financial and industrial plans of IRI's subsidiaries (from Studies) • Control functions over the IRI Group (from Inspectorate)

Table 4.11: The internal organisation of the Institute and its main Services or Divisions. *Source:* Author's elaboration.

The Studies Service was IRI's internal think tank, as well as its strategic brain (at least until the delegation of its planning responsibilities to the Planning and Control Division in 1984). Directed by the illustrious Professor Pasquale Saraceno (1948-1966) and by

Veniero Aimone Marsan (1966-1983), the Studies Services processed all the financial and economic information from IRI's companies and elaborated new industrial strategies for IRI's executives. From 1957, the Studies Service assumed a central role in IRI's four-year planning process, combining and integrating the programmes of IRI's subsidiaries into a consolidated plan for the IRI Group.

The Inspectorate was a peculiar office for auditing, information gathering and control developed by the Institute to facilitate its control over IRI's subsidiaries. Its activities of intelligence and control included periodic analyses of the companies' financial accounts but also occasional examinations of particular situations – such as subsidiaries that required a more in-depth assessment and evaluation of their financial, economic and technical issues. The Institute's 'Inspectors' performed their duties by participating to the Boards of Auditors of IRI's subsidiaries as appointed members and by visiting the production sites and head offices of companies requiring further examination.

5.5. The role of the Institute as a planning centre for the IRI Group

The progressive transformation of IRI from a financial holding – as it was conceived at its foundations in 1933 – into a coordinated industrial group was completed in the mid-1950s¹³⁸. Few years earlier¹³⁹, former IRI's General Director Donato Menichella had championed an increase in the efficacy of the Institute's "overall financial planning" role in order to "guide the development of the IRI Group".

The turning point was the introduction – in 1956 – of IRI's four-year planning system as a (Marsan, 1992, p. 153):

Governance method of the Group [which characterised] the role of strategic orientation and executive control of the Institute with respect to the parallel activity of planning performed by the sectoral holdings and by the participated companies.

IRI's planning had an explicit policy projection: the scale and range of IRI's sectoral activities implied that its investments decisions steered and defined sectoral national

¹³⁸ IRI's 1955 annual report is the first to present aggregate figures on revenues, investments and employment, together with a more detailed description of the industrial activities of its main sectoral subsidiaries.

¹³⁹ P. 5 from the signed note 'Prima fase del programma inteso a migliorare il settore finanziario contabile dell'IRI e delle sue holdings [1952]' (Archivio storico IRI, Serie Nera, Busta STO/522).

policies. In fact, IRI's corporate planning followed and was framed into the 'Vanoni Scheme', a decennial national economic programming framework approved in 1954, to which the Institute had contributed through the work of Professor Saraceno and other officials.

IRI's 1957-1960 four-year industrial plan¹⁴⁰ was the first major experience of corporate planning¹⁴¹ in Italy, on a similar scale and diversification. The plan, in the words of the Institute¹⁴², incorporated a corporate "working method" and a four-year "general orientation of the Institute", as foreseen by Article 1 of IRI's 1948 Statute.

The formulation of investment plans for each sector and their coordination by the Institute responded to four main functions:

- a) The better specification of responsibilities at each shareholding level – the Institute, sectoral subsidiaries, operating companies;
- b) The definition of long-term directives;
- c) The identification of interconnections among existing sectoral plans;
- d) The definition of sectoral financing needs in order to estimate the financing contribution from the Institute;

The Institute's initial planning approach was indicative and focused on improving the efficacy of IRI's overall financing needs. The plans were nourished with those submitted by IRI's subsidiaries. They were revised annually, with a four-year continuity in their temporal framework.

The planning focus was therefore primarily sectoral, but transversal objectives called "overarching aspects of the plan" – i.e., the internal evolution of employment, housing for workers, exports, activities in the South – were already discussed in the first 1957-1960 version. Despite retaining a sectoral orientation, in the following years, IRI's plans were characterised by a growing relevance of cross-cutting themes.

¹⁴⁰ 'IRI - Programma quadriennale 1957-60' (Archivio storico IRI, Bilanci, Programmi quadriennali del Gruppo Iri).

¹⁴¹ This followed dedicated visits by the Institute's officials to study the most modern corporate techniques adopted by large corporation in the US (in 1953), The Netherlands, Sweden and Switzerland (in 1955).

¹⁴² From 'Relazioni e note sul piano quadriennale' (Archivio storico IRI, Serie Nera, Busta AG/3258).

A report¹⁴³ from the consulting management company Booz, Allen & Hamilton (BA&H) – commissioned in 1960 by the General Director and elaborated in cooperation with the Inspectorate and the Studies Services – suggested the introduction of modern planning and control techniques, which were already in use within major US corporations.

Given the complexity and heterogeneity in size, sectors, managerial approaches of the IRI Group, the BA&H report suggested a flexible approach to IRI's planning and control, in which each “organizational unit” – the Institute, the sectoral subsidiaries, the operating companies – had specific planning and control functions within the overall planning process.

The BA&H study was extremely influential in shaping IRI's planning policy in the following decades, as testified in a 1966 document¹⁴⁴ illustrating the guidelines for corporate planning to which IRI's subsidiaries had to abide.

- Operating companies had to organise their planning programmes according to “general chapters” – based on their strategic projections, their plans for sales, production, investments, staff, followed by estimates of their economic, financial and patrimonial accounts – and “special chapters” on labour problems, R&D, business organisation, export relations.
- Sectoral subsidiaries had to validate the four-year programmes of their controlled companies and formulate a synthesis of to be submitted to the Institute, together with their own four-year economic and financial programmes.
- The Institute was responsible for a further synthesis of the four-year plans received from the sectoral subsidiaries in accordance with the Institute's general economic objectives.

At this point, the Institute's planning had evolved from mostly estimating the financing needs of the various sectoral investment programmes to effectively orienting the planning process of the IRI Group around economic variables such as value added,

¹⁴³ 'Planning, reporting and control systems in Iri. Rome, Italy' (Archivio storico IRI, Serie Nera, Busta STU/608).

¹⁴⁴ 'La programmazione nelle aziende del Gruppo Iri', June 1966 (Archivio storico IRI, Serie Nera, Busta AG/3262).

investments and employment. The planning process became a key instrument through which the Institute combined the technical necessities of its operating subsidiaries with broader economic policy objectives (Quattrone et al., 2015), according to its constitutive nature as a public economic entity. In fact, IRI's four-year plans were eventually submitted to the Ministry for State Holdings, which would later include them with those of the other state holding companies in a Report to be presented in Parliament.

Later, difficult conditions faced by IRI's manufacturing companies following the 1973 oil shocks and the structural crisis of the steelmaking sector prompted the Institute to reconsider its planning approach. During the 1980s, IRI's planning philosophy moved away from the primacy of (external) general and sectoral policy objectives towards increasing the (internal) competitiveness of IRI's composing subsidiaries.

Nevertheless, for as long as IRI remained a public law corporation, it maintained a four-year planning framework¹⁴⁵ focused on the competitive objectives of its companies, but also considering:

synergies activated with other companies of the Group, to be conceived as preferential 'partners', given the common interest in the realisation of IRI's general mission.

In fact, although IRI's planning became more and more centred on the competitive and financial objectives of its subsidiaries, it nonetheless maintained among its "group's strategic lines" a series on indicative cross-cutting programmes such as those included in IRI's last 1992-1995 plan¹⁴⁶: internationalisation; labour policies and employment; investments in plants; investments and policies for the Southern area of the Country; research and development; entrepreneurial promotion and reindustrialisation.

With the transformation of IRI into a joint-stock company in 1992, the planning process was terminated, signalling the end of IRI's external policy projection and of its internal coherence as an integrated industrial holding.

¹⁴⁵ P. 3 from 'Schema di riferimento per la formulazione del piano di finanziaria. vol. verde. (originali)' (Archivio storico IRI, Serie Nera, Busta DPC/49). Author's translation from Italian.

¹⁴⁶ 'Gruppo Iri. Programma 1992/1995' (Archivio storico IRI, Bilanci, Programmi quadriennali del Gruppo Iri).

6. Concluding remarks on IRI's SOSOEs

This Chapter has provided an organisational and economic overview of the IRI system of SOEs, as a diversified and policy-oriented state holding company. It has also outlined IRI's multilevel structure, analysing the basic functions of each shareholding level – operating companies, sectoral subsidiaries, the Institute.

A dedicated section in the Appendix explains IRI's¹⁴⁷ institutional placement within the Italian system of State Holdings (illustrated in Figure 4.7 below), relative to the external public authorities to which IRI was differently responsible: the Ministry of State Holdings, the Interministerial Committee for State Programming, the national Court of Auditors and the national Parliament.

¹⁴⁷ The same scheme applied to IRI and to the two remaining state holding groups – ENI and EFIM – but excluded other public corporations or state companies such as the electric energy ENEL or the state's national railways, which were subject to a different juridical regime and fell under the supervision of the Ministry for Industry and of the Ministry for Transport respectively.

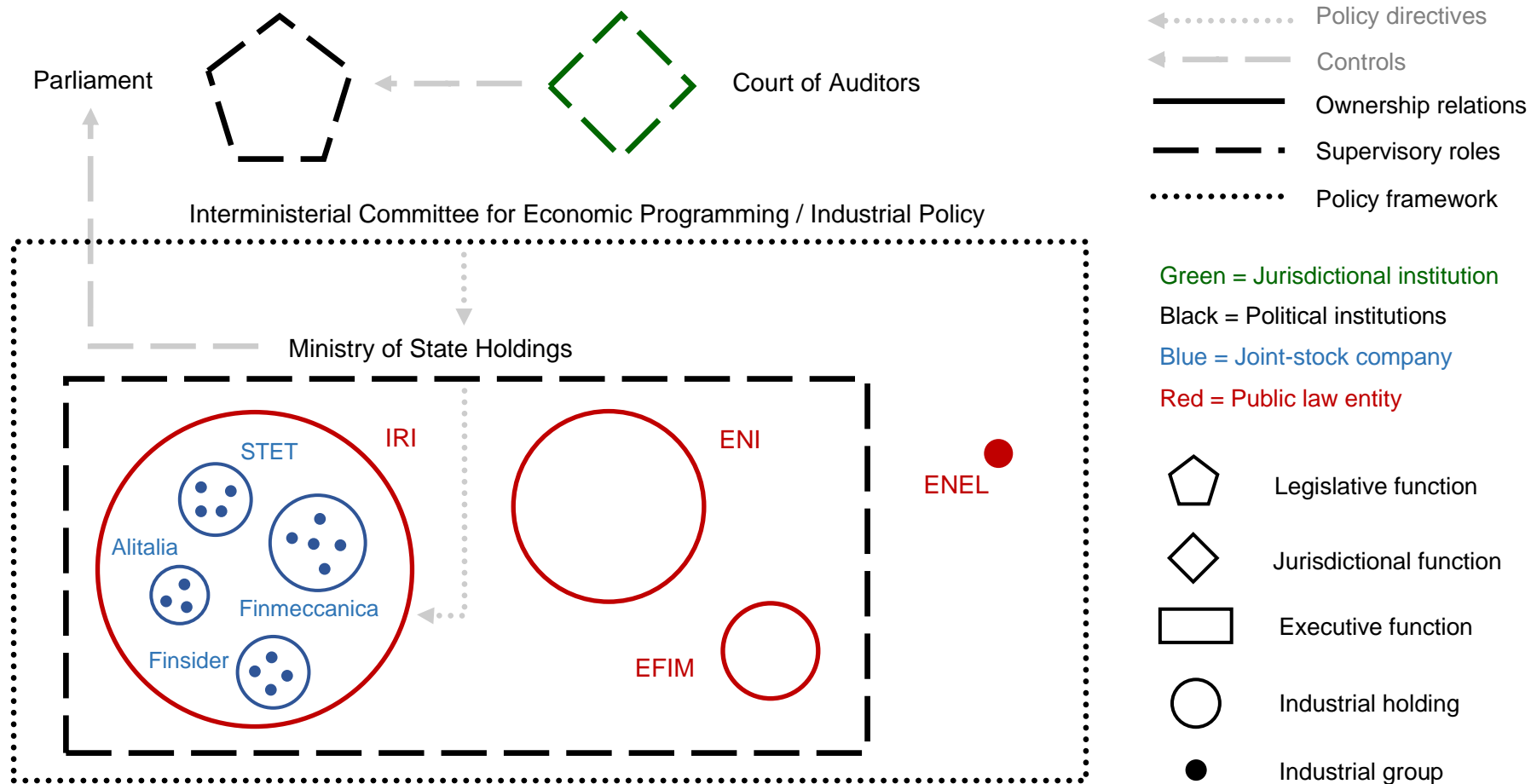


Figure 4.7: Graphical representation of IRI's functional relations within the system of State Holdings in its mature configuration (from the late 1970s). Source: Author's elaboration.

Part II

Chapter 5

The economic and financial dimensions of IRI

1. The relevance of IRI's dimensions

IRI was one of the most diversified industrial conglomerates in the world. Nonetheless, as presented in Chapter 4, it possessed a considerable degree of internal integration and coordination across its main shareholding levels and sectoral subsidiaries. This enables a meaningful statistical assessment of IRI's economic and financial dimensions as a unitary entity.

This Chapter analyses the most original and complete set of quantitative figures on IRI, elaborating on the IRI Database (see Chapter 2 and the Appendix for further methodological details and specific sources). It provides an empirical assessment of IRI's defining variables (in relation to national values), exploring their dynamics through available time periods in the years 1948 to 1992.

Section 2 presents IRI's ranking at the global level. Section 3 contains estimates of IRI's weight in the Italian economy with respect to its revenues, exports, value added, employment, investments and assets. It also reconstructs IRI's role in the Italian stock market. Section 4 estimates IRI's national market or production shares at the disaggregated sectoral level of activity. Section 5 reports on the internal sectoral evolution IRI's revenues, exports, employment, investments and R&D expenditure. Section 6 illustrates IRI's sources and destination of financing. Section 7 assesses IRI's financial performance, presenting its main financial results and ratios. Section 8 concludes with a reflection on the most critical implications resulting from the analysis of IRI's quantitative figures, highlighting their demystifying relevance with respect to conventional economic theories on SOEs and to the prevailing accounts on IRI's historical interpretation.

2. IRI's global ranking

Annual rankings published by Fortune enable an approximate comparison between IRI and other large industrial groups at the global level. If considered as a unitary industrial conglomerate from the beginning of the publication¹⁴⁸, and merging the US list with the international one¹⁴⁹, IRI could be classified according to a hypothetical ranking of the largest global corporations based on revenues, assets and employees. All this considered, IRI appeared as one of the world's largest industrial conglomerates, with an increasing tendency to occupy higher positions towards the late 1980s and early 1990s.

In terms of revenues (Figure 5.1), IRI moved up from the 25th-30th positions in the second half of the 1950s, to the first 15 positions from the end of the 1960s, reaching its highest rank (10th) in 1992. During this period, IRI ranked among the world's largest industrial groups (excluding the big oil companies), together with General Motors, IBM, Toyota, General Electric, Hitachi, before other conglomerates such as Siemens, Samsung and Philips. In Europe, among non-oil corporations (BP and Royal Dutch Shell), IRI ranked second or first¹⁵⁰ since 1964 (behind or ahead of Unilever and Daimler-Benz depending on the years). As for total assets (Figure 5.2), IRI's position in the global ranking ranged from first to fifth place. Among the non-oil companies in Europe, it ranked constantly first. Finally, relative to the total number of employees (Figure 5.3), IRI climbed from the eighth position in 1954 to the second place in 1974 (only behind General Motors), while stabilising around the sixth position between the 1980s and 1990s, behind General Motors, Daimler Benz, IBM, Siemens and Ford. IRI ranked always among the top five largest industrial employers in Europe – leading between 1971 and 1986, then only second or third to Siemens and Daimler Benz.

¹⁴⁸ The magazine began to include IRI as unitary industrial group only from the 1983 list. Before that, the Fortune ranking reported IRI's subsidiaries.

¹⁴⁹ Until the first global ranking was published in 1990, Fortune used to compile two separate rankings, one relative to the largest US corporations (Fortune 500 US) and the other covering the rest of the capitalist world (Fortune 500 International).

¹⁵⁰ Among Europe's non-oil industrial companies, IRI ranked fifth from 1954 to 1957, third from 1958 to 1963 and second from 1964 to 1978, first from 1979 to 1986 and then second from 1986 to 1992, with the exception of 1989 (first place again).

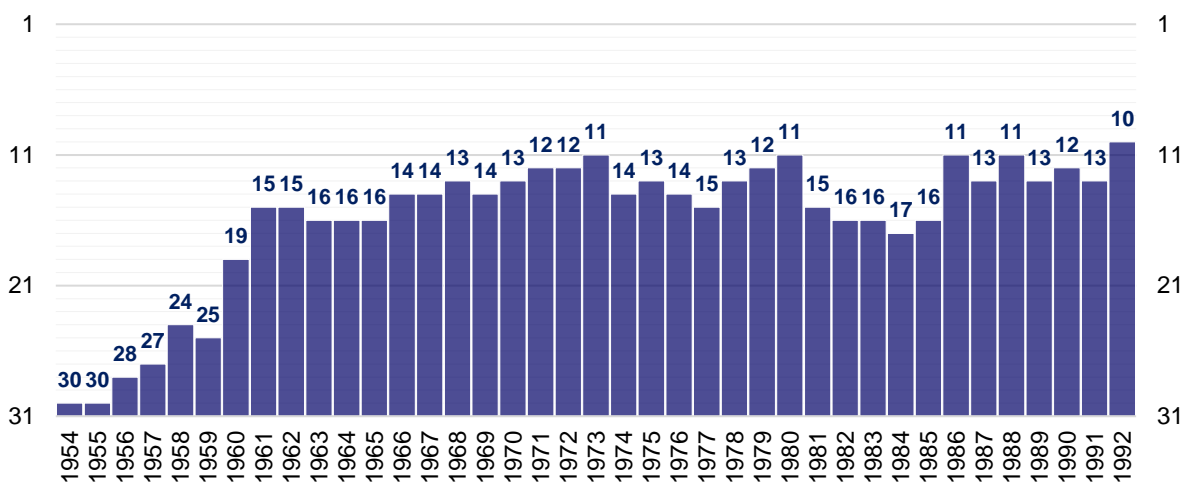


Figure 5.1: IRI's global ranking in terms of revenues. Source: Author's elaboration on IRI Database.

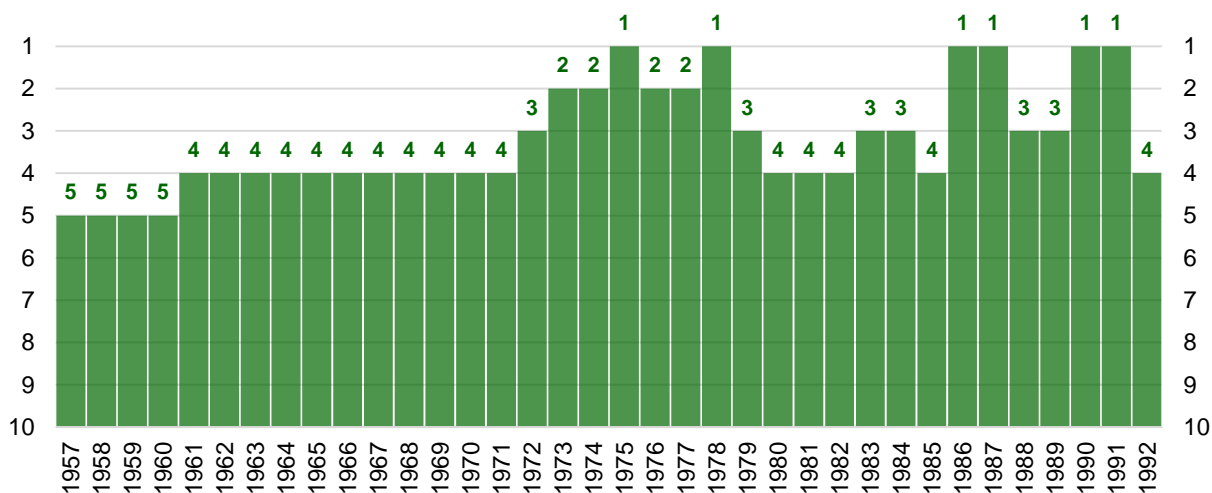


Figure 5.2: IRI's global ranking in terms of assets. Source: Author's elaboration on IRI Database.

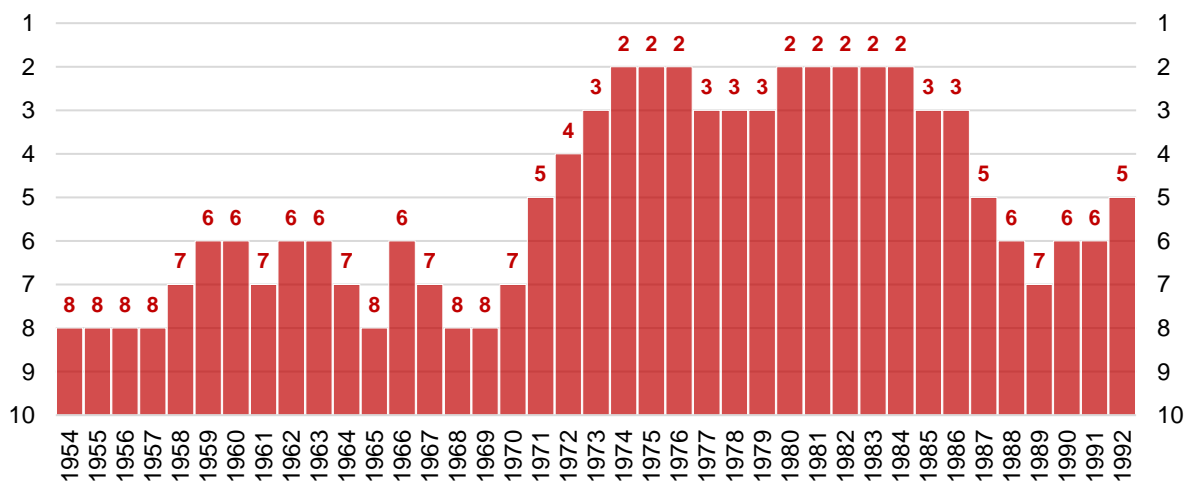


Figure 5.3: IRI's global ranking in terms of total employees. Source: Author's elaboration on IRI Database.

3. IRI's main figures and their comparison with Italy's aggregate values

3.1. IRI's revenues

Over the period 1950-1992, IRI's revenues relative to Italy's GDP corresponded to an annual average of 5.0% (Table A5.1). During the 1950s, revenues per employee in real terms¹⁵¹ grew by an annual average of 8.9%, accounting for 83.3% of the average growth rate in total revenues. This raised IRI's share of revenues over Italy's GDP from 3.3% in 1950 to 5.2% in 1960 (Figure 5.4), while IRI's share of total employment in the Italian economy was constant or slightly decreasing (see below section 3.4.).

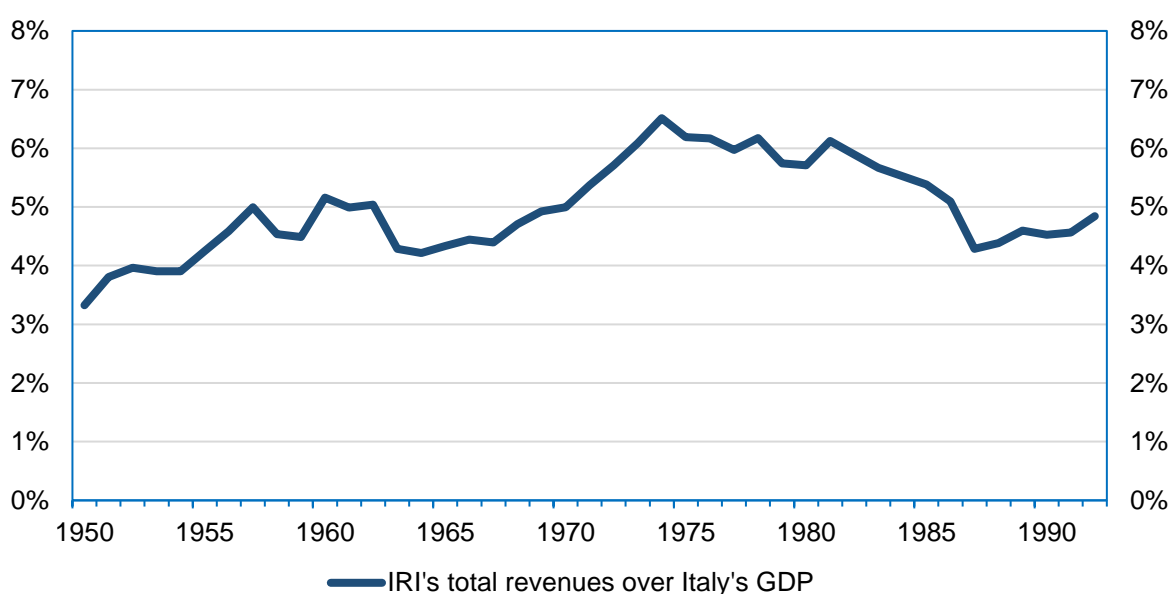


Figure 5.4: IRI's total revenues over Italy's GDP. Source: Author's elaboration on IRI Database.

The share of IRI's revenues over Italy's GDP fluctuated between 4% and 5% in the period 1961-1970, when the average annual growth rate of revenues per employee was 3.1% and accounted for 46.7% of the average growth rate in total revenues. In the period 1971-1981, IRI's revenues over Italy's GDP reached the maximum figure of 6.5% in 1974, largely driven by the positive net acquisition of companies by IRI in the first half of the 1970s. In fact, the average annual growth rate of revenues per employee reached the minimum level of 1.3% during this decade, accounting for only 22.8% of the average growth rate in total revenues.

¹⁵¹ Measured in 2018 constant euros and with respect to IRI's employees in the industrial section (excluding banks). The same applies below in this section 3.1 with reference to revenues per capita in absolute terms unless specified.

In 1981, IRI's revenues were still amounting to 6.1% of Italy's GDP. This fell to 4.3% in 1987¹⁵², before recovering to 4.8% in 1992. During the period 1981-1992, the average annual growth rate of IRI's revenues in real terms remained positive, as the reduction in the number of employees was more than compensated by the sustained growth of real revenues per employees, which amounted to an annual average of 4.7%.

Figure 5.5 illustrates the decomposition of the annual growth rates of IRI's revenues throughout the period 1950-1992, showing the relative contribution of the growth in revenues per employees and of the growth in the total number of employees. Over the entire period, the average annual growth rate of IRI's revenues per employee was 4.5%, which explained 75.3% of the average annual growth rate of IRI's revenues, with the average growth rate in the number of employees accounting for the remaining share of 24.7%.

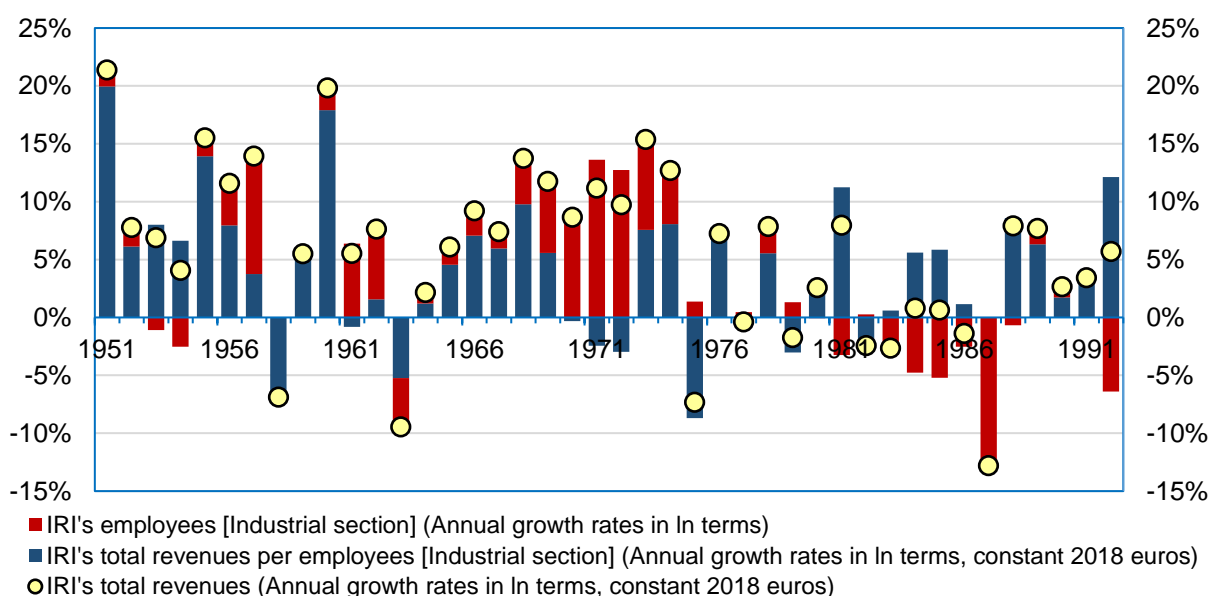


Figure 5.5: Decomposition of annual growth rates of IRI's revenues. Source: Author's elaboration on IRI Database. Notes: 1) Revenues are measured in 2018 constant euros; 2) The number of employees refers to IRI's industrial section (excluding the banks); 3) Growth rates are calculated in natural log terms (ln).

¹⁵² Figures after 1986 were statistically lowered by the privatisation of Alfa Romeo at the end of 1986, and by the exclusion of the semiconductor company SGS from the 1987 consolidated accounts – following the merger with the French competitor Thomson Semiconducteurs. Alfa Romeo and SGS represented around 7% of IRI's revenues in 1986.

Figure 5.6 reports the pattern of IRI's revenues in real terms throughout the 1950-1992 period. They presented a sustained growth pattern until the mid-1970s, a stagnation period until the mid-1980s and a final upswing in the last five years. From the mid-1970s, the contribution of foreign revenues became very significant, as they grew proportionally more than domestic revenues (see section 3.2. below).

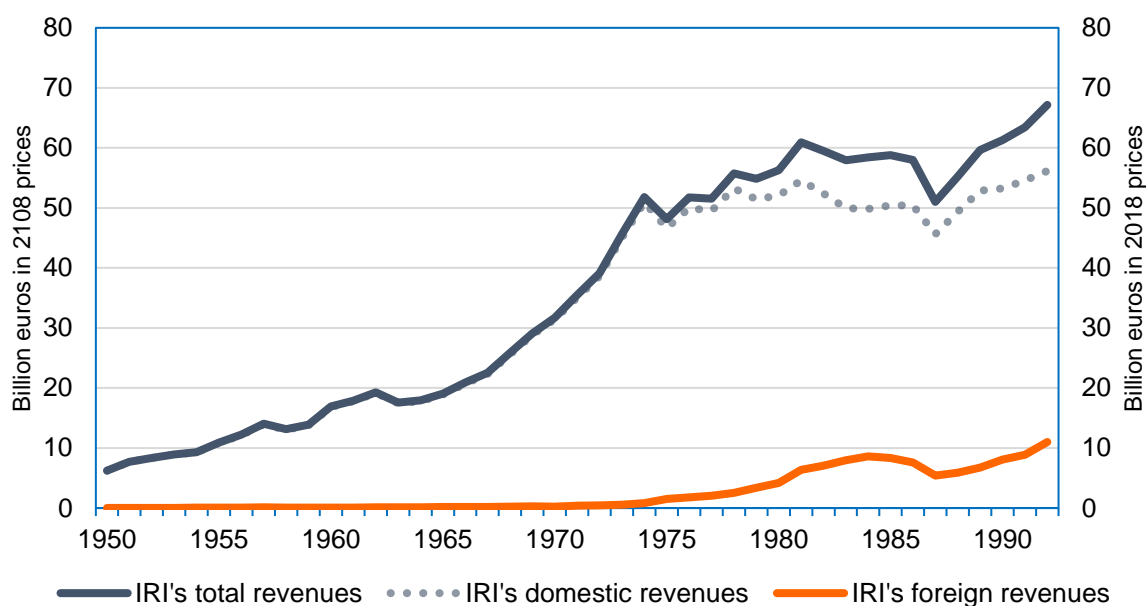


Figure 5.6: IRI's revenues in real terms. Source: Author's elaboration on IRI Database. Notes: Values are reported in 2018 constant euros.

3.2. IRI's foreign revenues

Over the period 1950-1992, IRI's foreign revenues relative to Italy's exports registered an average value of 5.1% – with significant fluctuations from the lowest value of 3.1% in 1951 to the peak of 8.4% in 1981 (Figure 5.7).

The average share of IRI's foreign revenues in Italy's exports was much higher in the periods 1971-1980 and 1981-1992 – both at 5.9% – than in the previous two decades (Table A5.2). This points to a more intensive internationalisation of IRI's activities taking place from the mid-1970s (see Chapter 7). Until 1975, IRI's foreign revenues accounted for less than 15% of IRI's total revenues, but increased rapidly in the

following years, reaching a 31% share in 1981. Despite the statistical drop of 1987¹⁵³, IRI's foreign revenues recovered to 20.4% of IRI's total revenues in 1992 (Figure 5.8).

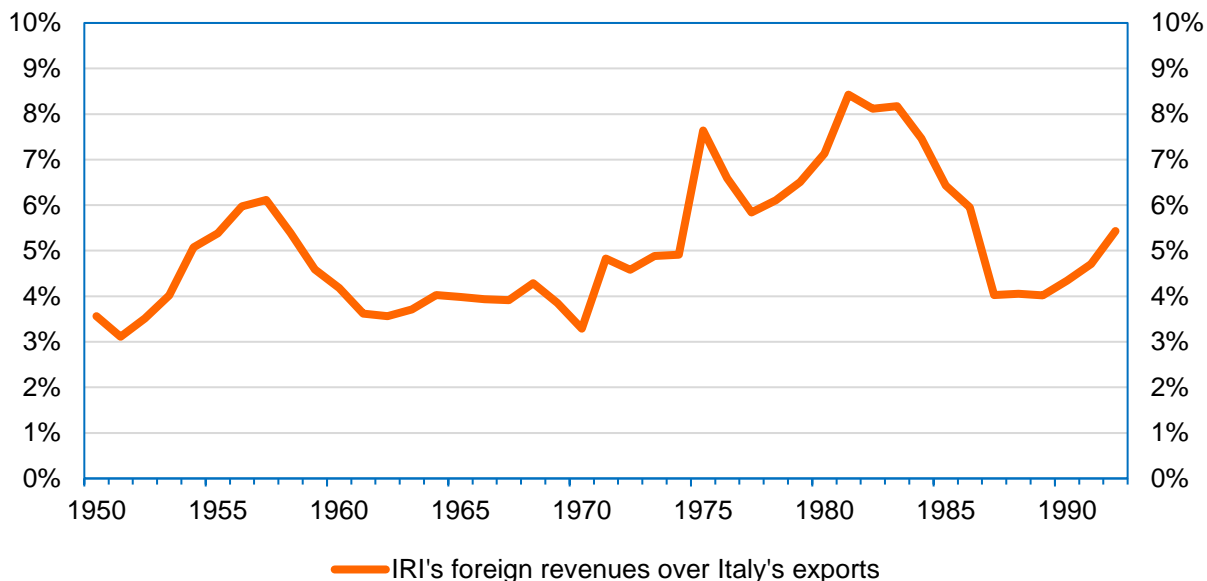


Figure 5.7: IRI's foreign revenues over Italy's exports. Source: Author's elaboration on IRI Database.

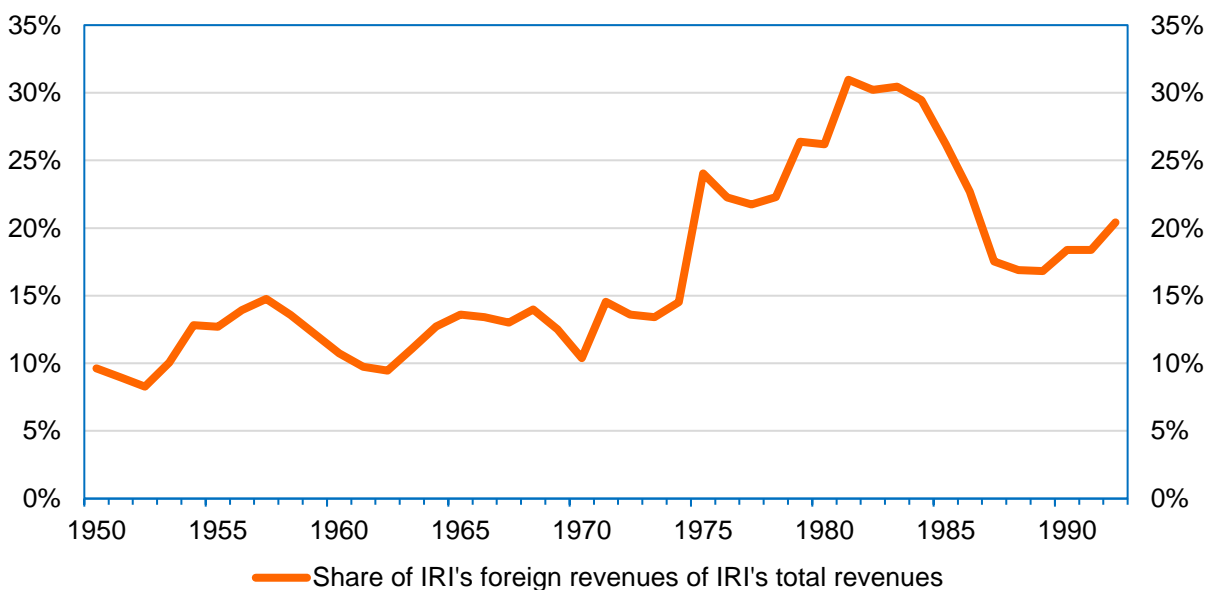


Figure 5.8: Share of IRI's foreign revenues of IRI's total revenues. Source: Author's elaboration on IRI Database.

¹⁵³ Alfa Romeo and SGS's exit from the consolidated accounts impacted significantly on IRI's exports, as both companies exported a large share of their manufactured goods. In 1986, they accounted for 11.3% of IRI's exports.

In real absolute terms, IRI’s foreign exports per employee¹⁵⁴ increased most significantly in the period 1971-1980, averaging at a 31% annual growth rate (Table A5.2). As Figure 5.9 below shows, IRI’s foreign revenues per employee in real terms soared between 1975 and 1984, stagnated for two years and then recovered steadily after the statistical blip of 1987 until 1992 (at an annual average growth rate of 16.6%).

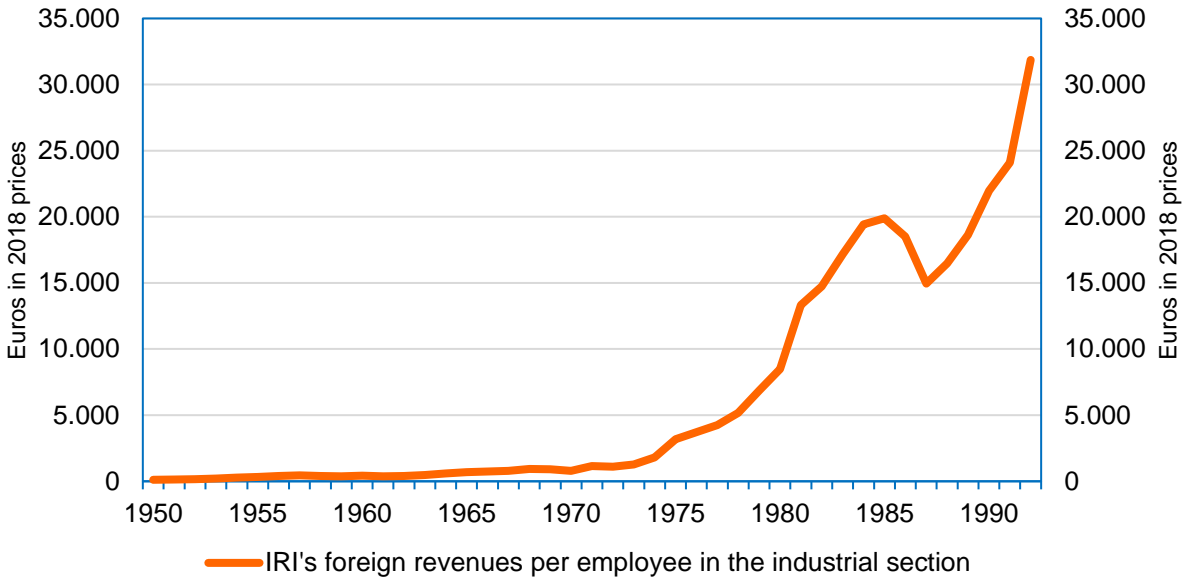


Figure 5.9: IRI’s foreign revenues per employee in real terms. Source: Author’s elaboration on IRI Database. Notes: 1) Foreign revenues are measured in constant 2018 euros; 2) The number of employees refers to IRI’s industrial section (excluding banks).

¹⁵⁴ Measured in constant 2018 euros, with respect to the total number of employees from the industrial section (i.e. excluding the banks).

3.3. IRI's value added and productivity

On average over the period 1950-1992, IRI's share of value added¹⁵⁵ relative to Italy's value added amounted to 3.0% (Table A5.3), displaying a long-term increasing trend from the lowest figure of 2.1% in 1950 to the 3% value at the end of the period in 1992, having peaked at 3.8% in the mid-1970s (Figure 5.10).

A similar pattern appears if IRI's value added is measured relative to Italy's value added in the non-agricultural¹⁵⁶ commercial economy¹⁵⁷ and to Italy's value added in 'IRI sectors'¹⁵⁸.

The growing share of national value added accruing to IRI cannot be attributed to the net acquisition of non-IRI companies, which significantly took place only in the first half of the 1970s (see Figure 5.14). Instead, it is primarily explained by IRI's sustained long-term productivity increase¹⁵⁹, which registered a slightly higher annual growth rate (4.6%) relative to the rest of the non-IRI economy in the main sectors of IRI's involvement (4.4%) over the entire 1950-1992 period, despite starting from a 1.9 times higher absolute value¹⁶⁰ in 1950 (Table A5.3 and Figure 5.11).

IRI's productivity growth relative to the correspondent non-IRI sectors was more sustained in the 1950s and slightly inferior in the 1960s (when productivity in the non-IRI economy accelerated consistently). IRI's productivity stagnated in the 1970s and then recovered throughout the 1980s and early 1990s, surpassing the growth rate of the 'non-IRI economy' by a large extent.

¹⁵⁵ Estimated for the years 1950-1974, with the exception of 1968, which is retrieved from IRI's 1976 annual report.

¹⁵⁶ IRI was essentially not involved in the agricultural sector, with the only major exception of Maccarese, Italy's largest farm, with more than 3,000 hectares of cultivable land.

¹⁵⁷ Measured as Italy's value added minus value added in agriculture and in the public administration.

¹⁵⁸ Sectors of IRI's involvement, namely: manufacturing, constructions, transports, communications and energy utilities until 1962.

¹⁵⁹ Measured in terms of real value added per employee (constant 2018 euros) in the industrial section (excluding banks).

¹⁶⁰ IRI's real value added per employee in 1950 can be estimated at 17,654 euros in 2018 prices, while the corresponding figure for the non-IRI rest of the economy in the same sectors of IRI's activity can be estimated at around 9,331 euros in 2018 prices.

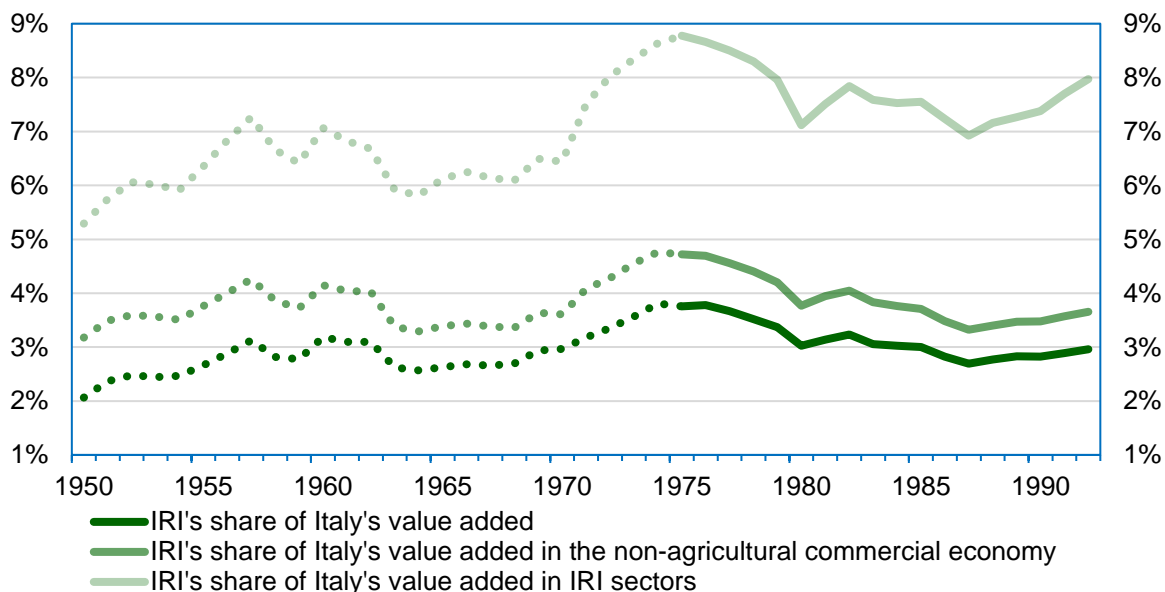


Figure 5.10: IRI's share of Italy's value added. Source: Author's elaboration on IRI Database. Notes: Dashed line from 1950 to 1974 represents an estimate deriving from the average share of value added relative to IRI's revenues for the years 1975-1991 (54.4%). The estimated series matches closely the available data point for the year 1968 provided by IRI sources (IRI's 1976 annual report).

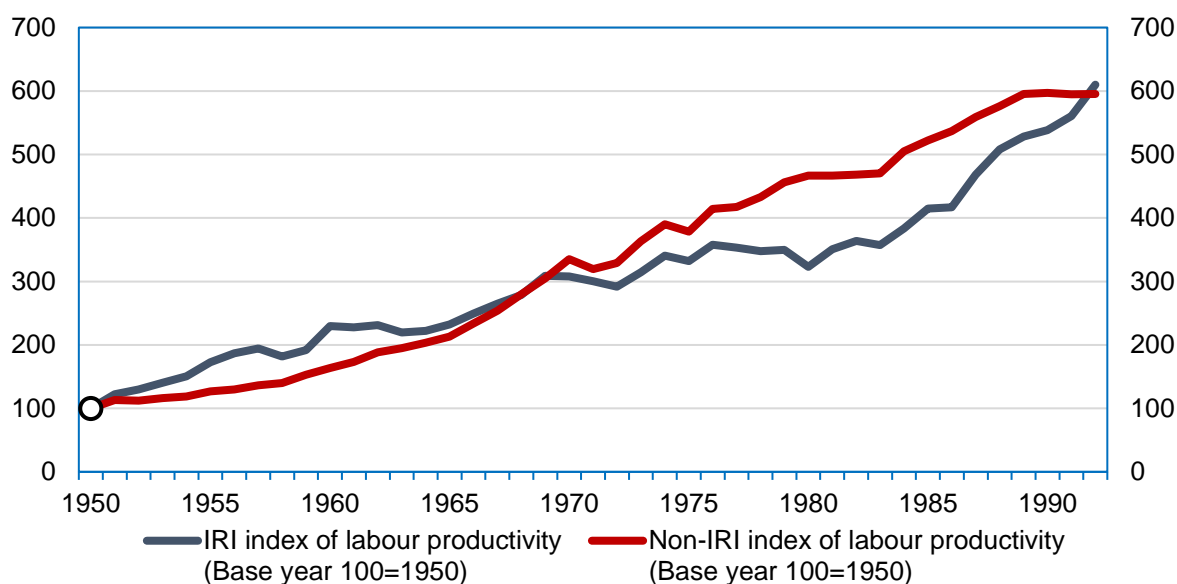


Figure 5.11: Estimated index of IRI's labour productivity relative to the non-IRI Italian economy. Source: Author's elaboration on IRI Database. Notes: 1) Labour productivity is measured as real value added in constant 2018 euros divided by the number of employees (in the industrial section in the case of IRI); 2) For the sake of comparability the non-IRI figure for productivity growth refers to the 'IRI sectors' (excluding banks).

3.4. IRI's employment

IRI was Italy's largest employer in the business enterprise sector. The number of IRI's employees changed significantly throughout the period 1950-1992. Three distinct trends emerge from Figure 5.12 and Figure 5.13.

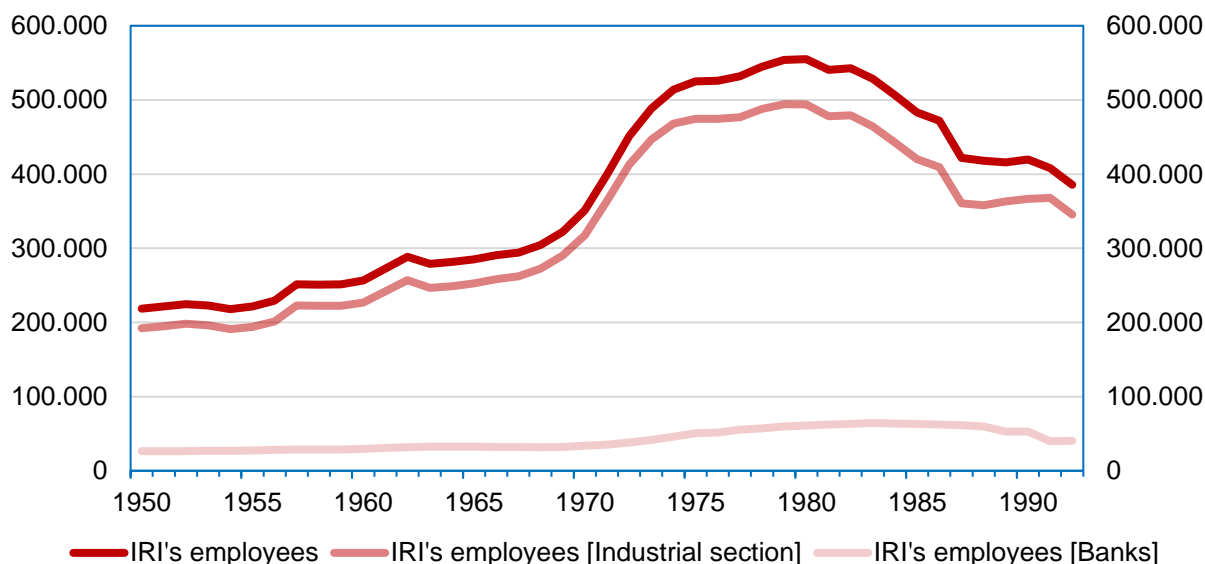


Figure 5.12: Total number of IRI's employees. Source: Author's elaboration on IRI Database.

First, a gradual increase in the first two decades brought the overall employment figures from the lowest value of 218,529 headcounts in 1950 (192,067 in the industrial section) to over 300,000 by the end of the 1960s (290,003 in the industrial section in 1969). The average share of IRI's employees in the Italian economy rose from 1.1% in the period 1950-1960 to 1.5% in the following decade (1961-1970).

Second, in the first half of the 1970s, the expanding mechanical, steelmaking and telecommunications sectors, together with the acquisition of ailing companies following the economic crisis of those years, brought the total number of IRI's employees beyond the 500,000 threshold during the ten years between 1974 and 1984 (employment in the industrial section remained above 400,000 from 1972 until 1985), peaking at around 550,000 in 1980 (494,250 in the industrial section in 1979). The average share of IRI's employment in the Italian economy was 2.5% over the period 1971-1980.

Third, from 1981 the number of IRI's employees was significantly reduced, down to 385,581 units in 1992 (345,295 in the industrial section). The average share of

employees in the Italian economy over the period 1981-1992 was 2.1%, following a descending pattern from the 2.5% value in 1981 to 1.7% in 1992 – reinforced by the 1987 statistical effect¹⁶¹.

The average share of IRI's employees relative to the non-agricultural commercial sector over the period 1950-1992 amounted to 2.6%, with a slightly different evolution through time. In fact, when excluding the agricultural sector, IRI's share of national employment was slightly lower in 1964 compared to 1950, despite an increase in the absolute number of employees of almost 63,000 units over the same period. In 1992, with around 167,000 more employees than in 1950, IRI's share of employment in the non-agricultural commercial economy was 2.1%, compared to 2.2% in 1950. Therefore, with the exclusion of the ten-year period 1969-79, IRI's overall increase in the total number of employees had been proportional to the employment dynamics in the rest of the Italian industrial economy.

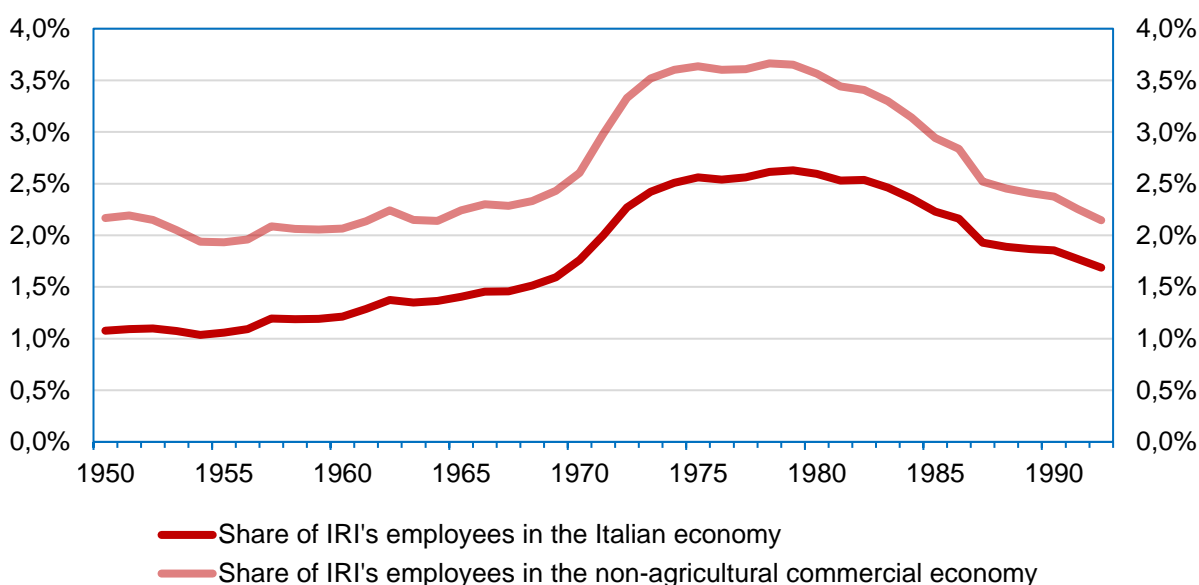


Figure 5.13: Share of IRI's employees relative to Italy's employment. Source: Author's elaboration based on IRI Database.

¹⁶¹ SGS and Alfa Romeo accounted for 10.3% of IRI's employees in the industrial section in 1986 (8.9% of total IRI employees).

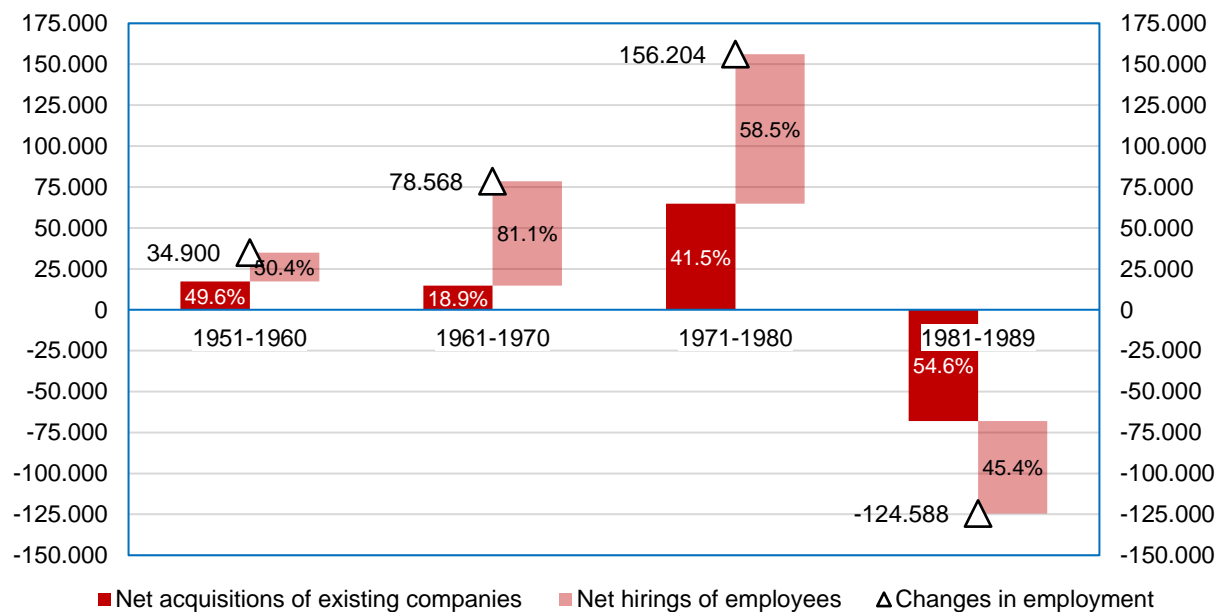


Figure 5.14: Decomposition of IRI's employment pattern in four different subperiods from 1951 to 1989. Source: Author's elaboration on IRI Database.

Finally, decomposing IRI's employment pattern (Figure 5.14) between net acquisitions of existing companies and net hirings highlights the higher contribution of net job creation. This latter accounted for more than half of the overall increase in IRI's employment until 1980 – even in the 1971-1980 phase, characterised by IRI's bailouts of ailing companies (mostly in the steelmaking and shipbuilding sectors).

3.5. IRI's investments

IRI's share of national fixed investments was relatively higher and more cyclical than other variables. With the exception of the years 1954-57 and 1980-1981, it rarely fell below the 4% value. On average over the period 1950-1992, IRI's share of national investments amounted to 5.1% (Table A5.5), almost three times the employment share, reflecting the capital-intensive nature of IRI's activities. When measured excluding the agricultural and housing sector, IRI's share of national investments was two percentage points higher – 7.1% on average for the entire period. IRI was by far Italy's largest industrial group in terms of fixed investments.

The period 1961-1980 recorded higher values compared to the years 1950-1960 and 1981-1992 (Table A5.5), but the investments dynamics was cyclical through different subperiods (Figure 5.15).

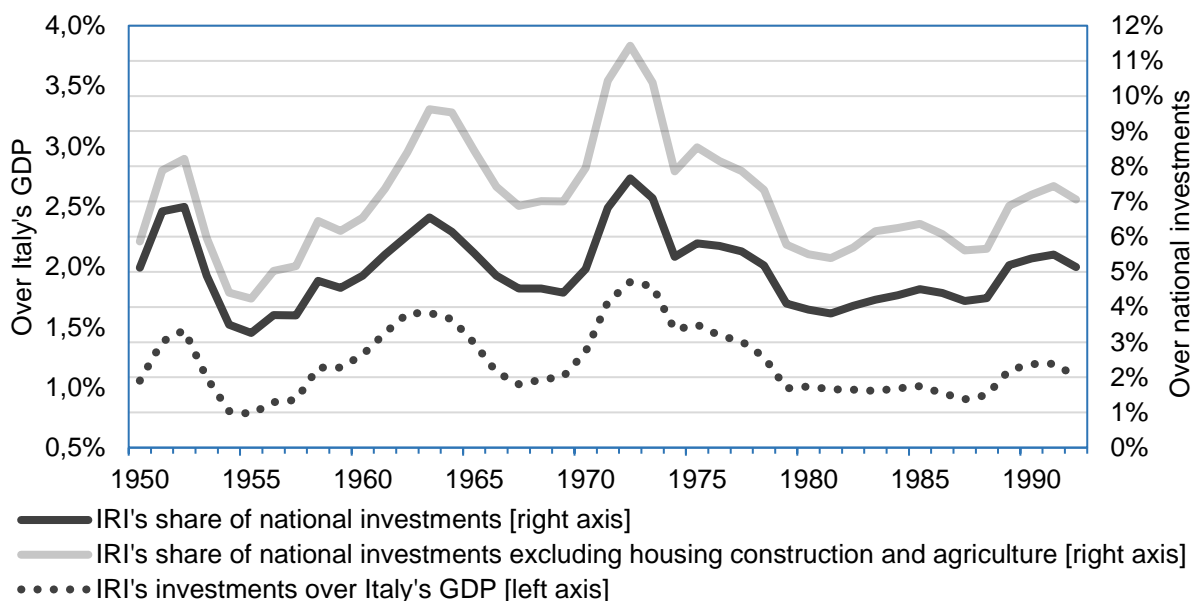


Figure 5.15: IRI's investments over national investments and GDP s). Source: Author's elaboration on IRI Database.

The magnitude of IRI's investments was such that they could display a distinct macroeconomic impact, as they averaged 1.2% over Italy's GDP during the period 1950-1992 (Table A5.5). However, as illustrated in Figure 5.16, the annual growth rates of IRI's investments were only rarely and casually synchronised with Italy's business cycles. In certain periods, IRI's investments played a countercyclical role against the downturn (for instance in 1958, in the years 1971-1972 and in 1975), in others they registered an opposing tendency (for instance in 1953-1954, in 1966-1967, in 1973 and over the years 1977-1979). Overall, no significant correlation can be recorded between IRI's investments and Italy's GDP.

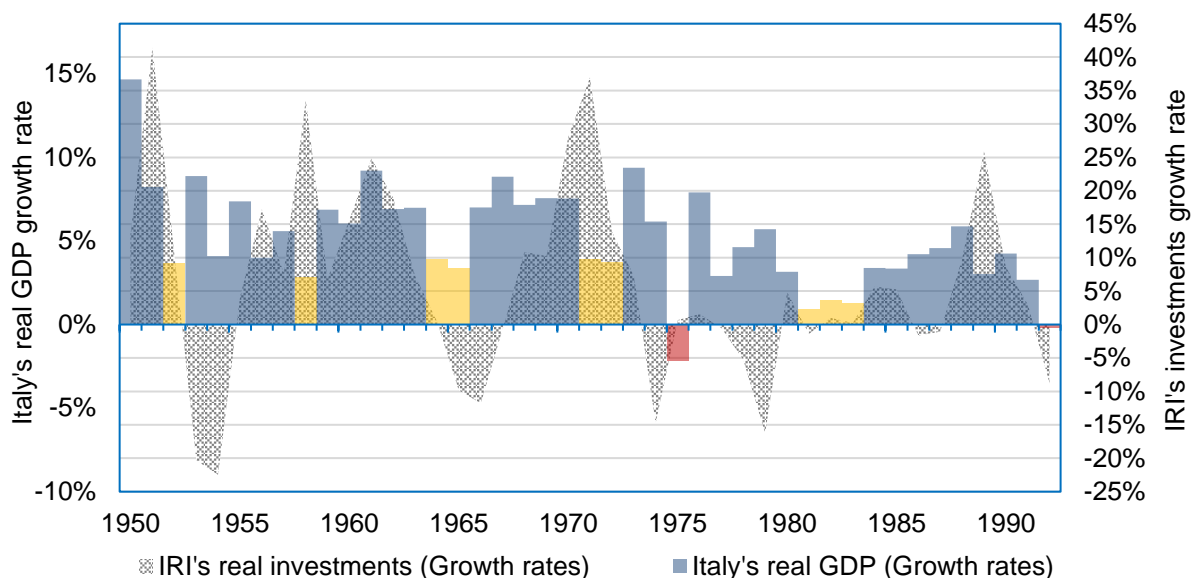


Figure 5.16: Comparison between IRI's investments growth rates and Italy's real GDP growth rates. Source: Author's elaboration on IRI Database. Notes: With respect to Italy's GDP growth rates, yellow columns represent downturns, while red columns report annual falls in GDP.

In fact, IRI's investments cycles mainly depended on the long-term industrial programmes of IRI's major companies. By looking at the deviation of IRI's investments over total revenues (Figure 5.17) from their average (i.e. 24.7% over the 1950-1992 period), it is possible to identify four investments cycles – already visible in Figure 5.15.

The first cycle (1950-1953) corresponded to the post-war reconstruction of the damaged electric energy plants, to the recreation of Finmare's naval fleet and to the installation of Finsider's new integrated steelmaking plant at Cornigliano, near Genoa. The second cycle (1961-1966) was driven by the construction of the steelmaking plant in Taranto, as well as by the first large infrastructural investments in the motorways and telecommunications networks. The third cycle (1969-1974), the most pronounced (also due to the slowing down of national investments), corresponded to the realisation of the Alfa Romeo car-making plant in Pomigliano d'Arco (near Naples) and to the doubling of production capacity at the Taranto steelworks. Finally, the fourth cycle (1988-1992) resulted out of the 1987 statistical blip¹⁶². Taking this into account, a longer trend of investments growth could be traced back from the mid-1980s, driven by a series of initiatives in the air transport sector and in the newly emerging high-tech

¹⁶² SGS and Alfa Romeo accounted for 5.1% of IRI's fixed investments in 1986.

sectors (especially in telecommunications), by new infrastructure investments and by the renovation of the Taranto steelmaking plant in the early 1990s.

The size of all four investments cycles relative to IRI's revenues is approximately similar, albeit slightly decreasing through time (Figure 5.17). The first two amounted to more than 35% of total revenues, with the third peaking at 34.2%. The fourth cycle was relatively smaller, peaking at only 26.3% of IRI's revenues in 1990¹⁶³.

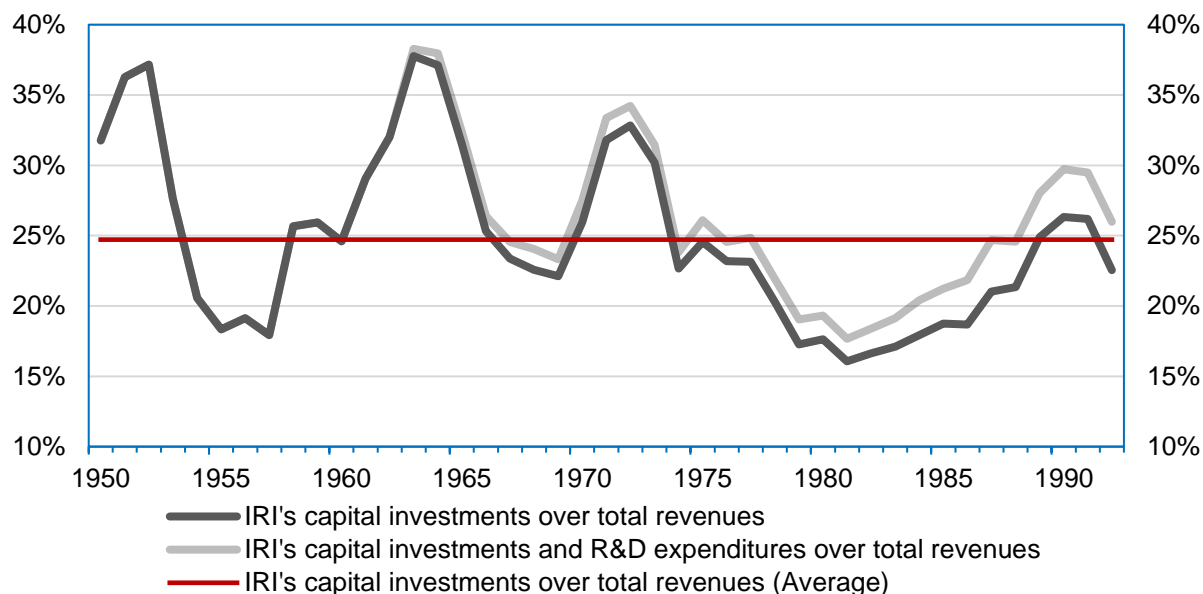


Figure 5.17: IRI's investments over total revenues. Source: Author's elaboration on IRI Database.

Four investments cycles appear also when considering IRI's investments per employee in real terms¹⁶⁴ (Figure 5.18). In this respect, the fourth cycle was more pronounced than the previous ones. IRI more than doubled its per capita investments in real terms, from the trough of 1979 (19,161 euros in constant 2018 prices) to the peak of 1991 (45,117 euros in constant 2018 prices). This was only partially explained by the reduction in the overall number of employees: from 1979 to 1991 IRI's total investments in real terms increased from 9.5 billion to 16.6 billion euros in constant 2018 prices (Figure 5.19).

¹⁶³ However, given the transformation of IRI's activities, away from more traditional capital-intensive sectors (i.e. steelmaking and engineering) towards more knowledge-intensive ones (i.e. aerospace, electronics and telecommunications), with the addition of IRI's R&D expenditures, the overall amount of investments relative to IRI's total revenues would reach a 29.7% value at the peak of the fourth cycle in 1990.

¹⁶⁴ With reference to IRI's employees in the industrial section (excluding the banks) and to investments measured in 2018 constant euros.

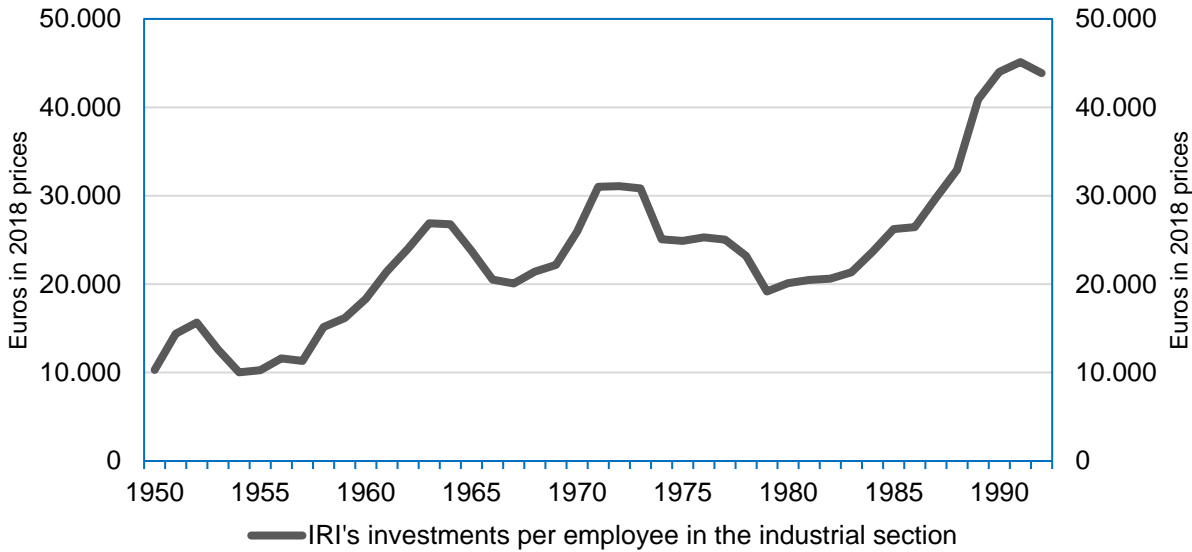


Figure 5.18: IRI's investments per employee in real terms. Source: Author's elaboration on IRI Database. Notes: 1) Investments are measured in 2018 constant euros; 2) The number of employees refers to IRI's industrial section (excluding banks).

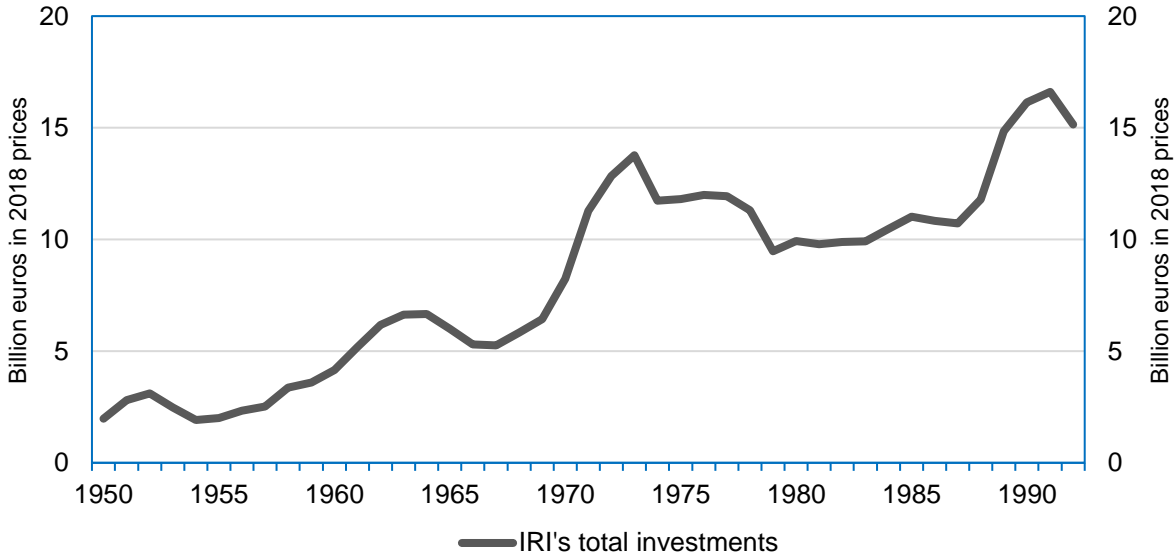


Figure 5.19: IRI's total investments in real terms. Source: Author's elaboration on IRI Database. Notes: Investments are measured in 2018 constant euros.

3.6. IRI's assets

Figures on total consolidated assets of the IRI Group were only available from 1957 (Figure 5.20). Relative to Italy's GDP, the average value of IRI's assets from 1957 to 1992 was 13.2% (Table A5.6).

This figure was approximately stable through time, with an increasing trend until the peak of 16% in 1975, followed by a progressive fall to below average values between

1979 and 1986. In 1987, the series shows a sudden upward shift: the value of IRI's total assets relative to national GDP remained above 15% in the period 1987-1991, before falling again to 13% in 1992.

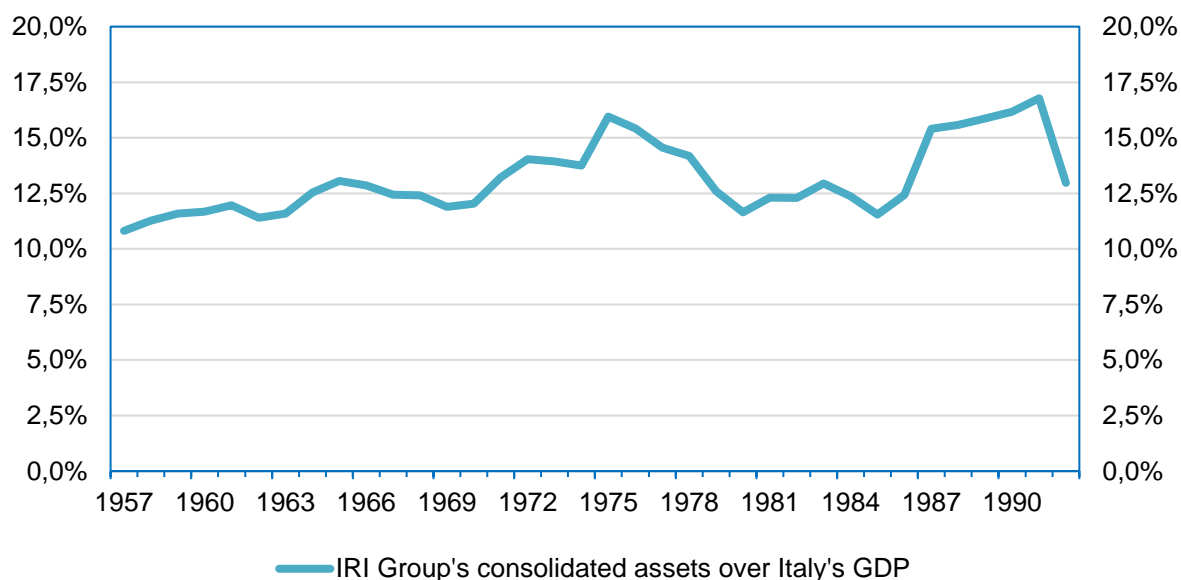


Figure 5.20: IRI Group's consolidated assets relative to Italy's GDP. Source: Author's elaboration on IRI Database.

3.7. IRI's relevance in the national stock market

IRI's presence in the national stock market was unexpectedly very significant. In 1935, after the delisting of the three founding banks, IRI controlled 9 out of the 133 companies listed on the Milan stock exchange (6.8% of the total). At the end of the period in 1992, the number of IRI's listed subsidiaries had increased to 22 out of 230 (9.6% of the total). In the early 1990s, IRI's listed companies were participated by more than 440,000 third-party shareholders. Table 5.1 summarises the diachronic succession of IRI's listed – and de-listed – subsidiaries on the Milan stock exchange.

Year of listing	Name	Sector	Year of de-listing
1884	<i>Italiana Condotte Acqua</i> ² (Acquired by IRI in 1970)	Civil Engineering	1990
1895	Alti Forni, Fonderie e Acciaierie di Terni ²	Steelmaking	1983
1895	Credito Italiano ¹	Banking	1935
1898	Banca Commerciale Italiana ¹	Banking	1935
1905	Banco di Roma ¹	Banking	1935
1905	Unione Esercizi Elettrici (UNES) ²	Electric energy	1964
1908	Industriale Elettrochimica di Point Saint Martin (later SIP ² , then incorporated in Telecom Italia)	Electric energy, Telephones	-
1918	Ilva Alti Forni Acciaierie d'Italia ² (Italsider from 1961)	Steelmaking	1983
1920	Monte Amiata ² (Later SIFA, then Finmeccanica)	Mining	1992
1924	Dalmine ² (De-listed when incorporated by Tenaris)	Steelmaking	2003
1924	Meridionale di Elettrocità ² (from 1964: SME ³)	Electric energy	1996
1925	Manifatture cotoniere meridionali ² (Acquired by IRI in 1956)	Textile	1965
1926	Ansaldo ²	Shipbuilding, Mechanical	1962
1936	STET ³ (Telecom Italia in 1994)	Telecommunications	-
1939	Motta ² (Acquired by IRI in 1968)	Food	1978
1940	Finsider ³	Steelmaking	1988
1952	Società impianti telefonici – SIT ²	Telecommunications engineering	1961
1952	Finmare ³	Maritime transport	1988
1953	Finelettrica ³	Electric energy	1965
1955	Cementir ² (Today Cementir Holding)	Cement	-
1956	Mediobanca ¹	Banking	-
1959	Cornigliano ² (Incorporated in Italsider in 1961)	Steelmaking	1983
1968	Alitalia ²	Air transport	2009
1968	Italcable ² (Incorporated in Telecom Italia in 1994)	Telecommunications	-
1970	Banca Commerciale Italiana ¹ (Incorporated in Intesa San Paolo in 2001)	Banking	-
1970	Banco di Roma ¹ (Incorporated in Unicredit in 2007)	Banking	-
1970	Credito Italiano ¹ (Today Unicredit)	Banking	-
1973	Alimont ² (Alivar from 1974, then incorporated in SME)	Food	1992
1985	Credito Fondiario ¹ (Italfondario from 1994)	Banking	2001
1985	Sirti ²	Telecommunications	2006
1986	Aeritalia ² (Incorporated in Finmeccanica in 1993)	Aerospace	-
1986	Ansaldo Trasporti ² (Incorporated in Finmeccanica in 2001)	Railway engineering	-
1986	Banca di Chiavari e della Riviera Ligure ¹ (Later Reti Bancarie)	Banking	2006
1987	Autostrade ²	Motorways	2003
1991	Banco di Santo Spirito ¹ (Incorporated in Banca di Roma in 1991, then Unicredit in 2007)	Banking	-
1991	Elsag Bailey ² (Incorporated in Finmeccanica in 1993)	Industrial automation	-
1992	Fabbrica Italiana Apparecchiature Radioelettriche – FIAR ²	Avionics and radar manufacturing	2000
1992	Finmeccanica ³ (Today Leonardo)	Aerospace, Electronics, Defence	-

Table 5.1: IRI's banks¹, operating companies² and sectoral subsidiaries³ listed on the Milan stock exchange. Notes: In lighter grey, subsidiaries already listed when IRI was established in 1933. In italics, those already listed on the stock exchange, acquired by IRI after 1933.

Over the years 1962-1992, the average share of IRI's listed companies on the Milan stock exchange was 10.5% of the total (Table 5.2 and Figure 5.21). However, on average over the same period, IRI's listed companies represented 25.5% of the national stock market capitalisation and 33.6% of the total amount of gross dividends distributed by Italy's listed companies. IRI's listed companies were larger than the national average and distributed an even higher sum of dividends to their shareholders.

This translated into higher dividend yields for IRI's listed companies – gross dividends over market capitalisation of IRI's listed companies averaged 4.6% over the 1962-1992 period, compared to 3% of non-IRI listed companies (Table 5.2 and Figure 5.22).

	Average	Period
Share of IRI's listed companies on the Milan stock exchange	10.5%	1962-1992
Market capitalisation share of IRI's listed companies	25.5%	1962-1992
Gross dividends share of IRI's listed companies	33.6%	1962-1992
Gross dividends over market capitalisation (IRI's listed companies)	4.6%	1962-1992
Gross dividends over market capitalisation (Non-IRI listed companies)	3.0%	1962-1992
Dividend pay-out ratio of IRI's listed companies	59.2%	1988-1992
Number of third-party shareholders	436,192	1990-1992

Table 5.2: Average values of IRI's listed companies on the Italian stock exchange. Source: Author's elaboration on IRI Database.

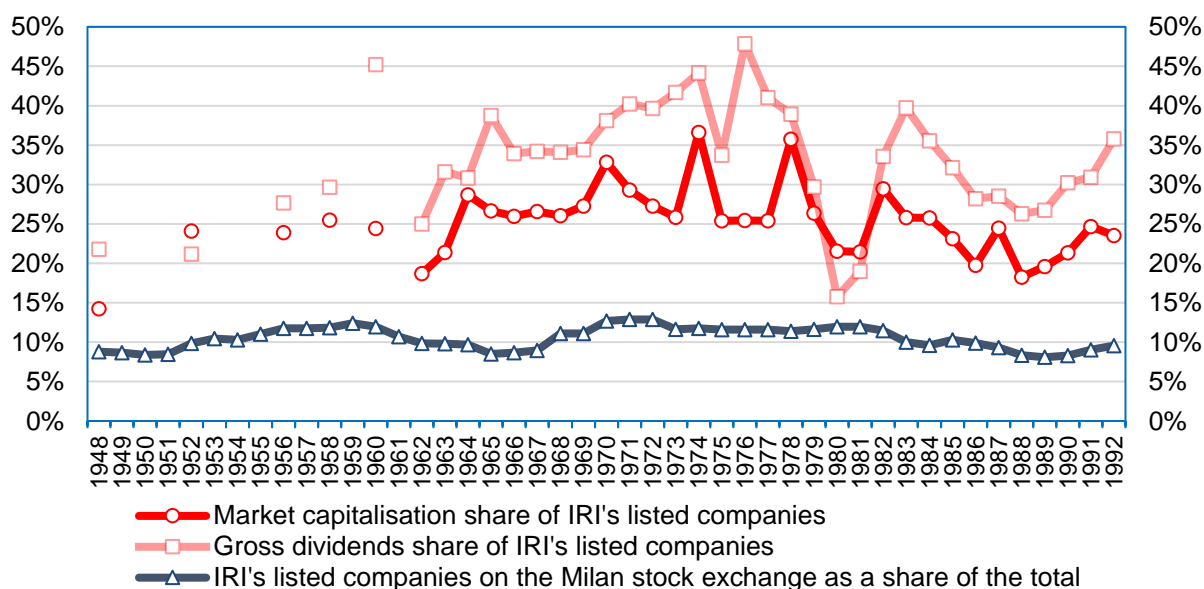


Figure 5.21: Main figures on IRI's listed companies on the Italian stock exchange. Source: Author's elaboration on IRI Database.

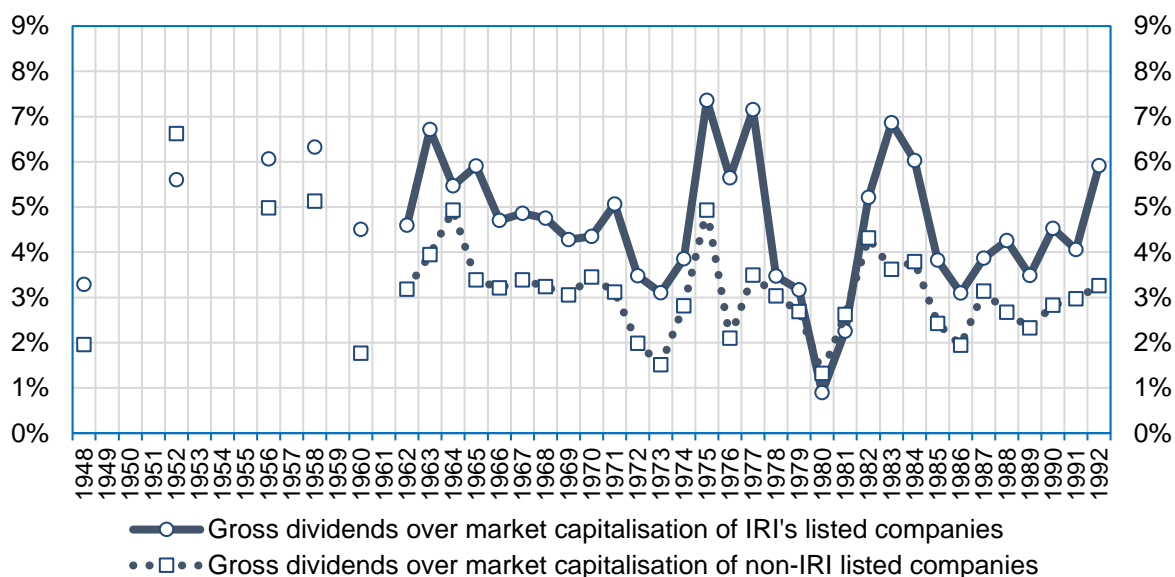


Figure 5.22: Dividends yield comparison between IRI’s listed companies and non-IRI listed companies. Source: Author’s elaboration on IRI Database.

In real terms¹⁶⁵, the market capitalisation of IRI’s listed companies more than doubled between the 1960s and the late 1980s – interposed by lower values between 1974 and 1984 (Figure 5.23). Over the 1962-1992 period, the cumulated value of gross dividends distributed by IRI’s listed companies amounted to 28.5 billion euros in 2018 prices.

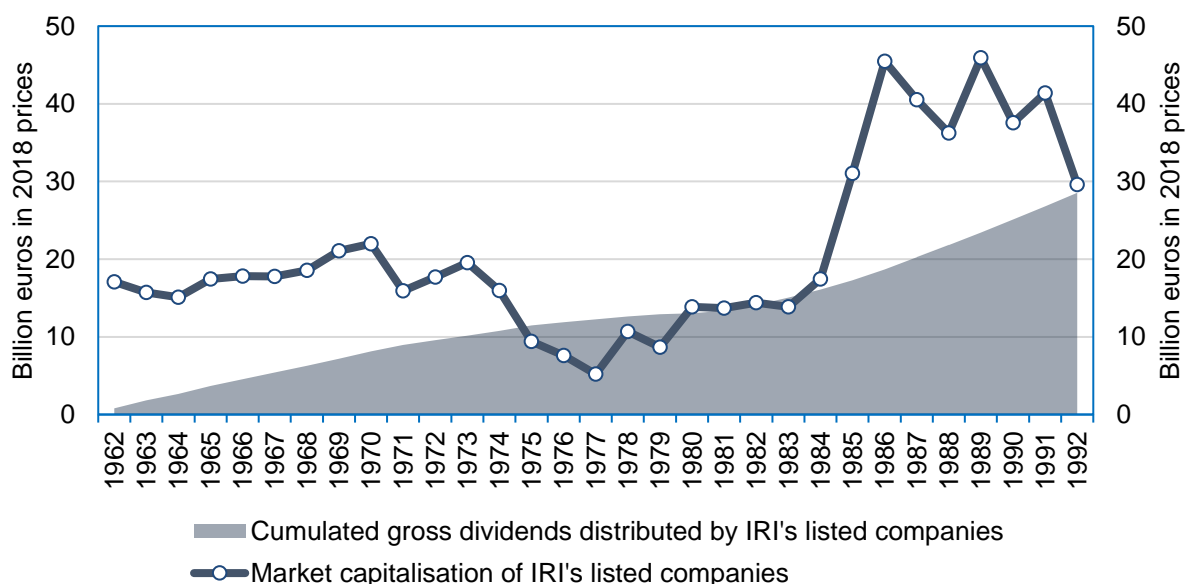


Figure 5.23: Market capitalisation and cumulated gross dividends of IRI’s listed companies in real terms. Source: Author’s elaboration on IRI Database. Notes: Figures in 2018 constant euros.

¹⁶⁵ Values in 2018 constant euros.

4. IRI's sectoral dimensions

Given the diversified conglomerate nature of the IRI Group, estimating its national weight at the sectoral level provides a better and clearer understanding of its presence in the Italian economy. Moreover, looking at IRI's internal changes in revenues, investments, employment and R&D expenditure can capture its sectoral evolution and diversification through time.

4.1. IRI's market and production shares

The relative weight of IRI's activities in the national economy varied across different sectors and periods. Figures 5.24 to 5.29 present IRI's sectoral market and production shares in the Italian economy in five different periods: late 1940s, mid-1950s, mid-1960s, mid-1970s, mid-1980s and early 1990s.

Late 1940s (Figure 5.24). IRI already occupied a significant presence in the steelmaking and mechanical sectors. However, IRI's national share of production in mechanical activities ranged from 80% in shipbuilding to 10% in car manufacturing to only 2.5% in aircraft. The weight of military productions was still very significant (over 60% of the national total). IRI also controlled the largest share of banking activities in the country, with 28.3% of total national lending and 23% of national deposits accounted for by its three banks. IRI owned one-quarter of the national fleet, produced 30% of electric energy domestically and operated 62% of Italy's telephone installation units.

Mid-1950s (Figure 5.25). In this period, IRI became involved in new activities. In the manufacturing sector, it diversified in cement production, reaching a 7.7% national share. It became an operator of airlines, accounting for almost half of national flights. Finally, it assumed monopolistic concessions for radio and TV broadcasting. National steelmaking production capacity reached 50% in terms of crude steel and over 80% relative to crude pig iron. IRI's presence in other sectors remained stable, apart from maritime transport and mechanical industry, where it reduced its weight, while specialising in civil productions – such as its entry in manufacturing telecommunications equipment (20% national share).

Mid-1960s (Figure 5.26). IRI acquired a monopolistic position in telephone services¹⁶⁶, while exiting from the electric energy sector¹⁶⁷. With the acquired responsibility for building and operating the main motorways route from Milan to Naples, IRI controlled 49% of the national motorways network. IRI's diversification in electronics reached a relevant dimension by the mid-1960s, with less than 10% of national revenues but a significant presence in semiconductors and telecommunications engineering (over 30% national revenues). IRI's steelmaking production increased further – 58.5% of national crude steel and 94% of crude pig iron. The national share of cement produced by IRI also augmented to 13.2%. IRI's share of national flights operated by the new airline company¹⁶⁸ was close to 70%.

Mid-1970s (Figure 5.27). By this period, IRI's diversification into new sectors reached its peak. With the entry in the airport sector¹⁶⁹, IRI accounted for over 40% of national boarding passengers and over 50% of loaded goods. It increased its involvement in civil engineering, reaching a relevant share in specialised constructions (around 12%). By the mid-1970s, IRI accounted for over 15% of national revenues in informatics. IRI's compensations for the nationalisation of the electric energy activities were partly reinvested in the food processing sector, where it obtained relevant market positions in the segments of processed tomatoes (14%), olive oil (13.5%) and frozen food (19%). IRI increased its specialisation in engineering activities, with significant positions gained in railway systems and electro-mechanical products and growing market shares in electronics. During this period, IRI's Alfa Romeo expanded its production, reaching a 14.8% national share. The relative weight of banking activities and maritime transport continued to decline.

Mid-1980s (Figure 5.28). Sectoral shares in this later phase highlight IRI's tendency to specialise in large systemic activities and in strategic segments under international oligopolistic competition. The latter were particularly exemplified by the growing shares in electronic telecommunications equipment (32.5%), aerospace (39.2%), electric

¹⁶⁶ From 1957, following the acquisition of the remaining two telephone concessionaires, previously owned by private shareholders.

¹⁶⁷ From 1963, following the 1962 nationalisation of the electric energy sector and the transfer of IRI's assets to the newly-established public corporation ENEL.

¹⁶⁸ Alitalia – Linee Aeree Italiane was established in 1957 from a merger of LAI and Alitalia.

¹⁶⁹ In 1974, the two Rome Airports of Fiumicino and Ciampino came under IRI's control.

power plants (65%), railways systems (60% railway signalling) and industrial automation (48%). IRI maintained relatively stable market positions in other consolidated activities, except for a further reduction in banking and a revival in maritime transport under freight shipping (over 40% in bulk carrier and 55.6% relative to container shipping). As for food processing, IRI reached leading market positions in processed tomatoes (28%) and ice creams (32%). Finally, with the liberalisation of the television sector in the early 1980s, IRI lost its monopoly on national broadcasting, falling below the 50% share of national broadcasting time.

Early 1990s (Figure 5.29). This latest period confirmed the pattern of specialisation of the 1980s. IRI exited the automotive sector¹⁷⁰ and further consolidated its national shares in telecommunications equipment (48%), aerospace (over 50%), energy and railway engineering, container shipping (89.5%). Other traditional activities maintained their relative weight, with a further decrease in banking, and a relative decline in steelmaking (less pronounced for special steel) and cement production. Data availability at this point allows a more complete picture of IRI's market and productions shares in motorway catering (84%), retail distribution (9.2%), cargo airline services (38.5% relative to international trade), telecommunication engineering (28.7%), biomedical machinery (25%) and naval engines (90%).

¹⁷⁰ At the end of 1986, Alfa Romeo was sold to the leading private carmaker FIAT.

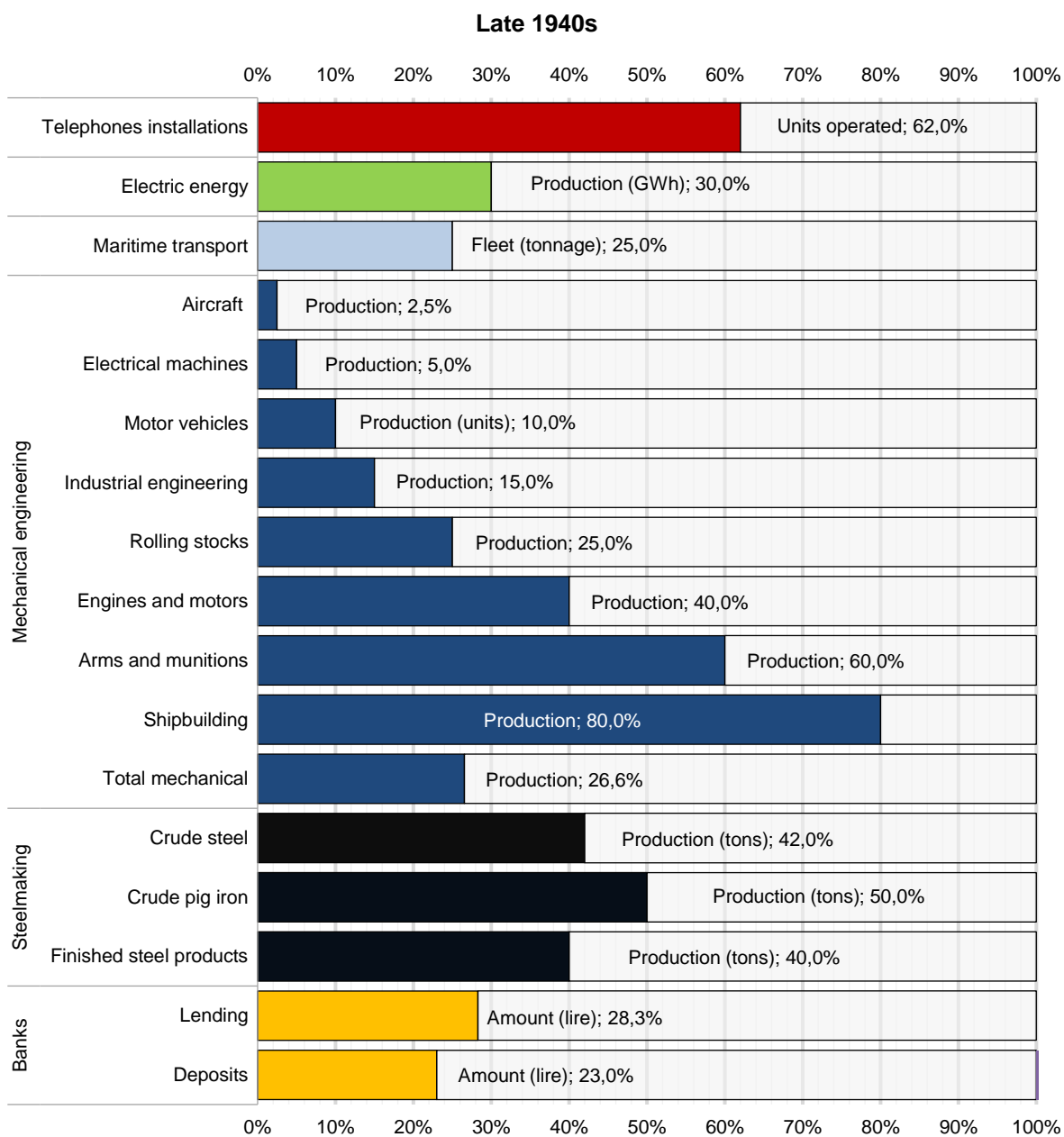


Figure 5.24: Shares of IRI's activities in different sectors relative to the national economy (late 1940s).
 Source: Author's elaboration on IRI Database.

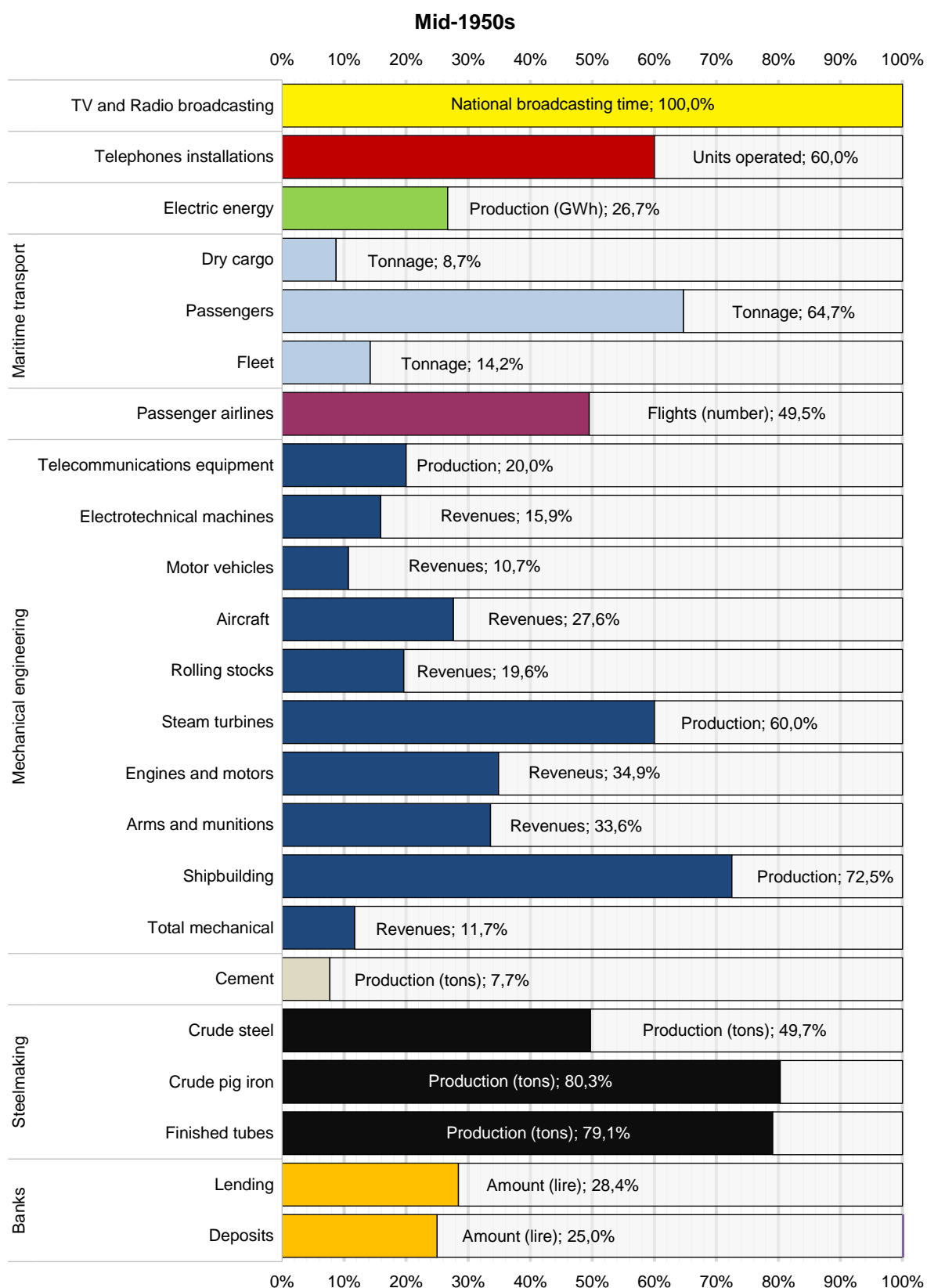


Figure 5.25: Shares of IRI's activities in different sectors relative to the national economy (mid-1950s). Source: Author's elaboration on IRI Database.

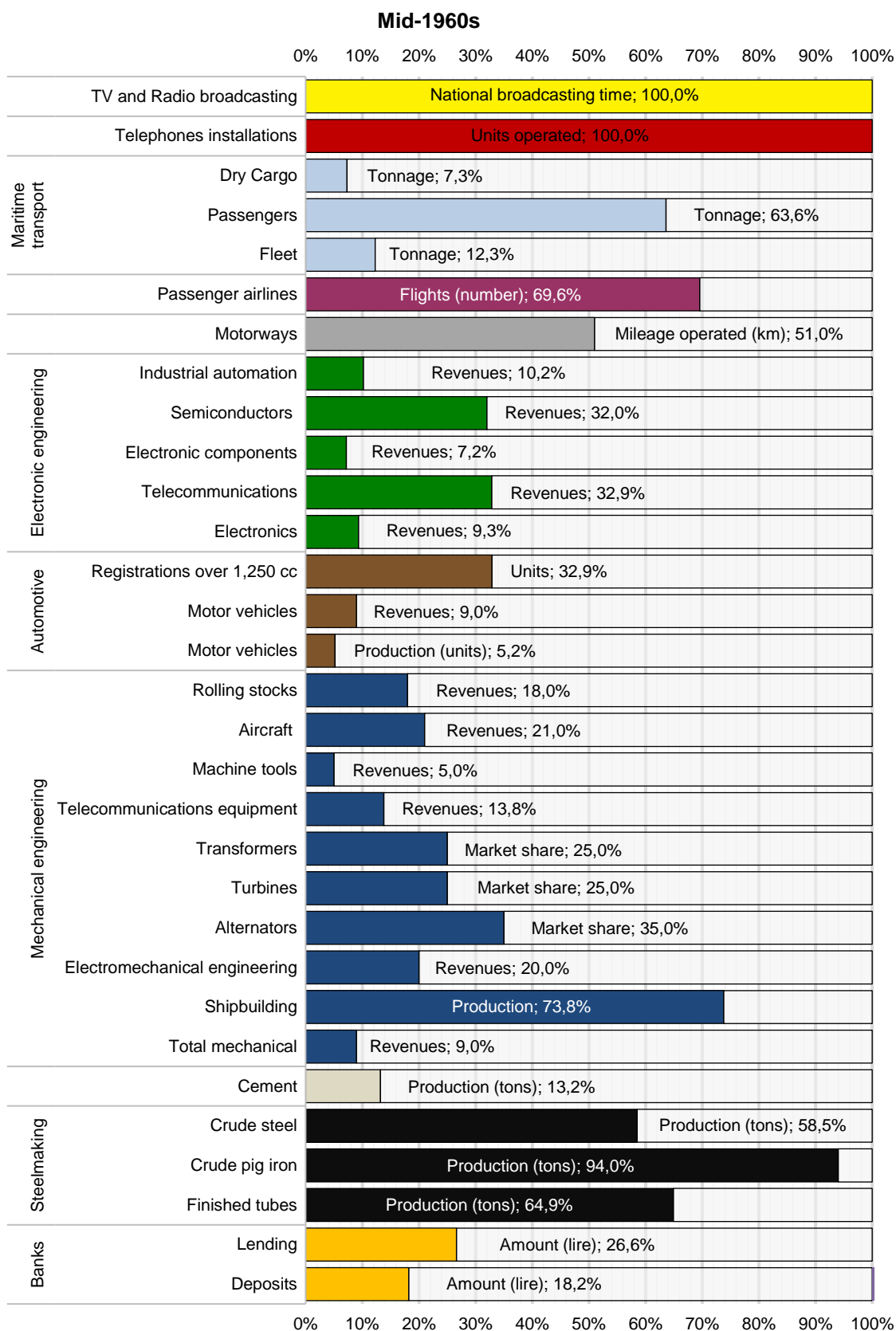


Figure 5.26: Shares of IRI's activities in different sectors relative to the national economy (mid-1960s). Source: Author's elaboration on IRI Database.

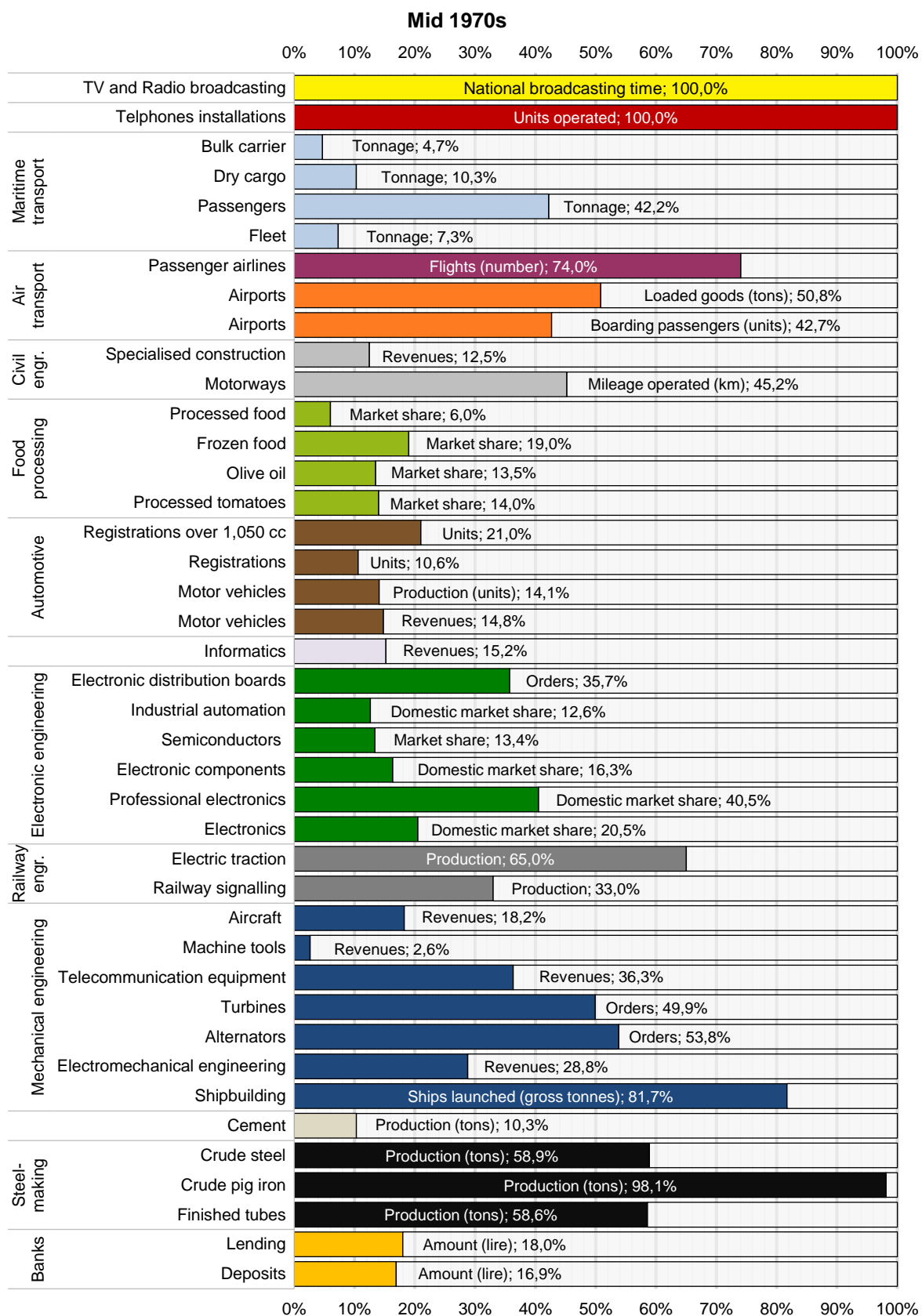


Figure 5.27: Shares of IRI's activities in different sectors relative to the national economy (mid-1970s).
 Source: Author's elaboration on IRI Database.

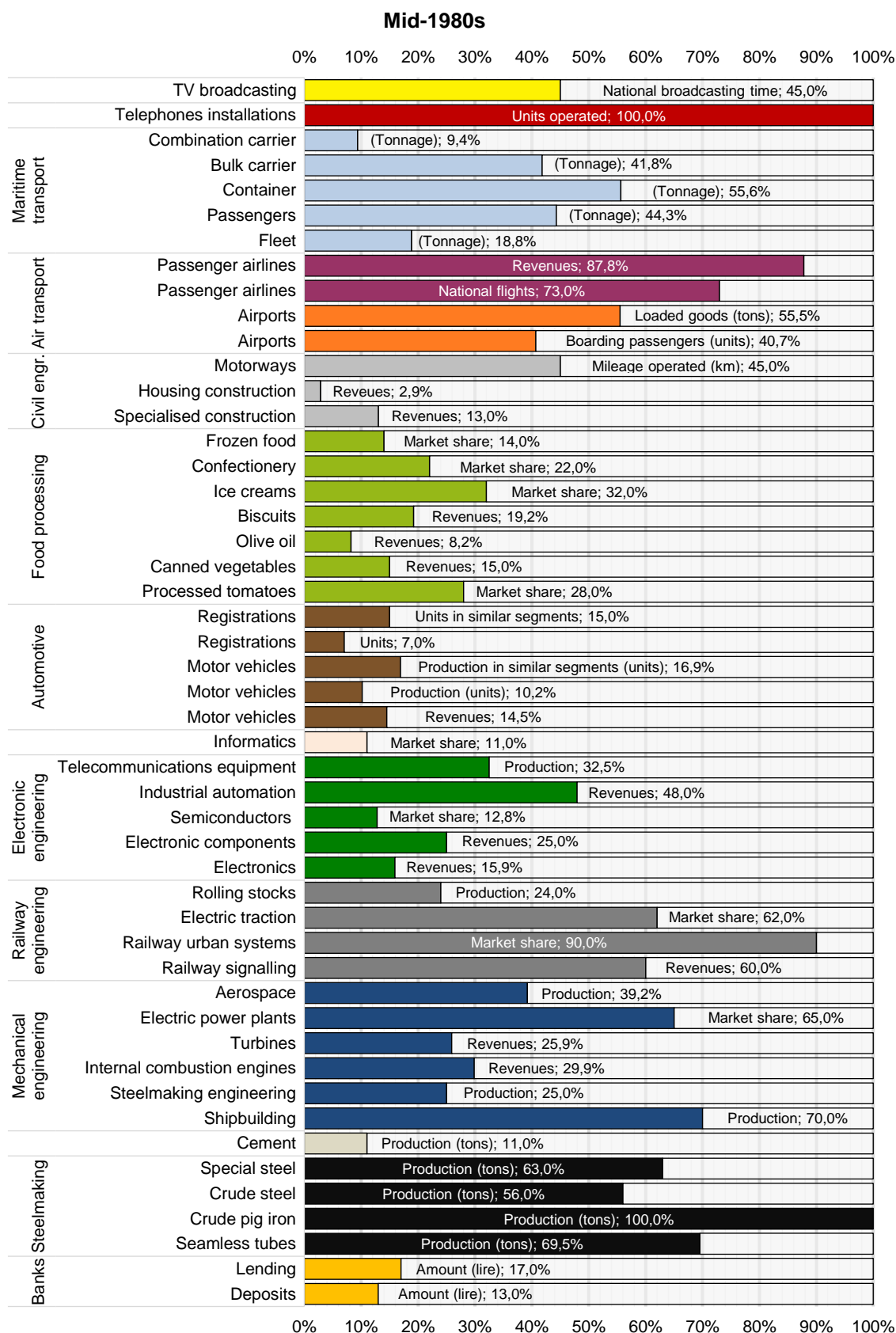


Figure 5.28: Shares of IRI's activities in different sectors relative to the national economy (mid-1980s). Source: Author's elaboration on IRI Database.

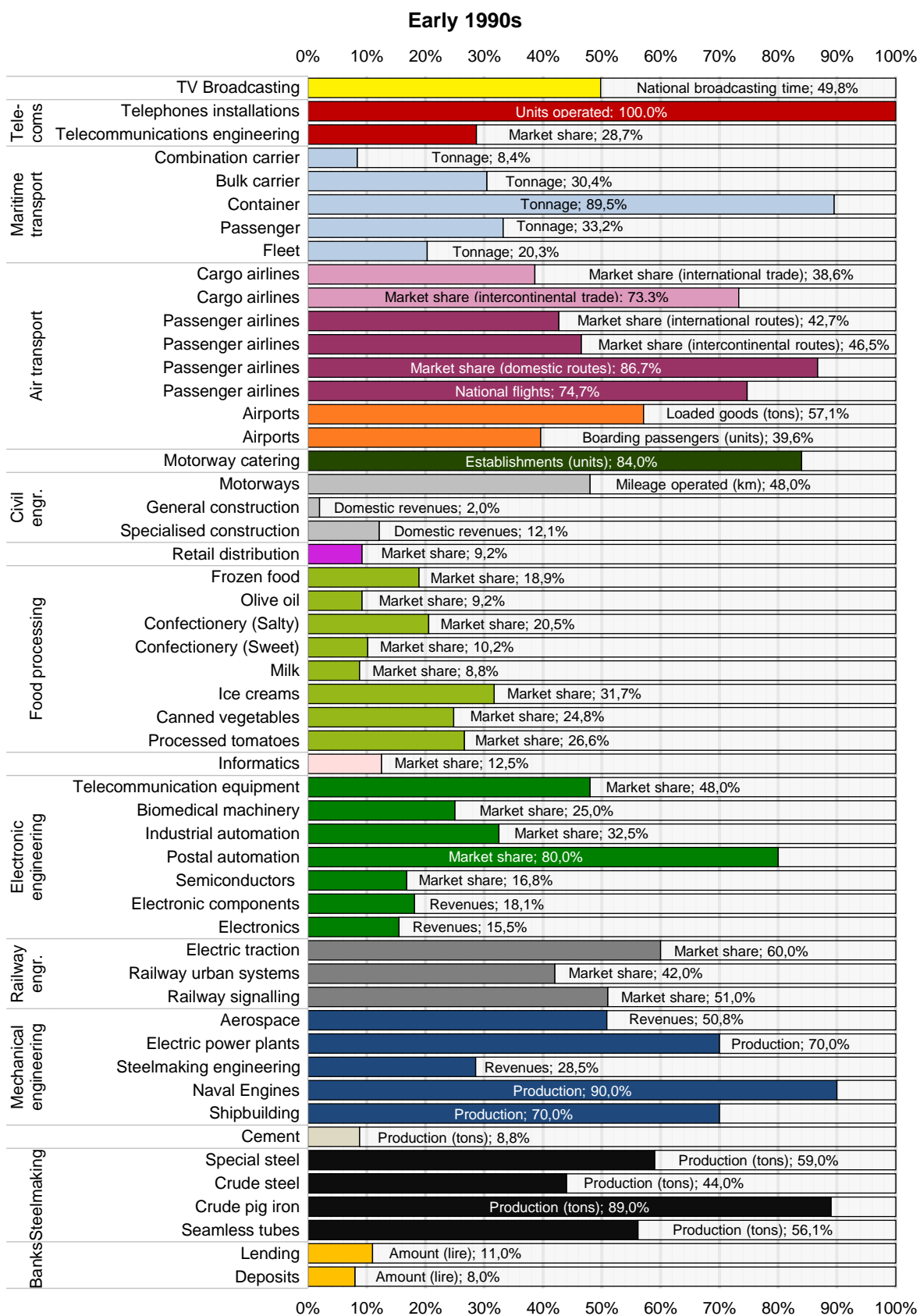


Figure 5.29: Shares of IRI's activities in different sectors relative to the national economy (early 1990s). Source: Author's elaboration on IRI Database.

4.2. IRI's internal sectoral evolution

IRI's internal sectoral diversification can be evaluated with respect to its composing variables – revenues, exports, employment, investments, R&D expenditure – and in different time periods: 1951, 1961, 1971, 1981 and 1991 (Figures 5.30 to 5.34). What emerges is the dynamic evolution of IRI's internal structure, facilitated by its multi-sectoral holding configuration and by the joint-stock nature of its subsidiaries.

The 1951 IRI was radically different from the 1991 IRI. The predominance of traditional heavy mechanical and metal productions in the 1950s and 1960s was progressively replaced by the growing share of modern electronic engineering and telecommunications services. The declining importance of maritime transport within IRI was compensated by the affirmation of air transport. Electric energy production exited from IRI's perimeter in 1962, while infrastructure and food-related activities took a more prominent role.

Revenues shares (Figure 5.30). In 1951, manufacturing activities accounted for almost 69.4% of IRI's revenues, with the predominance of steelmaking – representing 34.2% of the total. Service sectors accounted for 19.1% of the total, dominated by maritime transport (11%), representing IRI's fourth largest source of revenues, followed by electric energy (10.5%). IRI's diversification process in the following decades implied an erosion of the manufacturing share of revenues – down to 43.5% of the total in 1991. Moreover, IRI's manufacturing revenues remodulated their composition: in 1991, steelmaking, mechanical and electronics activities represented similar revenues shares (around 12-14%). Telecommunications became progressively more important – by 1991 it was IRI's largest source of revenues with 27.9% of the total. The contribution of maritime transport gradually decreased (2.2% in 1991), while air transport, food and infrastructure similarly represented 7.1% of total revenues.

Export shares (Figure 5.31). The export shares – limited to the tradable activities¹⁷¹ – displayed a different pattern with respect the revenues shares. In 1951, shipbuilding represented the largest source of foreign revenues (35.8%), with mechanical (34.8%)

¹⁷¹ In the years 1951, 1961 and 1971 official figures on foreign revenues in service sectors – mostly maritime and air transports – are unavailable as considered marginal to the overall amount of IRI's foreign receipts.

and steelmaking (29.5%) closely behind. By 1991, the shipbuilding share of exports had fallen to only 3.2%. Steelmaking and mechanical exports maintained their importance, with the latter obtaining a higher relative weight with respect to total revenues – IRI's mechanical activities were more export-intensive than the steelmaking ones. Over the various decades, exports of electronics assumed greater relevance, from 2% in 1961 to 18.8% in 1991. In 1991, the fourth largest source of foreign revenues was the air transport sector (14.1% of the total).

Employment shares (Figure 5.32). The composition and evolution of IRI's employment shares broadly mirrored its revenues shares. In 1951, manufacturing activities accounted for 75.1% of the total. Services activities represented 14.9% of total employment. Electric energy accounted for 7.9% and infrastructure for the remaining 2.4%. In the following decades, employment in service sectors underwent a relative expansion, reaching 41.1% of the total in 1991, with the telecommunications sector accounting for the largest share (26.9%). Manufacturing activities were down to 46.8% of the total in 1991, with electronics accounting for the largest share (14.5%). Telecommunications services and electronic engineering, which accounted for less than 5% of IRI's employment in 1951, reached a 41.4% share in 1991. It is also worth noting that, except for 1991, IRI's employment shares of mechanical activities were higher than its revenues shares, while the opposite occurred with steelmaking (which employed the largest share of IRI's workers until the mid-1980s). Shipbuilding activities also maintained higher employment shares relative to their revenue shares, from being IRI's third largest employment sector in 1951 with a 15.4% share, to falling to only 5.4% in 1991 – below air transport (7.8%), infrastructure (6.1%) and food (6%).

Investments shares (Figure 5.33). The internal compositions of IRI's fixed investments followed a different pattern, due to the specific investment-intensity of each sector and to the cyclical nature of IRI's investment programmes. Investments in non-steelmaking manufacturing activities represented relatively modest shares (although growing in the case of electronics), compared to its revenues and employment shares. On a comparable level with its employment and revenues shares until 1971 (between 22% and 33%), from 1981 investments in steelmaking activities significantly diminished in relative terms, reaching 7.6% in 1991. In 1951, more than half of total IRI's investments were accounted for by electric energy activities (34.6%) and by maritime transport

(19.3%), which remained considerable until 1961 (16.7% and 7.7% respectively), before falling to marginal values in following decades¹⁷². Quite significant was also the share of investments from infrastructure activities – representing 12.1% of the total in 1961 and 10.6% in 1991. The most significant evolution in IRI's investments composition concerned the telecommunications sector, which constantly grew from 9.5% of the total in 1951 to a staggering 65.1% share in 1991.

R&D share (Figure 5.34). IRI's R&D expenditure at the beginning of the available period¹⁷³ was mostly concentrated on mechanical activities (51.8%), followed by telecommunications (18.6%) and steelmaking (16.5%). The share of R&D expenditure in electronics rapidly increased from less than 5% to around 25% in 1971 and 1981, while dominating in 1991 with 51.8% of the total. By 1991, the corresponding share in mechanical activities was only 20.9%. Telecommunications services and steelmaking also fell to 13.5% and 4.8% respectively. Other activities – shipbuilding, radio and TV, food and infrastructure – represented a marginal share of 5.3% overall in 1991.

¹⁷² Electric energy exited from IRI's shareholding perimeter in 1963.

¹⁷³ An estimated comparison of IRI's internal R&D expenditures is available only from the mid-1960s.

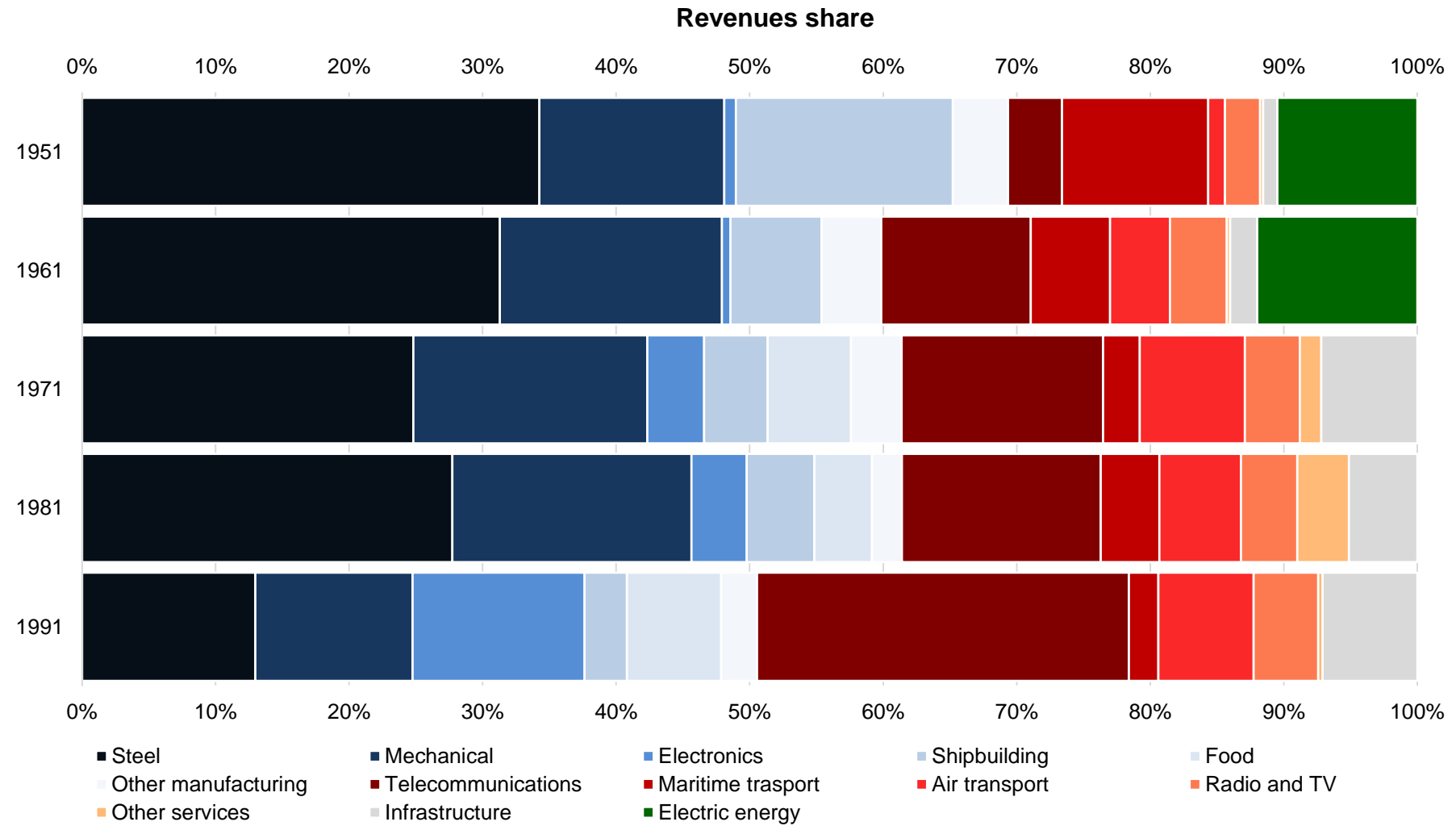


Figure 5.30: Internal evolution of IRI's revenues by sector. Source: Author's elaboration on IRI Database. Notes: Figures are relative to the years 1951, 1961, 1961, 1971, 1981, 1991.

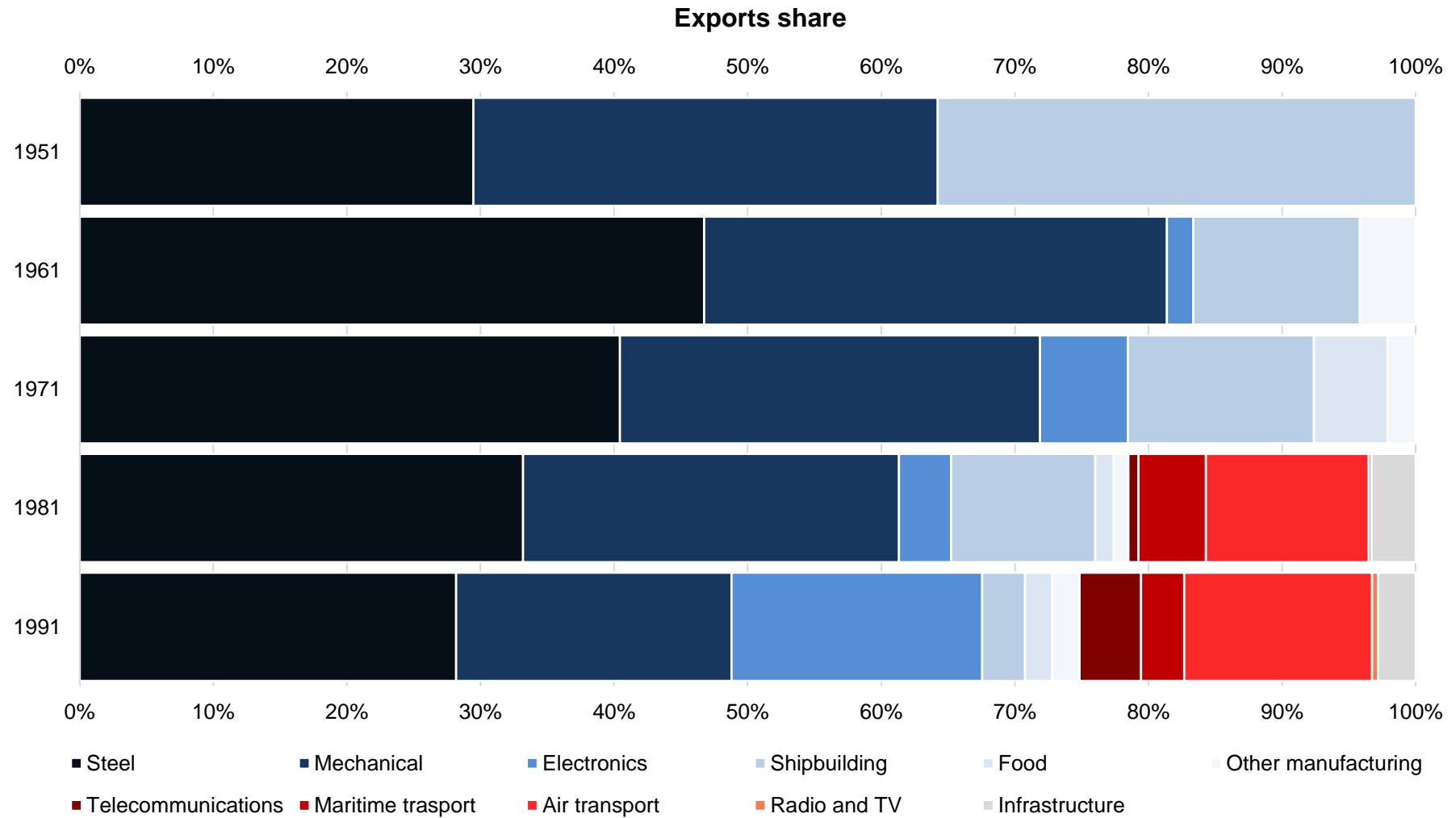


Figure 5.31: Internal evolution of IRI's exports by sector. Source: Author's elaboration on IRI Database. Notes: Figures are relative to the years 1951, 1961, 1961, 1971, 1981, 1991.

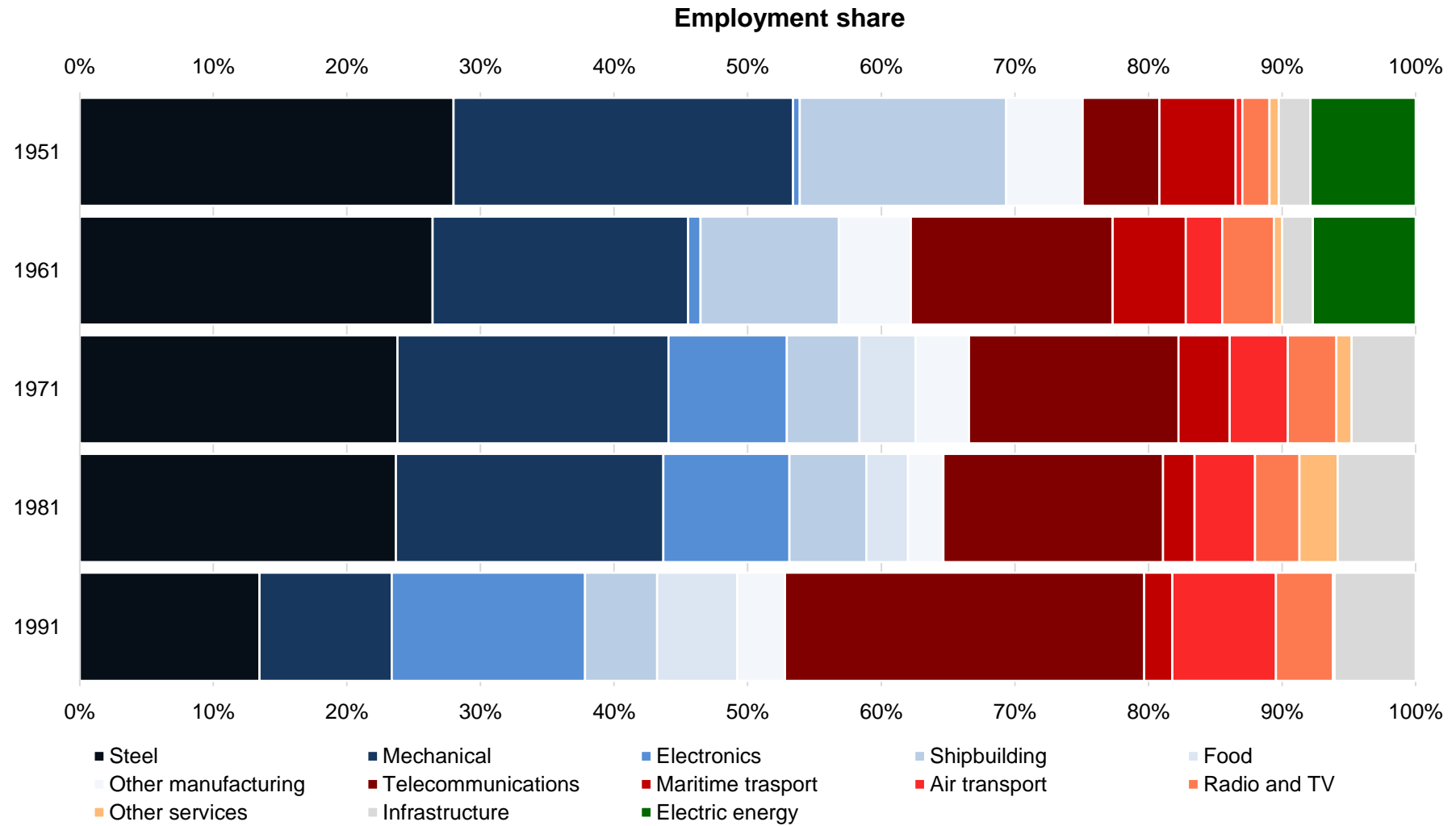


Figure 5.32: Internal evolution of IRI's employment by sector. Source: Author's elaboration on IRI Database. Notes: Figures are relative to the years 1951, 1961, 1961, 1971, 1981, 1991.

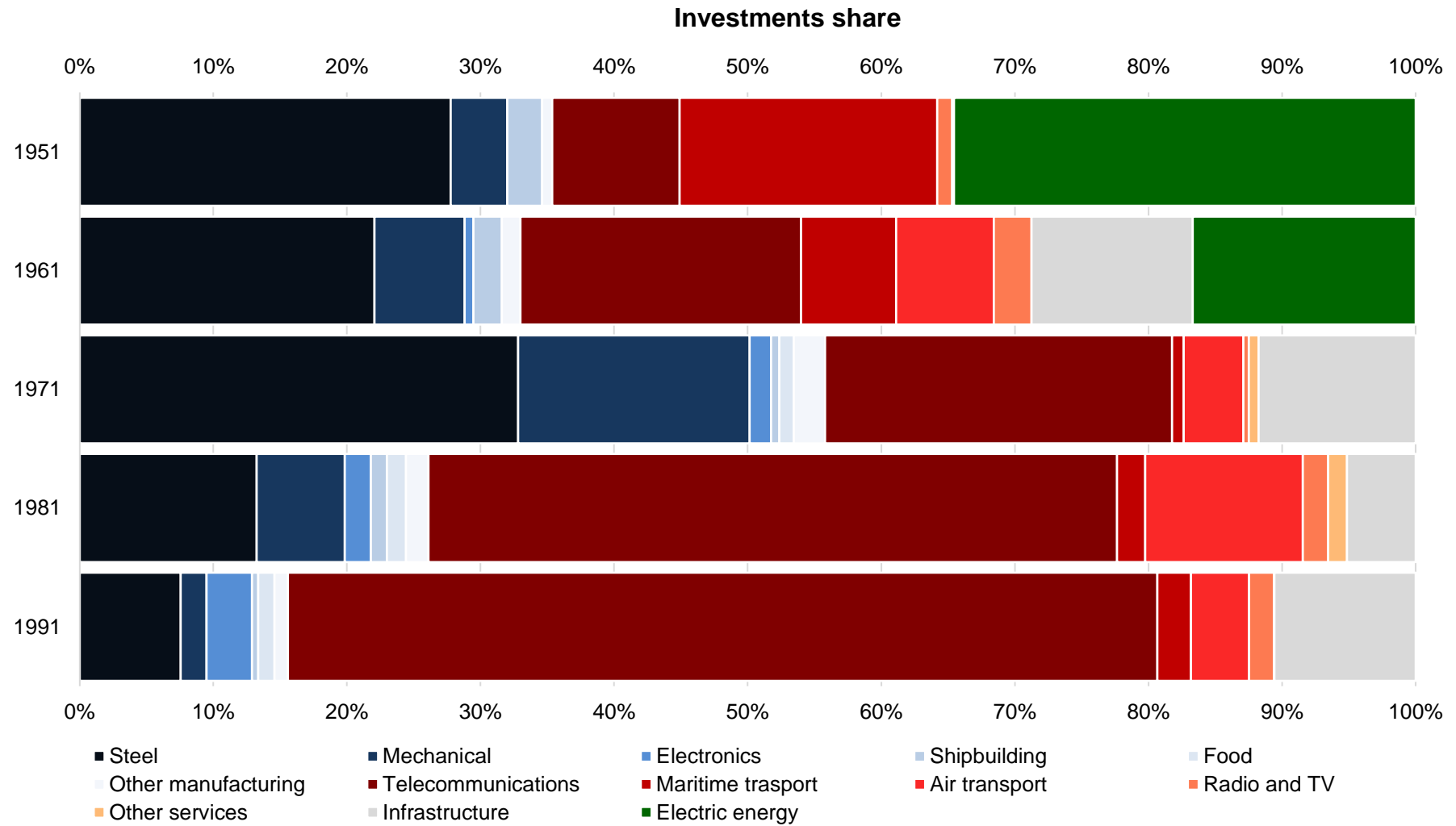


Figure 5.33: Internal evolution of IRI's investments by sector. Source: Author's elaboration on IRI Database. Notes: Figures are relative to the years 1951, 1961, 1961, 1971, 1981, 1991.

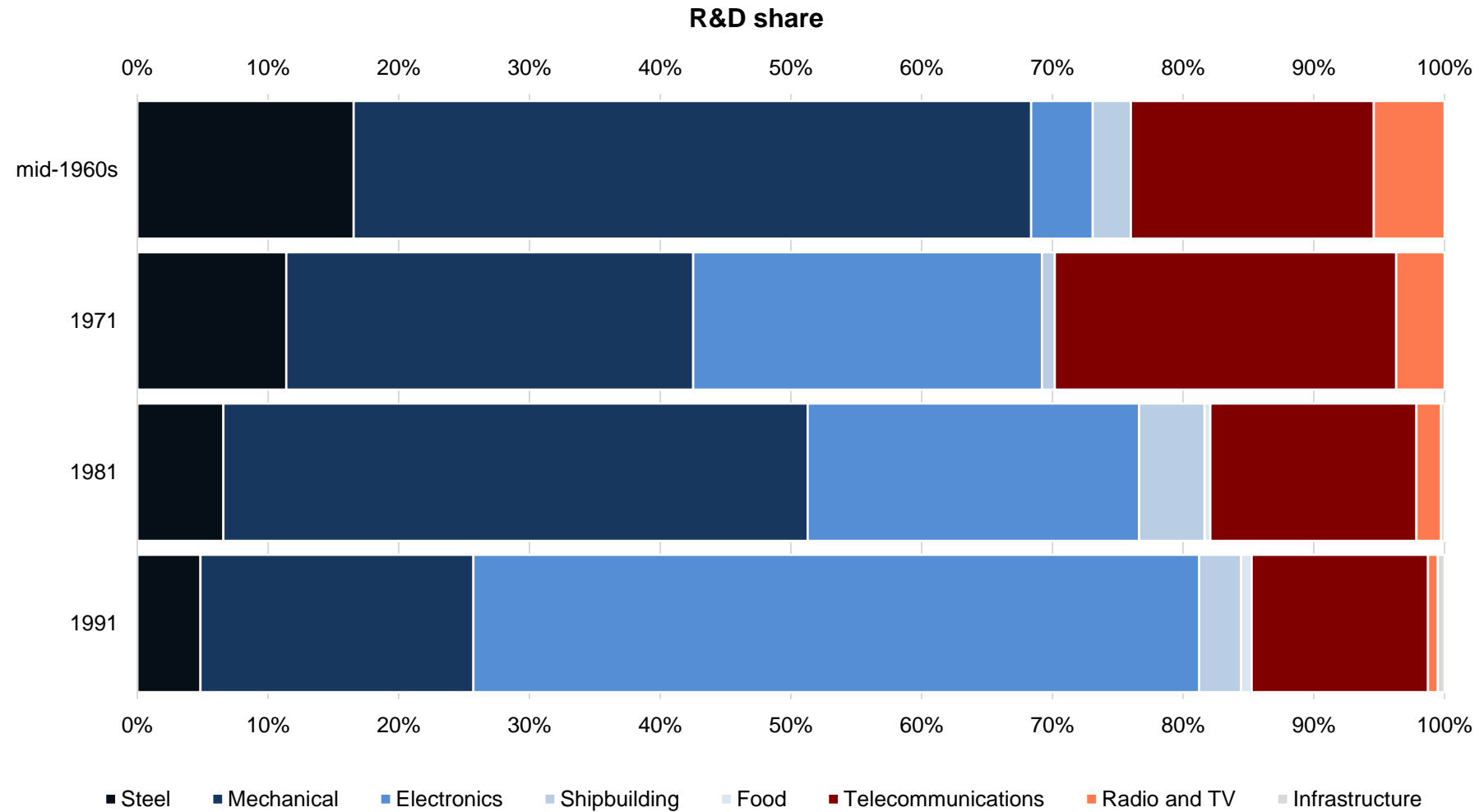


Figure 5.34: Internal evolution of IRI's R&D by sector. Source: Author's elaboration on IRI Database. Notes: Figures are relative to the mid-1960s and to the years 1971, 1981, 1991.

5. IRI's financing structure

The mixed-ownership and multi-level shareholding nature of IRI entailed a peculiar 'finance formula', with a plurality of sources at disposal for IRI's financing requirements. IRI's operating subsidiaries could rely on self-financing and recur to the market for their current operating expenses and future investments.

The consolidation of IRI's financial structure at the level of the Institute, together with its extra financing possibilities, allowed the destination of additional financing sources to sectors requiring upfront long-term investments (for further developments or for their internal restructuring).

5.1. IRI's financing sources

5.1.1. IRI's internal self-financing

IRI's financing requirements were covered by two main sources: internal self-financing and external resources. On average over the 1948-1991 period, self-financing from the companies contributed to 31.2% of IRI's overall financing requirements.

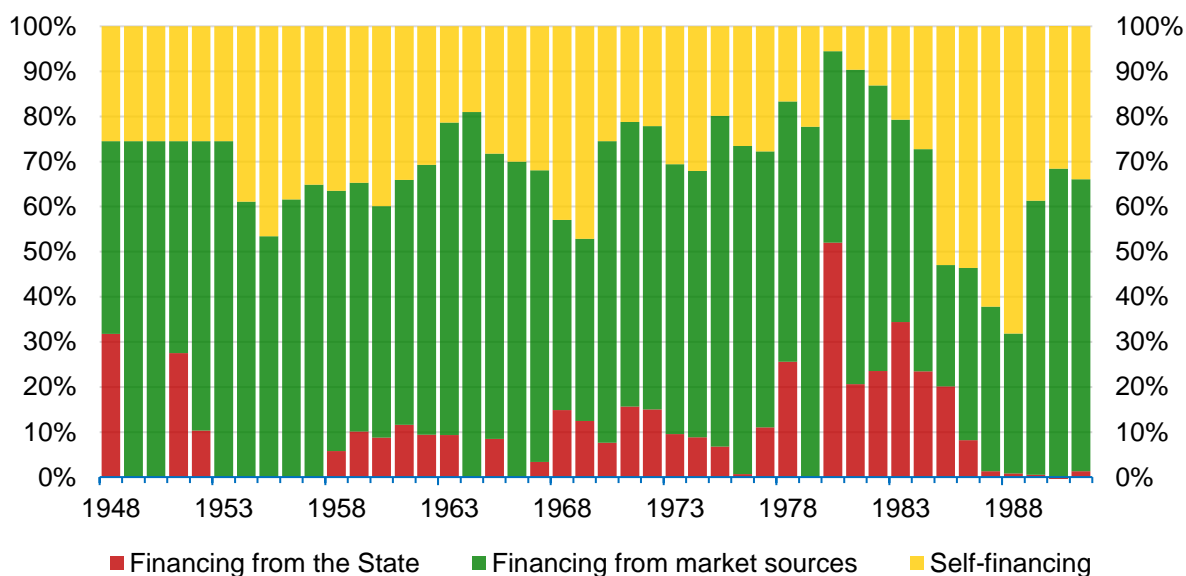


Figure 5.35: Composition of IRI's financing needs (1948-1991). Source: Author's elaboration on IRI Database.

The pattern of self-financing could be divided into three different periods (Figure 5.35). In the thirty years between 1948 and 1979, the recurrence to self-financing by IRI's companies averaged 30.5%, with a minimum of 19% in 1964 and a maximum of 47.1%

in 1969. The crisis of the late 1970s-early 1980s induced a significant fall in the share of self-financing, reaching the lowest point of 5.5% in 1981. From 1984 until 1991, the recurrence to self-financing increased, averaging 46.4% relative to the total financing needs of IRI's companies.

5.1.2. IRI's external sources of financing

On average over the 1948-1991 period, IRI's external sources of financing amounted to 68.8% of its total financing needs. IRI's external financing can be divided into five different sources (Figure 5.36): state grants assimilated to increases of IRI's endowment fund, divestment of assets, equity investments from third-party shareholders, long-term borrowing (loans and issuing of bonds), short-term borrowing.

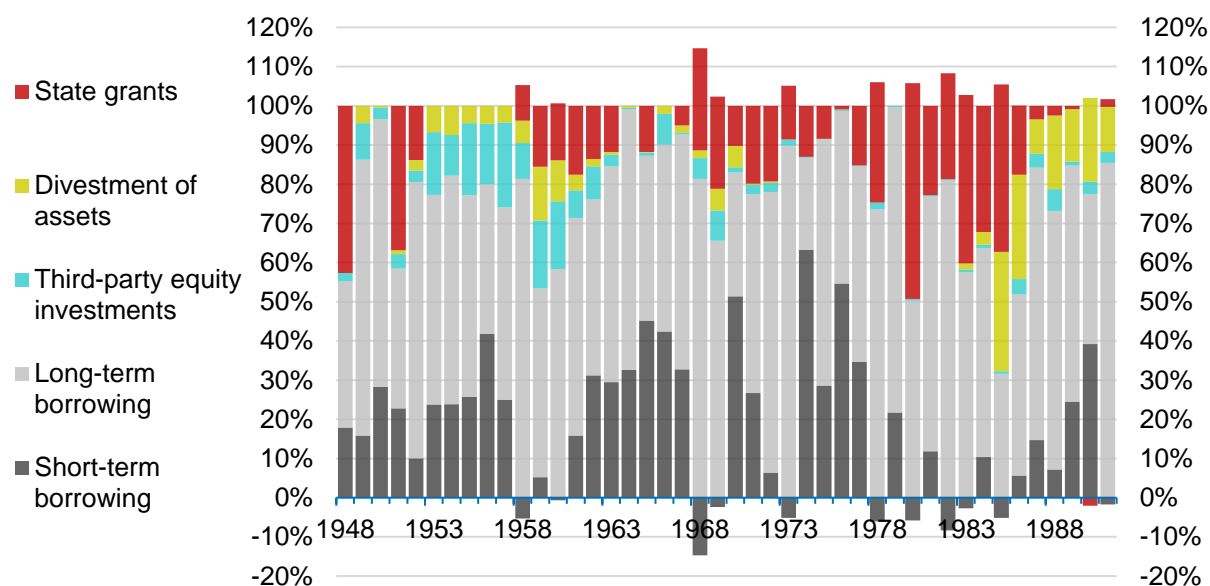


Figure 5.36: Composition of the external financing needs of IRI by source of financing (1948-1991). Source: Author's elaboration on IRI Database.

5.1.2.1. State grants and IRI's endowment fund

As for other public corporations, IRI was the recipient of direct state grants. However, rather than being current transfers channelled to the state holding company, state grants took the form of Treasury's capital injections into IRI's¹⁷⁴ 'endowment fund' (*fondo di dotazione*), corresponding to the equity of a private joint-stock company.

¹⁷⁴ The same applied to the other two state holding companies ENI and EFIM.

Increases in the endowment funds of the management entities were registered as expenditure entries in the capital account of the state budget.

Saraceno (1977a, p. 423) summarised the philosophy underlying the attribution of new capital grants, explaining that the state:

(a) in assigning a given sum to the endowment fund of a state holding agency and in entering this sum in the budget as an expenditure on *capital* and not *current account*, intends to make an investment and not to appropriate a sum for subsidizing an enterprise. In other words, the endowment fund must be invested and not *consumed* to cover the costs a private enterprise would not incur; and

(b) by not entering any returns to capital investment in the endowment fund among budgetary revenues, admits the possibility that such returns may not materialize.

Capital grants from the Treasury – subject to Parliamentary approval – were therefore supposed to be limited to the ‘public element’ of specific investments agreed with the state holding companies. As such, increases in the endowment fund were granted to cover the so-called ‘improper burdens’ (*oneri impropri*) resulting from policy-oriented investments with a lower, deferred or null rate of return. Examples of these were the initiatives in underdeveloped regions – such as the establishment of Taranto’s integrated steelworks in the late 1950s or the Alfa Romeo car making plant at Pomigliano d’Arco in the early 1970s (see Chapter 6) – or the restructuring of financially troubled companies of systemic importance, such as the reorganisation of the mechanical and shipbuilding sectors in the late 1940s (see Chapter 7). However, from the late 1970s and especially in the first half of the 1980s, increases in the endowment fund were required and prevalently deployed to recapitalise the IRI Group from the financial losses of its operating activities – especially those in the steelmaking, shipbuilding and car making sectors (see below section 6.1.).

Over the 1948-1991 period, state grants from the Treasury represented 10.2% of IRI’s total financing requirements (Figure 5.35) and 14.1% of its external financing sources (Figure 5.36). The contribution of state grants was quite discontinuous over that period – null or net negative in 11 years, higher than 25% of IRI’s total financing in 9 years but almost never beyond the 50% value¹⁷⁵. The period with the highest contribution of

¹⁷⁵ Apart from the year 1981.

state funds to IRI's external financing needs was from 1978 to 1985, when it averaged 31.7% of the total.

As mentioned, the contribution of state funds to IRI's external financing requirements mirrored annual proceeds from IRI's endowment fund. The allocation of public resources to IRI's endowment fund became a disputed issue in the debate over the governance of the state holding system, especially on the verge of the privatisation process in 1992. This justifies the need to provide an overall picture of the absolute and relative dimensions of IRI's endowment fund.

Its constitution dated back from the 1937 Statute¹⁷⁶, when it was firstly established from the capital gains obtained through the revaluation of IRI's divested assets in previous years. In 1941, the endowment fund was increased via the same process. Consequently, the direct contribution from the Treasury to IRI's endowment fund started only from 1946. Moreover, from 1971, part of IRI's proceeds from the endowment fund were destined to recapitalise smaller state holdings¹⁷⁷ established with the aim of restructuring ailing non-IRI manufacturing companies.

All this considered, the overall contribution from the state to the IRI Group in the form of proceeds to the endowment fund can be estimated at 54.1 billion euros in 2018 prices. From 1946 to 1991, this corresponded to an average 0.53% of Italy's public expenditure (an average 0.17% of Italy's GDP). From 1950 to 1991, IRI's annual proceeds from the endowment fund amounted to 3.04% of IRI's total revenues.

As illustrated in Figure 5.37, annual proceeds from the endowment fund in real terms were highly concentrated in the 1978-1985 period, accounting for 62.1% of IRI's overall proceeds from the endowment fund in real terms. However, the significant state contribution of the years 1978-1985 was on a comparable level with the period 1946-1952 when measured in relation to Italy's GDP (Figure 5.39) and to IRI's total revenues

¹⁷⁶ From article 2 of Decree of the Head of Government (31 December 1937).

¹⁷⁷ The most notable of them was Gepi – Società di Gestioni e Partecipazioni Industriali, a state financial holding established by Law n. 184 (22 March 1971) with the aim of supporting ailing companies needing to be reconverted or restructured. IRI, together with ENI and EFIM, were assigned a share of 16.67% of Gepi's capital (the remaining 50% was held by the state-owned investment bank IMI). From 1971 onwards, part of IRI's annual proceeds from the endowment funds were destined to Gepi's capital injections, therefore they should be excluded from the overall count of state direct financing to IRI's companies. In the 1980s, IRI was also recipient of state grants directed to recapitalise the electronics state holding REL and the former steelmaking state holding EGAM.

(Figure 5.40). If measured relative to Italy’s public expenditure (Figure 5.38), the three latter cycles of state allocations to IRI’s endowment fund – 1958-1963, 1968-1975, 1978-1985 – had similar dimensions, yet significantly lower than the first one (1946-1952). Therefore, IRI’s weight on Italy’s state budget was relatively higher in the early post-war phase than in later periods.

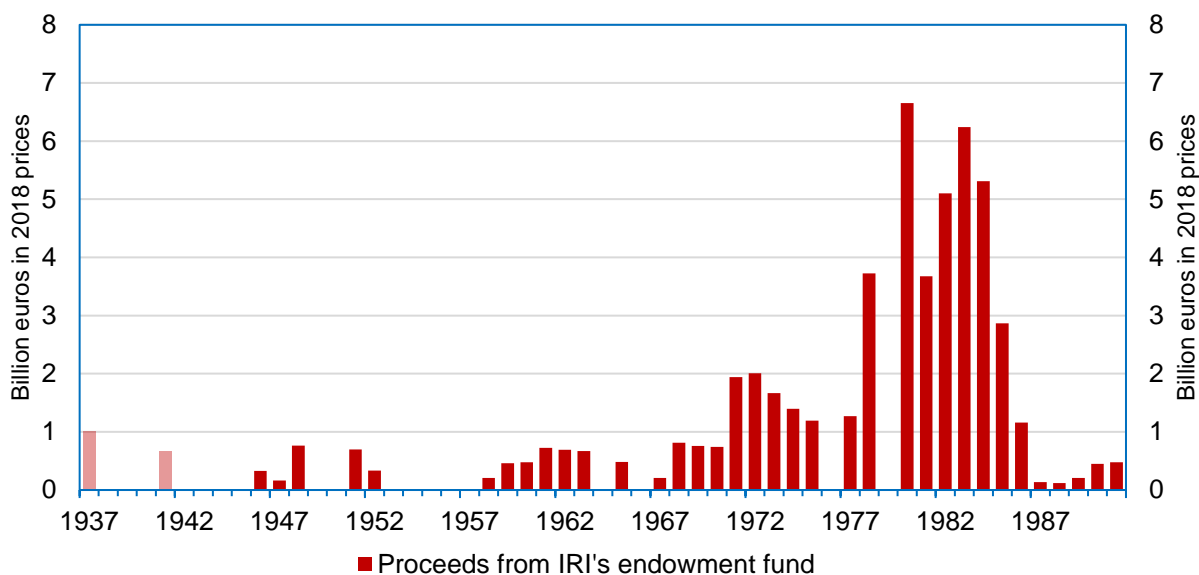


Figure 5.37: Annual proceeds from IRI's endowment fund in real terms (1937-1991). Source: Author's elaboration on IRI Database. Notes: 1) Shaded columns represent increases to the endowment fund from internal sources; 2) Figures are reported in 2018 constant billion euros.

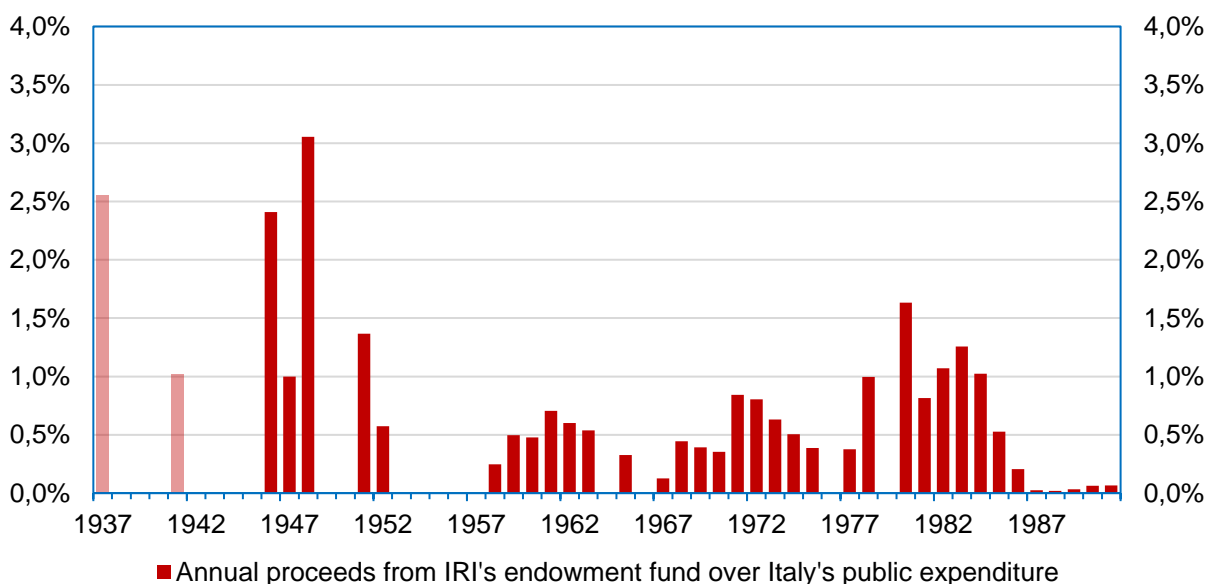


Figure 5.38: Annual proceeds from IRI's endowment fund over Italy's public expenditure (1937-1991). Source: Author's elaboration on IRI Database. Notes: Shaded columns represent increases to the endowment fund from internal sources.

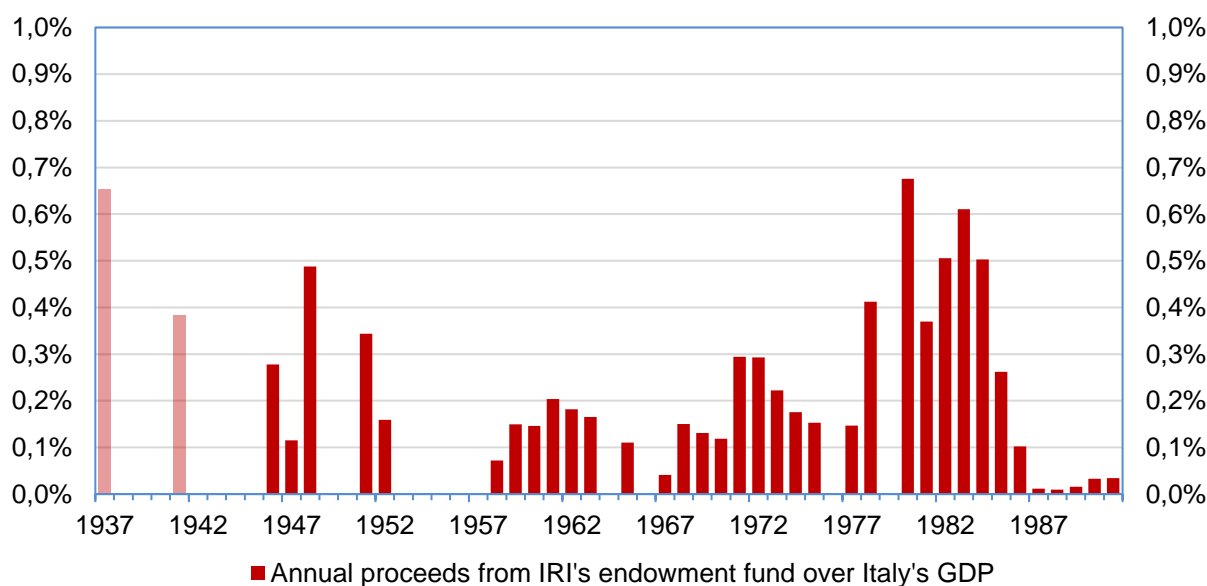


Figure 5.39: Annual proceeds from IRI's endowment fund over Italy's GDP (1937-1991). Source: Author's elaboration on IRI Database. Notes: Shaded columns represents increases to the endowment fund from internal sources.

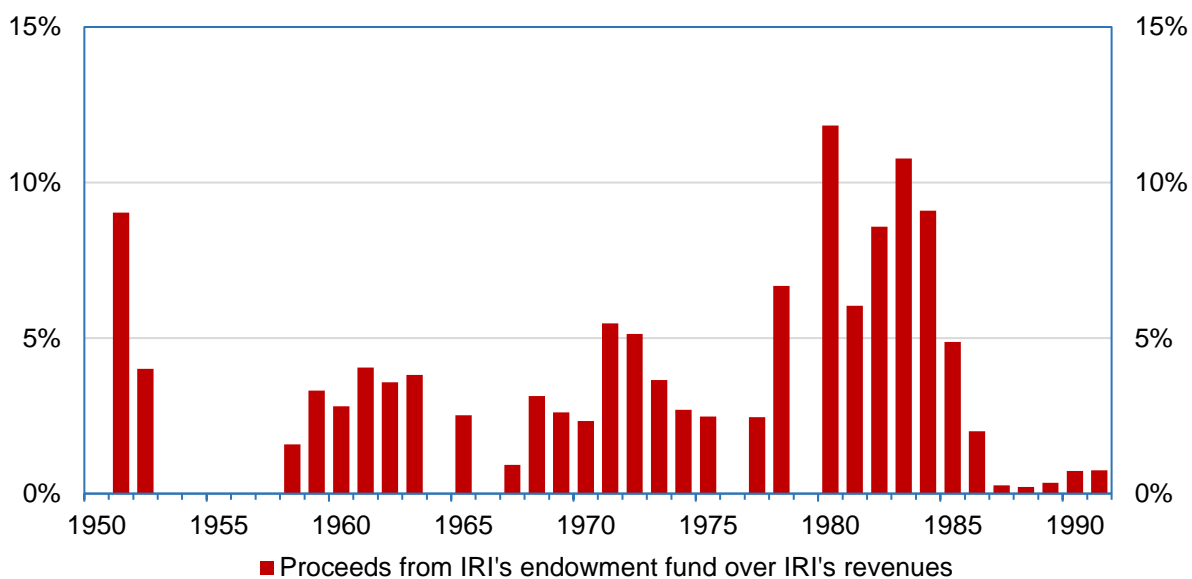


Figure 5.40: Annual proceeds from IRI's endowment fund over IRI's revenues (1950-1991). Source: Author's elaboration on IRI Database.

5.1.2.2. Long-term borrowing: loans and IRI bonds

Long-term borrowing was the largest source of IRI's external financing, averaging 57.3% of the total over the period 1948-1991 (Figure 5.36). In IRI's financial statements, medium and long-term loans from financial institutes specialised in industrial credit were assimilated with the issuing of obligations, under the heading 'long-term operations'. However, while the first source was available at all the

shareholding levels within the IRI Group, bonds issuing was mostly a prerogative of the Institute, representing an additional source of financing available to the IRI Group.

The Institute adopted the financing option of bonds issuing as early as in 1933. In fact, IRI's special bonds issuing coincided with the creation of the first sectoral financial holdings¹⁷⁸ (Gasperin, 2022). IRI's 1948 Statute confirmed this prerogative. Subsequent to a deliberation of the Board of Directors¹⁷⁹, the Institute could issue bonds in national and foreign currencies¹⁸⁰, which could take the form of special series of convertible bonds, linked to certain stock holdings.

IRI bonds could be classified according to their direct financing destination and to their ordinary or convertible typology (Table 5.3). In case of IRI bonds issued to finance the Institute ('IRI-Institute'), the amount raised could be destined to whatever purpose. Only 'ordinary' IRI-Institute bonds were admitted, as they could not be converted into shares of the Institute, given its public law legal status.

When the issuing of IRI bonds was explicitly destined to financing a specific subsidiary ('IRI-subsiidiary'), it could take the form of convertible bonds. In this case, the issued bonds could be converted into shares of the companies' stocks, normally capped at half of their value, in order to preserve IRI's shareholding control of the subsidiary. Underwriters of convertible IRI bonds could also receive a premium calculated on a share of the dividends accruing to the linked stock holdings¹⁸¹. Consequently, the optional conversion into shares made IRI bonds particularly attractive – even without the state guarantee – when the underlying subsidiaries registered substantial profit margins. The convertible IRI bond, while allowing for further availability of financing resources that the Institute could distribute to their subsidiaries, at the same time it

¹⁷⁸ The share capital of STET (1933), Finmare (1936) and Finsider (1937) was constituted through the special issue of state-guaranteed convertible bonds (20-year maturity) – IRI-Stet, IRI-Mare, IRI-Ferro – which holders could convert into shares of the respective financial holdings.

¹⁷⁹ Article 6 of the 1948 Statute.

¹⁸⁰ Article 4 of the 1948 Statute.

¹⁸¹ Examples of this were: IRI-Stet linked to the sectoral holding STET, IRI-Mare linked to the sectoral holding Finmare, IRI-Ferro linked to the sectoral holding Finsider, IRI-Meccanica linked to the sectoral holding Finmeccanica, IRI-Elettricit  linked to the sectoral holding Finelettrica, IRI-Alfa linked to the company Alfa Romeo, IRI-Comit linked to the bank Banca Commerciale Italiana, IRI-Credit linked to the bank Credito Italiano, IRI-Banco Roma linked to the bank Banco di Roma, IRI-Alitalia linked to the sector leader company Alitalia, IRI-Aeritalia linked to the company Aeritalia.

facilitated the contribution of third-party investors to the capitalisation of IRI's subsidiaries.

Typology of IRI bonds

		Ordinary	Convertible
<i>Financing destination</i>	IRI-Institute	IRI bonds with a fixed or variable yield, destined to financing the Institute.	(Non-available option).
	IRI-subsiary	IRI bonds with a fixed or variable yield, destined to the financing of IRI's subsidiaries.	IRI bonds with a fixed or variable yield, plus an optional premium based on a share of the dividends from the linked stock holdings. They were destined to the financing of IRI's subsidiaries and their holders could convert a predetermined share of their value in stocks of IRI's subsidiaries.

Table 5.3: Taxonomy of IRI bonds. Source: Author's elaboration.

Bonds issuing was the main source of financing for the Institute – and by extension a major source for IRI's companies, in turn financed by the Institute (see below Section 5.2.). Over the 1948-1991 period, IRI bonds represented 41% of the Institute's liabilities structure (Figure 5.41 and Table A5.7), with a predominance in the 1950s and 1960s.

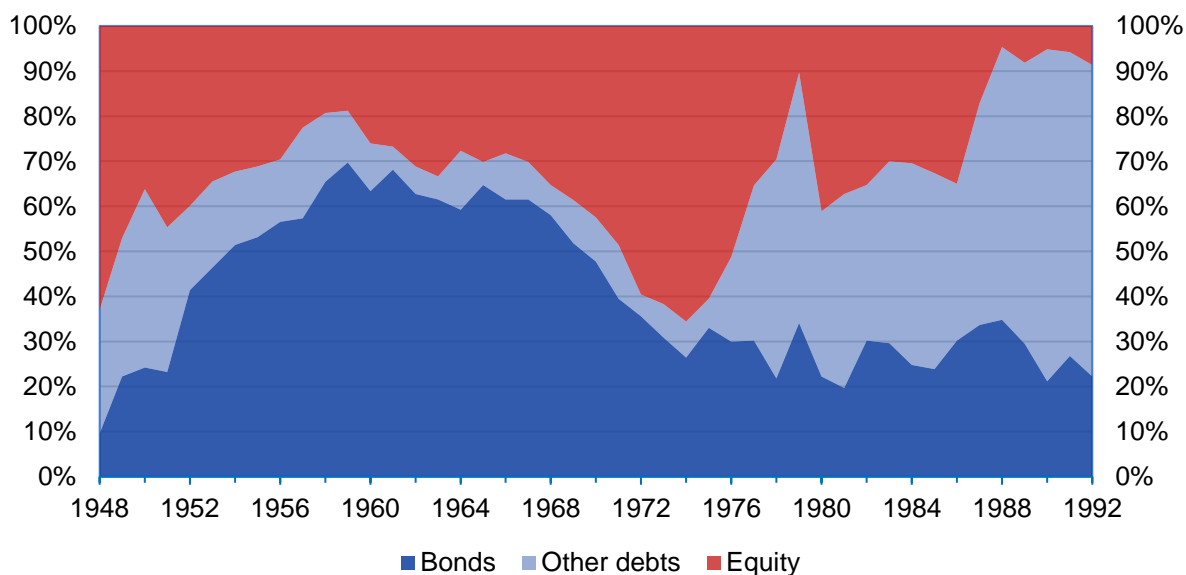


Figure 5.41: Structure of the Institute's liabilities (share over total). Source: Author's elaboration on IRI Database.

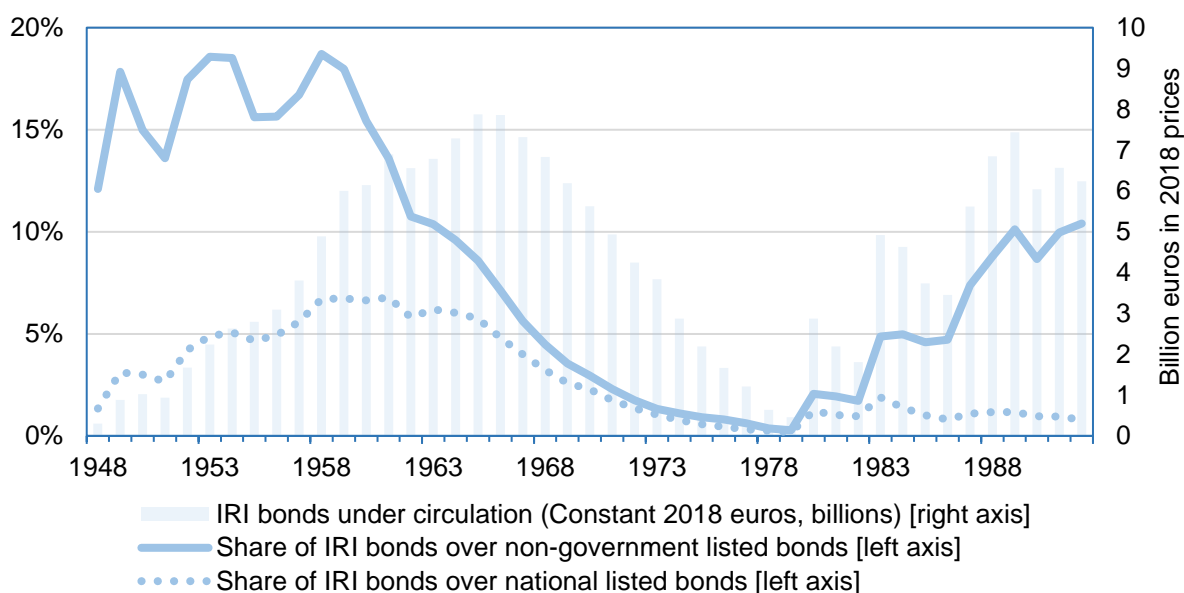


Figure 5.42: Listed IRI bonds under circulation. Source: Author's elaboration on IRI Database.

The dimension of IRI bonds issuing was relevant also with respect to the national bonds market. Figure 5.42 shows how the real value of listed IRI bonds under circulation progressively increased until 1965, falling to insignificant figures by the late 1970s, before increasing again throughout the 1980s. On average over the years 1948-1992, IRI bonds represented 8.4% of national non-government listed bonds in circulation (Table A5.8), with significant differences between the 1948-1960 period (when they averaged 16.4%) and the 1970s (when they fell to an average of 1.2%). However, by 1992 IRI bonds still accounted for 10.4% of national non-government bonds.

5.1.2.3. Short-term borrowing

Short-term borrowing – mostly in the form of commercial bank credit – was a volatile component of IRI's financing sources. On average over the 1948-1991 period, it represented 19.8% of IRI's total external requirements, ranging from more than 50% in certain years in the 1970s, to negative values (i.e. positive net reimbursement) in ten different years between 1948 and 1991 (Figure 5.36).

This was explained by the use that IRI's operating subsidiaries made of short-term borrowing to manage their annual liquidity requirements. In fact, the Institute's subscription of short-term credit was only a marginal share of its total borrowing.

5.1.2.4. Third-party equity financing

As illustrated in Chapter 4, the joint-stock legal nature of IRI's subsidiaries entailed the possibility of joint-ownership agreements with private enterprises and the acquisition of listed companies' stocks by individual shareholders.

This enabled IRI's companies to access equity financing from third-party investors, representing 5% of IRI's external financing needs on average over the 1948-1991 period (Figure 5.36). In earlier periods, third-party equity financing was significantly higher (13.2% on average in the 1950s), while during the crisis years of 1975-1985 it was essentially null (0.5% on average). In the last five years (1986-1991), when IRI resumed listing companies on the stock exchange, the contribution of equity financing recovered to an average of 3.3%, only slightly less than the 4.2% average value registered during the 1960s.

Despite being relatively low with respect to IRI's overall financing needs, equity financing from private investors represented an additional source that other SOEs – public corporations or state autonomous bodies for instance – could not dispose.

5.1.2.5. Divestment of assets

The joint-stock status of IRI's subsidiaries allowed a further source of financing based on the direct divestment of assets. This could materialise through the selling of shares on the stock market or via the outright privatisation of companies and their internal divisions.

IRI's divestment activity was massive during the pre-war years¹⁸², but came to a halt with the beginning of the conflict. Between 1948 and 1991, the share of IRI's external financing requirements covered by divestments of assets amounted to 5.2% of the total (Figure 5.36). Significant differences were registered throughout the period. From an average value of 6.1% in the 1950s, the share of financing from divestments fell to 2.4% in the 1960s and to only 0.4% on average in the years 1971-1984. However, from 1985 IRI resorted to the privatisation of companies (e.g. Alfa Romeo in 1986) and to

¹⁸² Divestments of assets in the period 1933-1936 amounted to 4.58 billion euros in constant 2018 prices, corresponding to 3.28% of Italy's 1936 GDP. In the years 1937-1939 they amounted to 2.23 billion euros in constant 2018 prices, corresponding to 1.29% of Italy's 1939 GDP (Gasperin, 2022).

the selling of subsidiaries' shares (for instance: Aeritalia, Sirti, Autostrade, Ansaldo Trasporti, etc.). In the period 1985-1991, 18.7% of IRI's total external financing came from divestment activities.

5.2. The Institute's additional financing and its sectoral destination

The financing contribution from the Institute represented a significant and additional source of IRI's overall external financing requirements. On average over the period 1948-1991, the Institute's share of IRI's financing needs was 30.2% (Figure 5.43), with higher values in the years 1948-1960 (39.4%) and 1981-1991 (35.7%), interposed by lower values in the 1960s (19.3%) and 1970s (23%).

This financing function performed by the Institute was crucial for at least two reasons. First, IRI's diversification and creditworthiness enabled the Institute to raise additional financing that the least profitable subsidiaries might not otherwise be able to obtain. Second, by assuming a key financing function for the IRI Group as whole, it reduced the dependence of IRI's companies on non-IRI credit institutes¹⁸³.

In other words, the Institute was the centre of financial coordination and a key dispenser of finance for the IRI Group. This created the possibility of forcing the allocation of resources against the logic of a short-term maximum economic return, in favour of long-term financing support for companies undergoing scaling up investments or restructuring processes.

¹⁸³ As pointed out by Holland (1972, p. 190) "when the IRI Institute issues bonds it is in effect acting as a credit institute for the companies which it controls".

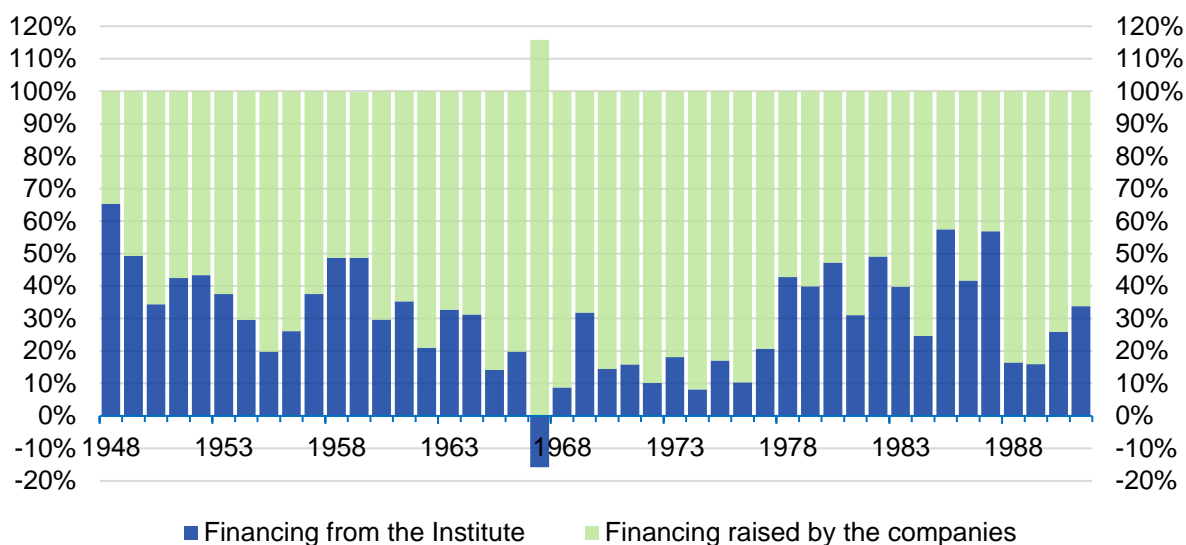


Figure 5.43: Relative contribution of the Institute to the overall external financing requirements of the IRI Group. Source: Author's elaboration on IRI Database.

Table 5.4 illustrates the sectoral distribution of the Institute's financing to IRI's companies, which only partially reflected the relative weight of its sectoral activities (as reported in Section 4.2.).

	Average 1948-1960	Average 1961-1970	Average 1971-1983	Average 1984-1992	Average 1948-1992
Steelmaking	17.8%	25.6%	32.4%	34.6%	27.1%
Mechanical	44.8%	15.2%	26.0%	6.2%	25.1%
Telecoms and Electronics	8.7%	7.5%	17.8%	35.6%	16.5%
Shipbuilding	-0.5%	2.8%	7.9%	0.5%	2.9%
Food	-	-	0.9%	0.5%	0.7%
Maritime transport	3.9%	0.8%	2.3%	1.5%	2.3%
Air transport	1.5%	-0.4%	4.0%	2.6%	2.0%
Radio and TV	1.0%	0.3%	0.0%	0.9%	0.5%
Infrastructure	7.7%	22.4%	1.4%	15.5%	10.7%
Electric energy	6.0%	1.4%	-	-	4.0%
Banks	2.5%	14.9%	-	1.3%	6.1%
Various	6.5%	9.6%	7.3%	0.8%	6.3%
Total	100%	100%	100%	100%	100%

Table 5.4: Sectoral destination of financing from the Institute to IRI's companies (average values). Source: Author's elaboration on IRI Database. Notes: 1) 1984-1992 values represents loans from the Institute and do not include capital increases; 2) Values for 'Banks' not available from 1971 to 1984; 3) 'Telecoms and Electronics' includes both telephone services and electronic engineering.

The relative contribution from the Institute – or, by contrast, from market sources – to IRI's financing needs varied significantly across different sectors (Figure 5.44). Over the period 1948-1983¹⁸⁴, electric energy, infrastructure and telecommunications were much less dependent on the Institute's financing, compared to the 30% average for

¹⁸⁴ Complete figures for the remaining 1984-1992 period are not available.

the IRI Group. On the opposite, shipbuilding and mechanical activities relied on the Institute for almost 50% of their total financing requirements over the same period. The steelmaking sector was also significantly supported by the Institute's financing – with the exception of the 1960s. Maritime transport received a significant contribution from the Institute in the 1960s, the same happened to air transport in the period 1971-1983.

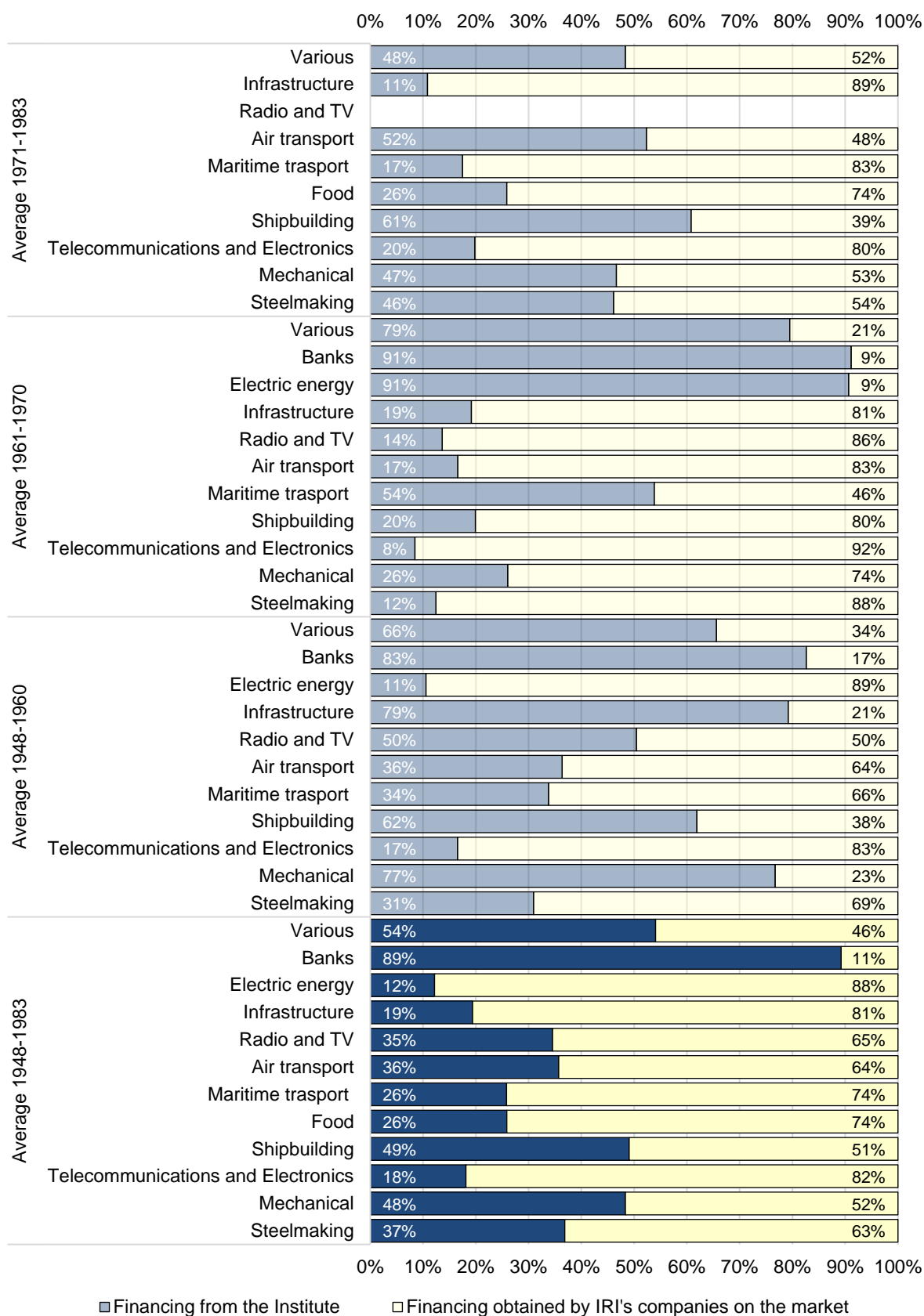


Figure 5.44: Financing contribution from the Institute and from market sources to IRI's sectoral activities. Source: Author's elaboration on IRI Database.

6. IRI's financial performance

The following sections reconstruct IRI's main financial results and ratios, providing an objective contextualisation of the figures.

6.1. IRI's financial results

IRI's consolidated net results¹⁸⁵ varied significantly over the 1958-1992 period (Figure 5.45). They were positive until 1969, for a cumulative amount of 4.8 billion euros in 2018 prices (Figure 5.46). From 1975, IRI started to incur huge losses, reaching a peak of -11.4% relative to total revenues in 1980. From 1986 to 1990, the IRI Group displayed again positive results (with a profit margin of 2.8% in 1989), turning slightly negative in 1991 and worsening in 1992. From the mid-1970s, the dismaying economic results of IRI's industrial section were partially compensated by the profit margins of the banks.

The cumulated sum of IRI's net results over the 1958-1992 period amounted to 36.6 billion euros losses in 2018 prices (Figure 5.46). This figure would be slightly positive, had it not been for the 37.1 billion¹⁸⁶ cumulated losses of the 1975-1985 period, which was characterised by the consequences of the 1973 oil shock on the automotive and shipbuilding sector, as well as by the global steelmaking crisis induced by stagnating demand for steel products. IRI was severely impacted by its heavy involvement in these sectors.

¹⁸⁵ Available from 1958.

¹⁸⁶ In constant 2018 euros.

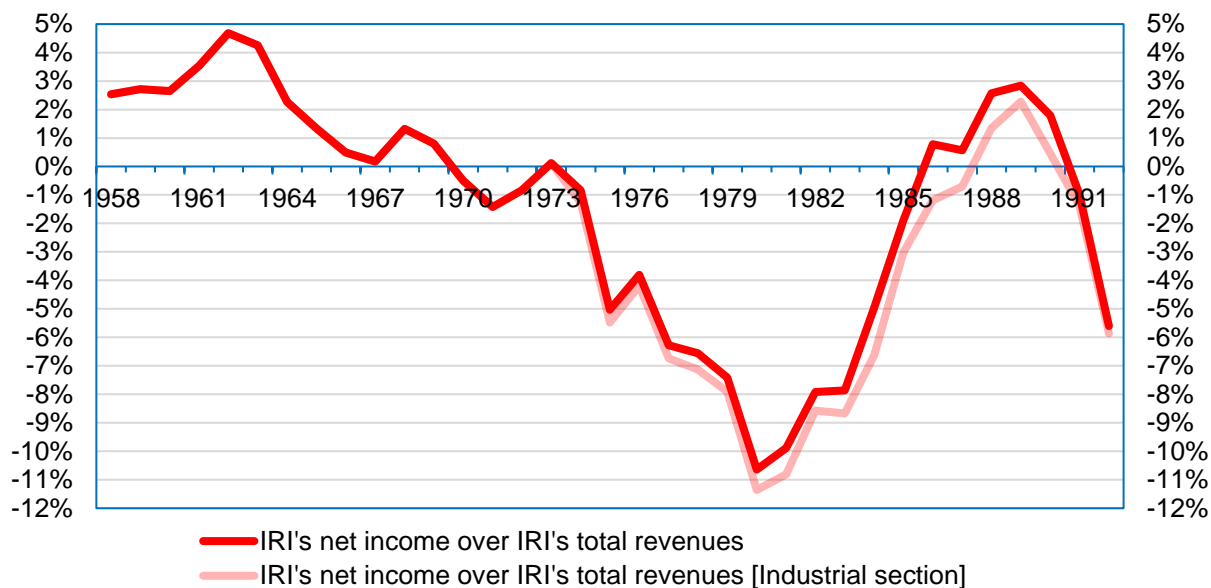


Figure 5.45: IRI's net results over total revenues. Source: Author's elaboration on IRI Database.

In particular, in the critical years 1975-1985, losses from its steelmaking activities amounted to 65.9% of IRI's total. IRI's cumulated losses over the 1958-1992 period would have amounted to only 6.8 billion euros without the negative contribution of steelmaking activities – which accounted for 74.4% of IRI's cumulated losses in the 1974-1992 period.

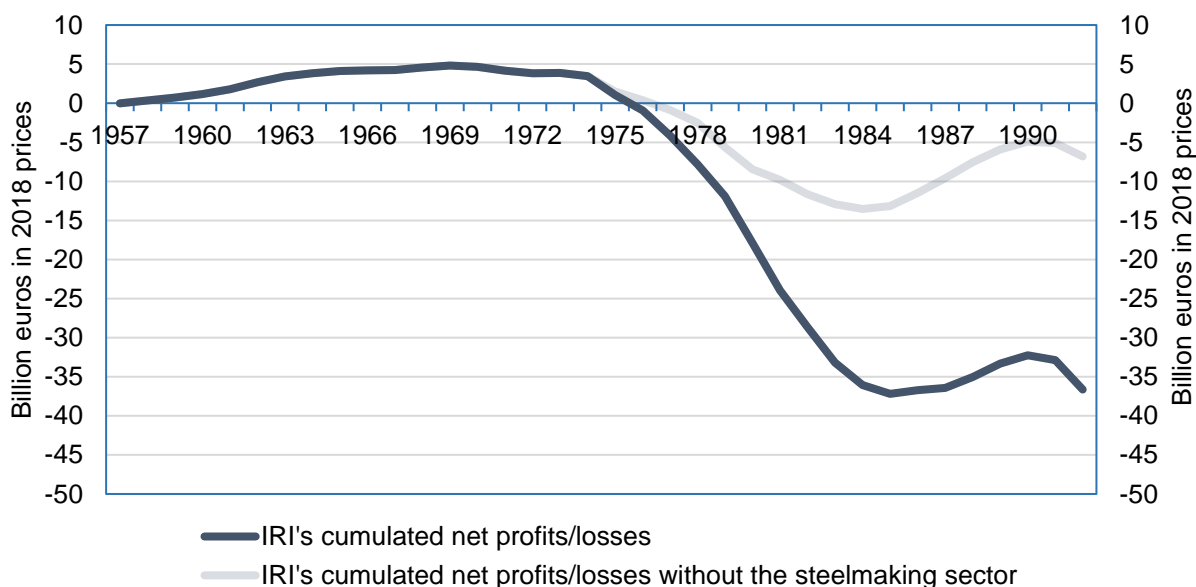


Figure 5.46: IRI's cumulated net results in real terms. Source: Author's elaboration on IRI Database. Notes: Values are reported in constant 2018 billion euros.

6.2. IRI's financial ratios

IRI's net debt to equity ratio increased progressively from 1957 until the mid-1970s (Figure 5.47), moving from 1.4 to 4.6, with the share of equity over total invested capital decreasing from 42% to below 20%. IRI's undercapitalisation worsened dramatically in the following years, reaching a debt/equity ratio of 11.4 in 1979 (8.1% of equity over invested capital). Subsequently, a series of capital injections from the state via increases in the endowment fund and from third-party investors brought the ratio to the levels of the late 1950s, with a low of 1.4 in 1986 (over 40% of equity over invested capital). In the years 1987-1992, the ratio increased again towards values registered in the late 1960s.

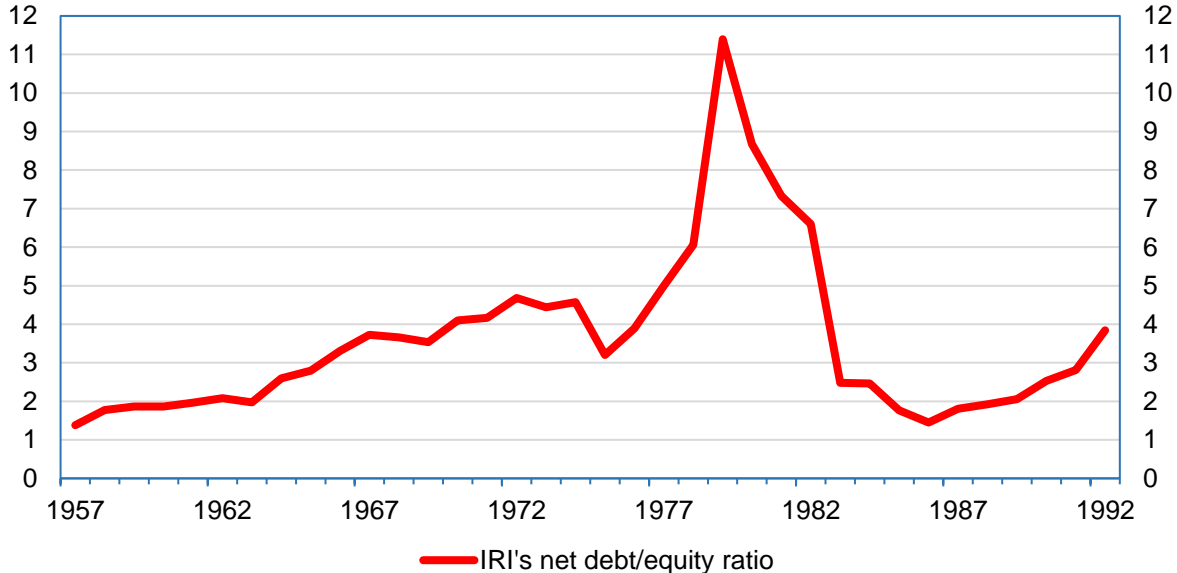


Figure 5.47: IRI's net debt to equity ratio. Source: Author's elaboration on IRI Database.

The 1975-1985 fragility in the liabilities structure of IRI impacted negatively on IRI's net borrowing costs, which in turns affected its overall economic results, weighting on the IRI's costs structure (Figure 5.48). However, IRI's net financial expenses fell below the 10% level relative to its total revenues from 1985.

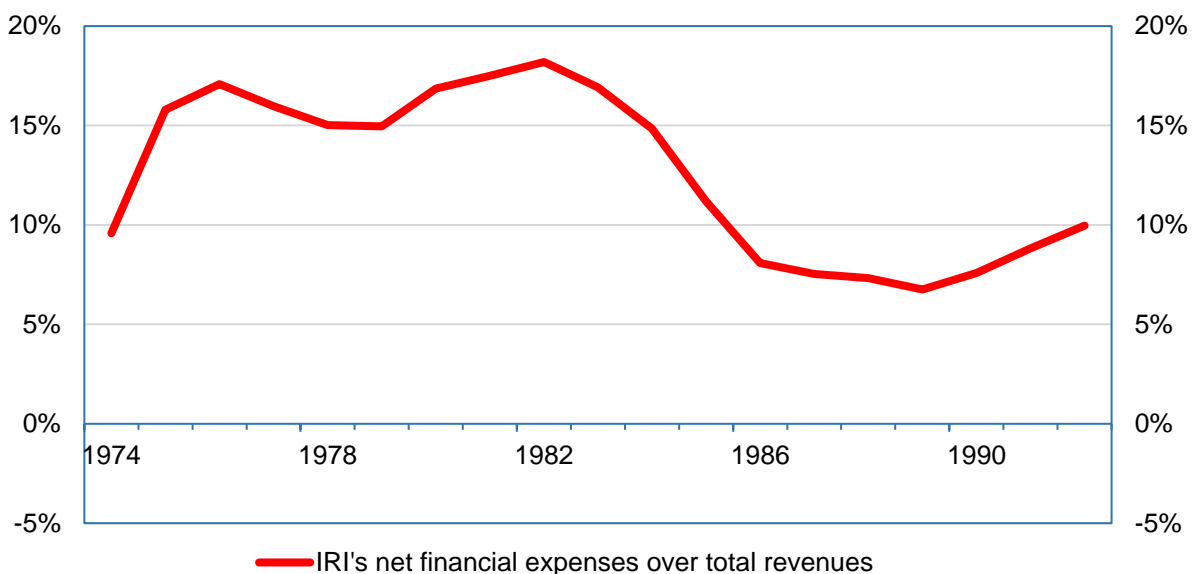


Figure 5.48: IRI's net financial expenses over total revenues. Source: Author's elaboration on IRI Database.

At the same time, the higher cost of borrowing during the 1975-1985 decade did not translate into a higher burden of IRI's net debt relative to total revenues (Figure 5.49). This variable assumed a distinct pattern from other balance sheet ratios – it increased from an 88.5% value in 1957 to a maximum of 172.5% in 1967, when it began a progressive fall to the lowest value of 73.1% in 1986. On average during the 1980s and early 1990s, IRI's net debt over revenues remained below 100%, lower than in any previous recorded period.

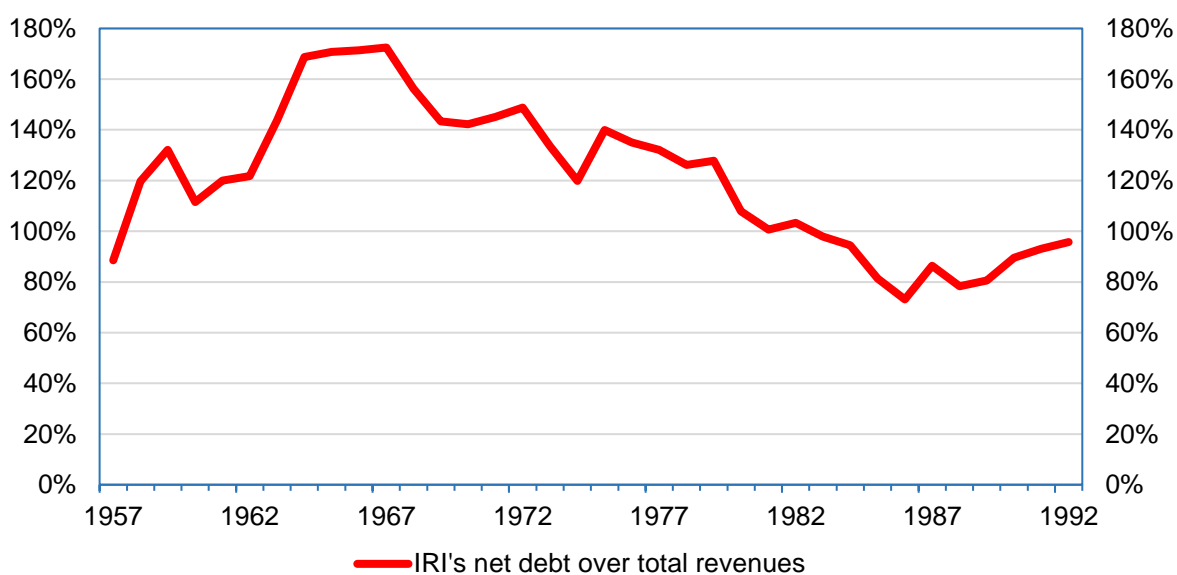


Figure 5.49: IRI's net debt over total revenues. Source: Author's elaboration on IRI Database.

7. Concluding remarks on IRI's dimensions

This chapter has presented the most complete set of economic and financial figures on IRI. Some analytical reflections can be drawn from here.

First, not only was IRI Italy's largest industrial group, but it also represented a truly global player when compared to other similar conglomerates worldwide. Notwithstanding a considerable reduction in the number of employees and controlled enterprises operated in the 1980s, IRI's global ranking by revenues reached its highest position in 1992, when the liquidation process began. Despite ranking fifth among the world's largest industrial economies at that time, Italy had only 7 industrial companies in the top 500 global ranking¹⁸⁷, compared to 30 in France and Germany, or 43 in UK. Whereas IRI ranked among the top 15 companies (oil and gas sector included), currently Italy does not display any manufacturing corporation in the top 500 international list¹⁸⁸. Had its estimated revenues corresponded to the 5% historical average share of Italy's GDP, IRI would have hypothetically ranked at the 56th position in 2018¹⁸⁹.

Second, the long-term dynamics of IRI's shares in the national economy points to a series of demystifying considerations. With the relative exception of the years 1975-1985, IRI displayed a positive trend of productivity, also in comparison with rest of the economy. IRI's exports provided a significant contribution to Italy's balance of payments – during the expansive cycle of the 'economic boom' in the 1950s but also during the crisis of the late 1970s, when IRI's internationalisation effort was stronger. Contrary to what is commonly popularised, IRI was neither an employer of last resort, nor a destroyer of private sector jobs. IRI's long-term employment expansion was proportional to the rest of the national industrial economy, doubling its absolute number

¹⁸⁷ Figures here refer to the Fortune Global 500 ranking of 1991.

¹⁸⁸ In the Fortune Global 500 ranking of 2019 (relative to the year 2018), the first Italian company in the list was the state-owned oil and energy company Eni (83rd position), followed by the state-owned electric energy utility Enel (89th position) and by the insurance company Assicurazioni Generali (92nd position). Further behind in the list stood the three remaining companies (all involved in banking and insurance): Intesa San Paolo, Poste Italiane and Unicredit at the 315th, 355th and 425th positions respectively. Despite ranking 24th, the Exor Group (owned by the Agnelli Family and controlling the FIAT Group) was legally registered in the Netherlands and made most of its revenues outside Italy.

¹⁸⁹ Calculated from comparing IRI's hypothetical revenues – 5% of Italy's 2018 GDP corresponded to 88.1 billion euros – with the 2019 Fortune 500 Global ranking using average €/€ exchange rate for 2018 of 1.17982 (BIS data).

of employees from 1950 to 1992 – a long-term net creation of jobs. The above-average expansive phase was limited to the 1970s and to the 1975-1980 crisis years. In fact, almost half of that employment increase was due to IRI's temporary rescuing of ailing companies that would have otherwise disappeared, generating subsequent mass redundancies. Finally, the average national share of IRI's investments was between two and three times the employment share, signalling a high capital-intensive nature of IRI's productions. Despite their significant size, IRI's investments never became a deliberate instrument of demand-management policies. They represented longer-term cycles of investments appearing in coincidence with capital-intensive initiatives or investment plans by IRI's subsidiaries.

Third, IRI's had a significant yet underplayed role in the national financial markets. It was a major player in the non-government bond markets, through the innovative financial instrument of state-guaranteed and convertible IRI bonds issued by the Institute. Even more pervasive was IRI's role in the national stock market through its listed subsidiaries. In the early 1990s, one out of ten companies listed on the Milan stock exchange was controlled by IRI. On average, IRI's listed companies represented more than one quarter of the overall market capitalisation and distributed more than one third of the total amount of gross dividends. IRI's listed subsidiaries were therefore among the largest companies by market capitalisation and yielded higher returns than the non-IRI ones on average. By financing its activities through the issuing of special bonds and shares through its listed subsidiaries, IRI also contributed to the valorisation of savings, generating decent economic returns for mostly domestic retail investors.

Fourth, IRI's evolving market and production shares at the sectoral level highlight its adaptive model of divestment and diversification which accompanied – and sometimes drove – the process of modernisation and structural change in the Italian economy. IRI's held varying market positions in a plurality of sectors – sometimes as a result of targeted acquisitions and divestments, in other cases as a consequence of its competitive advancements (or retreats) within specific market segments.

Fifth, IRI's internal composition through time – observed through its defining variables at the sectoral level – displayed the dynamic evolution of IRI's multi-sector holding configuration, adapting to external policy factors and technology developments. The

conglomerate nature of IRI allowed a diversification process that would have not been possible within traditional public corporations operating in nationalised industries. Over four decades, IRI's structure evolved significantly. The predominance of steelmaking and mechanical engineering activities at the beginning of the period was gradually replaced: on one side, this evolution resulted from the diversification into electronics, infrastructure, air transport, food processing; on the other side it was driven by the expansion of the telecommunications sector.

Sixth, the great bulk of IRI's financing requirements were covered by self-financing and financing from market sources. In terms of external financing requirements from market sources, long-term borrowing was the prevalent option, among which bonds issuing by the Institute represented a key and additional source. Contrary to what commonly understood, the overall amount of state financing in the form of increases in IRI's endowment fund was only a limited part of IRI's overall financing needs and mostly concentrated in the years between 1978 and 1985. IRI's state grants were modest in comparison to its relative dimensions. Moreover, had IRI not been able to recur to state capital grants, it would have had a competitive disadvantage with respect to other private groups, who could instead resort to capital injections from their private shareholders¹⁹⁰. Finally, IRI's endowment fund was conceived with the aim to achieve deliberate policy objectives (see Chapter 6 and 7), whose external social costs would otherwise have been significantly higher and more persistent in the absence of IRI's intervention.

Seventh, the Institute was responsible for providing a significant share of financing requirements to its controlled subsidiaries. This was particularly relevant as the Institute could dispense financing resources within the IRI Group, allocating extra credit to particularly needing sectors (e.g. mechanical engineering and shipbuilding). Thanks to the overall creditworthiness of the IRI Group and to the availability of state grants, the Institute could operate a policy-motivated internal switching of financial resources

¹⁹⁰ This point was clearly outlined by law scholar Giuseppe Guarino in 1992, when as Minister of State Holdings he pursued the transformation of the public law 'management entities' into joint-stock companies, so that they could access equity financing from both public and private shareholders. From Guarino's ministerial working documents, a copy of which was donated to the author (Interview with Giuseppe Guarino, 30 October 2018).

towards industrial activities with a strategic economic importance, but less appealing to private investors, due to their lower or deferred returns.

Eighth, IRI's overall financial performance was much less disastrous than normally popularised. IRI displayed positive net results until the early 1970s, when the oil shock and the global steelmaking crisis impacted on the profitability of IRI's most prominent companies. As it incorporated one of the largest steelmaking groups in the world, IRI's overall results were fundamentally compromised. Furthermore, in 1979 and 1980, the freezing of telephone tariffs – imposed by the government in the second half of the 1970s, with an anti-inflationary aim – generated financial losses in an otherwise profitable segment. On the other side, higher real interest rates at the end of the 1970s weighted on IRI's debt-based financial structure in terms of higher annual net financial expenses. The huge financial losses incurred in the 1975-1985 period had more to do with external market conditions and policy factors, rather than being caused by the progressive deterioration of economic efficiency in IRI's industrial activities. In fact, with the upswing of the steelmaking cycle and the normalisation of telephone tariffs, IRI was able to recover its decent profitability levels in the second half of the 1980s. Finally, IRI's financial ratios were far from persistently unsustainable. In the 1980s, the debt-to-equity ratio of the IRI Group was lower than it had been in the 1960s. Even more significantly, from 1967 onwards IRI's net debt over total revenues took a descending pattern. By the end of the 1980s, its value was lower than it had been in the late 1950s. Consequently, the financial accounts of the IRI Group were more solid at the end of the 1980s than before the 1970s crises.

The figures presented in this chapter provide a further justification for the analysis of IRI as a peculiar SOSOE within its national economic context. By virtue of its relative magnitude, changes in IRI's main variables had a significant quantitative impact on the levels and trends of national output, exports, employment and investments. Consequently, IRI's corporate decisions assumed a national policy relevance, especially for the sectors in which it was the dominant player.

IRI's main quantitative figures – analysed throughout the long-term period 1948-1992 – can demystify a series of inaccurate assertions about its progressive inefficiency and lack of innovativeness, which is sometimes dated back to the establishment of the

Ministry of State Holdings in 1956. The series presented in this chapter do not confirm this view, especially when considering IRI's figures from the mid-1980s. With this respect, IRI's problematic years can be restricted to the decade 1975-1985, when most of its economic and financial variables deteriorated. However, this neither considers the external economic conditions that afflicted IRI's main activities in steelmaking, shipbuilding, air transport, and car making, nor does it appraise the policy function that IRI played in avoiding or retarding the loss of productive capacity and output in key national sectors.

In conclusion, the analysis of IRI's main economic and financial variables through time exposes some of the limitations on how conventional economic theories frame the actual functioning of SOEs (Chapter 2). IRI's figures are testimony of the ability of SOEs to combine public policy mandates (see Chapter 6 for further details) with a low dependency on state funds, making an intelligent use of market-based financing sources. IRI's figures also point to the capacity of a SOSOEs to display entrepreneurial features, by diversifying into new activities and evolving through time (as exposed in greater details in Chapter 7).

Part II

Chapter 6

The public missions of IRI

1. IRI's public missions

As a *state* holding company, IRI embraced external public policy objectives – here defined as ‘missions’. The three most relevant ones were focused on: technical and managerial training (training mission); industrialisation and modernisation of the underdeveloped South of Italy (Southern mission); research aimed at knowledge creation and diffusion (research mission). The following sections of this chapter (2, 3 and 4 respectively) are dedicated to presenting the developments and main characteristics of IRI's three public missions and how they impacted on the national context. Section 5 provides concluding analytical remarks on IRI's missions, contextualising their emergence in Italy's post-war political economy framework.

2. IRI's training mission

2.1. The origins of IRI's training mission

IRI's training mission traces its roots in the pre-war years. IRI's 1937 Statute¹⁹¹ introduced the obligation to dedicate 10% of the Institute's profits to educating and training future business executives. IRI's preparation courses for executive careers (*Corsi di preparazione alle carriere industriali*) – run directly by the Institute – were inaugurated in 1938. Over its first three editions they involved more than 200 aspiring managers specialising in the mechanical, electro-mechanical, steelmaking, chemical and mining sectors.

¹⁹¹ Article 39 of the 1937 Statute.

IRI's management was aware of the central role that a competent managerial class played in a modern industrial economy, as annotated in an internal working document¹⁹²:

It is about spending, and spending generously, in order to sustain the formative process of 100 or 200 people among which the general directors and chief executive officers of tomorrow could be chosen¹⁹³.

The philosophy underlying IRI's approach was exemplified by the words of its first Chairman, Alberto Beneduce, speaking in 1938 to the participants of the first edition of the 'Courses' (Russolillo, 2003, p. 17):

It does not matter if the sequence of events will make you work for companies that are not controlled by IRI. Through your training, IRI has the ambition to create a selected managerial class, which would know that experience is not everything, nor is intuition, since the industrialist has to give prominence to technique and science¹⁹⁴.

The training programmes were not exclusively reserved for IRI's employees, but open to everyone. Furthermore, there was no obligation for the participants to continue their careers within IRI's companies. The following passage, from an internal IRI document¹⁹⁵, conveys the sense of embracing a public mission for the entire country:

The large-scale preparation of young people for their industrial careers could not be accomplished by enterprises belonging to private groups, they did not have any interest in doing so. [...] It is therefore a fundamental function that IRI and only IRI could accomplish, to the advantage of technical progress and production¹⁹⁶.

The courses lasted one year, divided into two periods of six months. In the first one, participants received lessons in business organisation, financial accounting, cost determination and technical management of industrial plants, as well as special technological classes. They would then spend the next six months as trainees in one or two companies.

Parallel to the development of managerial skills, IRI's professional training was also directed at manual workers, especially in the mechanical sector. In 1941, 14,900 out

¹⁹² P. 16, 'L'Iri. La sua situazione e la possibilità di farne strumento permanente per concorrere alla valorizzazione dell'Etiopia e alla politica di autarchia economica' (Archivio storico IRI, Serie Nera, Busta STO/521).

¹⁹³ Author's translation from Italian.

¹⁹⁴ Author's translation from Italian.

¹⁹⁵ P. 53 in 'L'Iri. Ente di carattere permanente. 1937-1942' (Archivio storico IRI, Serie Nera, Busta STO/521).

¹⁹⁶ Author's translation from Italian.

of 160,000 IRI's employees took part in traineeships or specialisation courses within IRI's companies. Their 17 training schools, with 7,000 attendees between the age of 14 and 17, offered education programmes of varying length (from six months to three years).

IRI's training mission was further reinforced in 1941, when the share of profits to be channelled into the training fund was elevated from 10% to 15%. The intensification of the conflict interrupted any further training programme.

2.2. IRI's training mission in the post-war period

The 1948 Statute maintained the commitment to dedicate 15% of the Institute's profits "to finance industrial management training ventures and vocational training and social welfare schemes"¹⁹⁷.

The post-war reconversion of the mechanical sector forced IRI to focus almost entirely on its internal retraining programmes for specialised workers and technicians. In this phase, training initiatives were mostly adopted by the single operating companies or by the sectoral subsidiaries.

An example of this was the opening of technical industrial institutes¹⁹⁸ for secondary school students at Ansaldo (Genoa), Alfa Romeo (Milan), Navalmeccanica (near Naples) in the 1945-1946 years. In 1948, Finsider established its own training institute (*Istituto Siderurgico Finsider*) at the Cornigliano steelworks (near Genoa), dedicated to the specialisation of young graduates.

In 1951, a group of IRI companies near Genoa founded the vocational training school 'La Calcinara', which from 1952 hosted the UN-sponsored *Centro Nazionale Formazione Istruttori* (CNFI), the first national centre for training professional instructors, established in collaboration with the Ministry of Labour¹⁹⁹.

With the institution of its Labour Problems Service in 1953, IRI assumed a more coordinating role on industrial relations and training policies at the Group level, beyond

¹⁹⁷ Article 24 of the 1948 Statute. Author's translation from Italian.

¹⁹⁸ In 1954, these were transformed into specialisation schools for professional figures with a technical diploma.

¹⁹⁹ From IRI's house organ 'Notizie IRI' n. 64 1965, p. 6.

its sectoral or cyclical needs (Lavista and Ricciardi, 2013). Two years later, IRI's first inter-companies training centre CAMIM²⁰⁰ (*Centro Addestramento Maestranze Industriali Meridionali*) inaugurated its three-year professional training courses for young workers in the area of Naples.

In 1958, IRI began the creation of four other inter-companies centres in the industrial cities of Milan, Trieste, Terni and Taranto. Together with the existing centres of Genoa and Naples, these constituted the basis for establishing *Iniziative per la Formazione e l'Addestramento Industriale* (IFAP), IRI's consulting company for technical and managerial training.

2.3. The centralisation of IRI's training mission under the Institute

The creation of IFAP in 1959 was a defining moment in the development of IRI's training mission. With its foundation, IRI concentrated its existing training activities under a single entity – a prerequisite for developing a centrally coordinated strategy at the Institute level, beyond sectoral or temporary training requirements.

IFAP was established as a joint-stock company, with its capital subscribed by the Institute (40%) and by IRI's main sectoral subsidiaries²⁰¹ – Finmeccanica (25%), Finsider (15%), STET (7.5%), Finelettrica (7.5%), Finmare (5%). IFAP was also recipient of contributions from the special fund dedicated to training programmes, as foreseen by IRI's 1948 Statute. With the subsequent transformation of IFAP into a non-profit association, its main associates fell under the statutory obligation to cover its extra annual costs.

²⁰⁰ CAMIM was established in 1955 as a joint-stock company participated by the Institute (60%), by Finmeccanica (20%) and by Finsider (15%). It was the first post-war training initiative led by the Institute, in collaboration with its main subsidiaries.

²⁰¹ The nature and composition of IFAP's shareholders changed throughout the decades. In 1967, IFAP's technical training activities were spun off to create the association ANCIFAP, later transformed into a joint-stock consortium company with the Institute and IRI's most important operating subsidiaries as its shareholders. IFAP was transformed into a non-profit consortium in 1971, with the Institute and IRI's sectoral subsidiaries as its main associates. In 1992, all of IRI's training activities were merged into IFAP-IRI, a joint-stock consortium company participated by the Institute and by IRI's main companies. IFAP-IRI was eventually put under liquidation on December 1994.

At its foundation, IFAP operated in two complementary fields: training activities for manual workers and qualified technicians; management courses for middle and top executives.

2.3.1. Professional training for manual workers and technicians

The provision of vocational general training courses to specialised workers and technicians was coordinated by IFAP but implemented at the level of the inter-companies centres (*Centri interaziendali di formazione professionale*), managed by consortia of local IRI companies.

These were initially located in the so-called 'IRI Cities', where IRI's employment presence was highly significant²⁰²: Genoa, Naples, Trieste, Terni, Taranto and Milan. By the end of the 1980s, their presence over the national territory increased further (Figure 6.4). Detached centres were operative at the Fiumicino Airport near Rome, La Spezia, Palermo, Turin, Bari, Catanzaro and Pescara.

IFAP's professional training programmes were open to non-IRI employees and they provided a versatile cross-sectoral training. The courses were articulated according to different levels of skills and specialisations in the mechanical, steelmaking, shipbuilding, electric energy, telecommunications and maritime sectors (IRI, 1964).

From 1961, IFAP's inter-companies centres began to provide two-year vocational training courses for young trainees and six-month retraining courses for adult workers. Starting from 1963, technicians with intermediate or advanced specialisation skills were also offered two-year courses, involving theoretical lessons and internships in

²⁰² Genoa accounted for 30,000 IRI manual workers and its centre could train 250 young and 1,000 adult manual workers in metal-mechanical, shipbuilding and shipping activities. Naples accounted for 19,000 IRI manual workers and its centre could train 200 young and 1,000 adult manual workers in metal-mechanical, shipbuilding, electrical and shipping activities. Trieste accounted for 15,000 IRI manual workers and its centre could train 150 young and 1,000 adult manual workers in metal-mechanical, shipbuilding and shipping activities. Terni accounted for 6,000 IRI manual workers and its centre could train 150 young and 600 adult manual workers in metal-mechanical, electrical and chemical activities. Taranto accounted for 1,500 IRI manual workers (projected to increase to more than 10,000) and its centre could train 150 young and 600 adult manual workers in metal-mechanical and shipbuilding activities. Milan accounted for 17,000 manual workers and its centre could train 150 young and 1,000 adult manual workers in electro-mechanical, car making, and precision mechanics activities. These figures refer to the year 1963 (Petrilli, 1967).

Italian and foreign companies, financed²⁰³ by the IRI companies that would eventually hire them at the end of the course. The remaining part of IFAP's centres was focused on training professional instructors.

The inter-companies centres facilitated experimentations through consortia and coordinated training programmes, leaving substantial autonomy to IRI's operating subsidiaries in defining their training programmes, according to the specific needs of the consortia of local companies²⁰⁴.

	Participants		Courses	Hours
	1966/67	1976	1976	1976
Young manual workers	2,107	1,589	80	103,342
Adult manual workers	3,854	16,872	1,140	345,802
Technicians	893	8,297	510	58,039
Instructors	454	1,876	146	7,928
Other activities	0	106	14	21,294
Total	7,308	28,840	1,890	536,444

Table 6.1: Main figures on the activities of the inter-companies training centres. *Source:* Author's elaboration on ANCIFAP annual reports 1967/68 and 1975-76.

In 1967, IRI spun off IFAP's technical training activities operated by the centres, creating a consortium named ANCIFAP (with IRI's sectoral subsidiaries as contributing associates), while IFAP retained the specialisation on managerial training. At the time of its foundation²⁰⁵, ANCIFAP was training 5,961 manual workers (2,107 young unexperienced workers and 3,854 adult workers), 893 technicians and 454 instructors on an annual basis, for a total amount of 7,308 participants (Table 6.1).

Ten years later, with a permanent training personnel of 469 units, ANCIFAP had established itself as Italy's leading professional training centre – one of the largest in Europe. In 1976, ANCIFAP offered 1,890 courses to 28,840 participants, among which 18,461 manual workers (1,589 young unexperienced workers and 16,872 adult workers), 8,297 technicians, 1,876 instructors, all amounting to 536,444 hours of training activities (Table 6.1).

ANCIFAP's activities peaked in the early 1980s when its training programmes were still mostly directed to IRI's companies seeking to retrain and update the skills of their

²⁰³ Each young technician was receiving an IRI-sponsored scholarship of 100,000 lire per month (in 1964, corresponding to around 1,100 euros in 2018 prices), 140,000 lire per month if non-resident (in 1964, corresponding to more than 1,500 euros in 2018 prices).

²⁰⁴ From IRI's house organ 'Notizie IRI' n. 39 1962, pp. 6-7.

²⁰⁵ Figures from ANCIFAP's 1967-1968 annual report, with reference to the period 1966-1967.

manual workers and technicians. However, ANCIFAP was already moving towards a more diverse offer of training programmes, oriented towards new technologies for industrial and office automation, project management and organisational systems. In 1986, traditional training programmes for manual workers accounted for 55.2% of the overall amount of training hours, down from 83.7% ten years earlier. By 1990, middle-management training programmes covered 47.1% of ANCIFAP's total hours of production, compared to 31.5% relative to its traditional technical training activities (55% with respect to IRI's companies associated to ANCIFAP).

The highly-qualified teaching personnel of the inter-companies centres and their modern training facilities – that reproduced the most advanced machinery in existing workplaces – responded to the organisational needs of IRI²⁰⁶. ANCIFAP's inter-companies centres reflected the structure of IRI's industrial activities, thus providing a permanently trained workforce for IRI's companies in their territorial settlements.

At the same time, training programmes at IFAP-ANCIFAP's centres were more organic, specialised and comprehensive than typical vocational training practices. ANCIFAP's programmes sought to nurture the adaptive and multidisciplinary capabilities of the worker, instead of providing a mere job induction at the workplace. They aimed at developing much broader sectoral competences for the trainee, rather than simply preparing the perspective worker for the job in a specific company or plant.

ANCIFAP's training centres came to represent a national infrastructure for training programmes. The public nature of IRI's inter-companies training centres manifested in two different cases.

First, a significant proportion of young manual workers participating to the biannual training course were subsequently destined to non-IRI companies. Among the total number of the hired trainees, the share of those recruited by non-IRI companies was very significant – 45% in 1965, 49% in 1966, 31% in 1967.

Second, ANCIFAP's retraining and specialisation courses could be attended by workers and technicians from non-IRI companies that needed to upgrade their workforce's skills. Until the early 1970s, ANCIFAP's programmes were prevalently

²⁰⁶ From IRI's house organ 'Notizie IRI' n. 16 1960, p. 15.

dedicated to non-IRI manual workers and technicians. In the second half of the decade, IRI's employment expansion was accompanied by a greater effort from ANCIFAP in training and retraining IRI's workforce to the specific needs of the companies. By 1982, around two-third of the courses and of the total number of participants were targeted on IRI's employees, corresponding to approximately half of the total number of training hours (Table 6.2). The progressively reduced importance of training programmes for manual workers and the increasing relevance of professional courses for public administration employees reduced to one-third of the total the share of hours dedicated to the employees of IRI's companies by the early 1990s.

	1972		1982		1992	
	IRI	Non-IRI	IRI	Non-IRI	IRI	Non-IRI
Courses	594 (56.3%)	461 (43.7%)	1,170 (65.8%)	607 (34.2%)	NA	
Participants	8,572 (49.6%)	9,060 (51.4%)	17,000 (68%)	8,000 (32%)	NA	
Hours	79,599 (26.1%)	225,310 (73.9%)	329,000 (49.4%)	337,000 (51.6%)	183,873 (33.8%)	360,672 (66.2%)

Table 6.2: Training courses dedicated to IRI and non-IRI employees. Source: Author's elaboration on ANCIFAP annual report 1972-73, IRI annual report 1982, IFAP-IRI annual report 1992.

2.3.2. Training courses and seminars for managers

In 1961, IFAP inaugurated its 'Centre for the study of managerial functions'²⁰⁷ dedicated to organising managerial training courses for middle managers and top executives.

The first editions of IFAP's annual courses were planned by the Centre and reserved to IRI's employees: in the first three years 1962-1964, they were attended by 283 participants from 33 different subsidiaries. These courses were focused on teaching modern management techniques for the development of problem-solving analytical and organisational skills, rather than imparting sectoral notions in specific areas of production.

By the end of the 1960s, IFAP's managerial training courses became more tailored to the needs of its associates²⁰⁸, which sent their newly-appointed executives to Rome for a compulsory three-month training course in managerial techniques. IFAP's

²⁰⁷ Author's translation of *Centro per lo studio delle funzioni direttive aziendali*.

²⁰⁸ IRI's main subsidiaries had their Chairmen as members of the executive board of IFAP.

activities were also accompanied by the growth of specialised training sessions – especially for middle managers – at their workplaces.

By the early 1970s, IFAP had assumed a permanent function within IRI's mission for managerial training. The total output of managerial courses provided by IFAP's training centre increased progressively for twenty years since their establishment, reaching a peak of over 10,000 weeks*participants in 1983 (Figure 6.1).

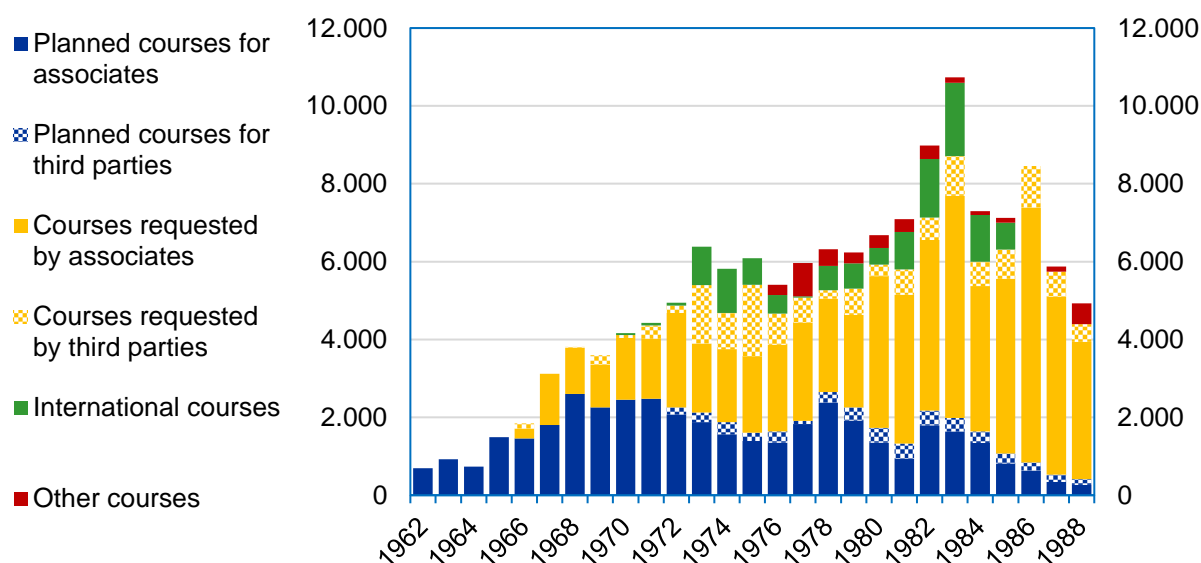


Figure 6.1: IFAP's managerial courses. Source: Author's elaboration from IFAP's annual reports (1962-1988). Note: Figures are measured in weeks multiplied by the number of participants.

The composition of IFAP's offer changed significantly through time and by the end of the 1980s, its annual courses for associates represented a smaller fraction of the total, while the great majority of activities were courses 'on request'.

Nonetheless, IFAP's inter-companies planned activities provided the most plural and comprehensive set of managerial skills. They covered areas such as: marketing and strategy; corporate finance and control systems; technological management and production; human resources and industrial relations; organisation; information systems; quantitative methods.

The philosophy underlying IFAP's courses can be summarised with the words of a 1983 IFAP catalogue²⁰⁹:

These activities are open to participants coming from the most diverse companies. The primary objective is to foster the professional and cultural growth of the single participant, based on the premise that, in order to run companies in a competitive way, practical experience is not enough, a solid conceptual basis is also occurred to confront the solution of management problems.

Moreover, participation to IFAP's training courses was progressively open to non-IRI companies (private and state-owned) or public entities. Whereas in the period 1962-1972 IFAP's courses were prevalently destined to IRI's managers (96.8% of total weeks*participants), in the following period (1973-1988) courses for third parties amounted to an average 25.7% of total weeks*participants.

Under the presidency (1968-1980) of IRI's General Economic Consultant, Professor Pasquale Saraceno, IFAP was also a truly intellectual centre for new thinking on management and business organisation theories. IFAP's internal teachers – other professors were visiting scholars from US business schools – were esteemed academics with extensive business experiences, who dedicated part of their professional activity to IFAP. They did it without receiving any additional remuneration, but purely on the basis of the prestige the Institute enjoyed²¹⁰, with its wide international network and vast collection of bibliographic resources. Among them, IFAP could list figures such as Gino Giugni, who was the intellectual mind behind Italy's labour code²¹¹, or Gianni Billia who was responsible for the digitalisation of the National Institute for Social Security (INPS) as General Director in the late 1980s.

In thirty years since their foundation, IFAP's managerial courses had been attended by more than 120,000 executives and executive staff, from most of IRI's subsidiaries, from 150 other companies and from various ministerial departments (IRI, 1990).

²⁰⁹ From p. 5 'Attività interaziendali presso la sede' (Archivio Storico IRI, Serie Rossa, R4281). Author's translation from Italian.

²¹⁰ From interview with Domenico De Masi (7 February 2020), a Sociology Professor who worked for IFAP and received numerous consulting appointments by IRI and non-IRI companies.

²¹¹ Law n. 300, 20 May 1970.

2.4. Technical training in the context of international cooperation

In 1962, the Institute established an Office for Technical International Cooperation²¹² (UCTI), with the aim of organising training courses for technicians from developing countries.

UCTI courses – inaugurated in the same year with 78 participants from 18 different countries – were entirely financed by the Institute and offered a 8-month training experience divided in four different phases. First, a one-month induction period in Rome, with theoretical lessons on different subjects (including Italian language intensive courses) delivered by IRI's executives. Second, a 7-month period of practical traineeships at IRI's companies, according to the technical specialisation of the participant. Third, a conclusive 2-week period in Rome for feedback exchange and the delivery of diplomas. Fourth, the return of participants in their respective countries, where the most outstanding among them were further followed in the development of their careers.

UCTI courses were held regularly on an annual basis. In the following years, the experience acquired in the organisation of international training courses was extended to other collaborations with international organisations and developing countries. In 1967, and from 1971 to 1976, IRI organised training courses – including an internship experience – for 255 participants in collaboration with UNIDO and the Ministry of Foreign Affairs²¹³. From 1980 to 1982 a series of training seminars were organised with the Organisation of American States, for Latin American participants. In 1980, IRI organised a dedicated course for technicians from Angola²¹⁴.

The continuation of UCTI courses throughout the years (until 1995) contributed to building a wide international network of alumni, who would assume key technical and institutional positions in their respective countries. As stated by a former IRI Chairman²¹⁵:

²¹² Author's translation of '*Ufficio per la Cooperazione Tecnica Internazionale*' (UCTI).

²¹³ (Archivio Storico IRI, Serie Nera, Busta Ucti/415).

²¹⁴ (Archivio Storico IRI, Serie Nera, Busta Ucti/449).

²¹⁵ Interview with Romano Prodi, Alessandro Ovi, Luigi Parlatore (19 November 2018), author's translation from Italian.

This was an effort that only IRI could make. A half-technical, half-managerial training for a dense group of foreigners coming to Italy. They provided a sensational network of contacts. These people ended up being General Directors or even Ministers. [...] I remember a meeting at Cairo with former alumni: they were all ministers, heads of cabinet...it was a real commercial network.

UCTI was responsible for compiling an annual yearbook containing names, courses attended, countries of origin, private and work addresses, roles within their workplaces of all the participants to IRI's international training courses. As reported in the 1995 and latest edition, the yearbook was meant to be²¹⁶:

An instrument of consultation for the operators of the IRI Group that work on the international markets, yet it aims also to be a link with qualified managers and professionals from different Countries that, having attended the courses, represent a precious knowledge asset and are often interested in preserving a fruitful relation with Italy.

From 1962 to 1995, 3,253 participants from 106 different countries attended IRI's international courses (Figure 6.3). The great majority of them came from Latin America and African countries, while the areas of specialisation were quite homogeneously distributed across IRI's sectoral specialisations (Figure 6.2).

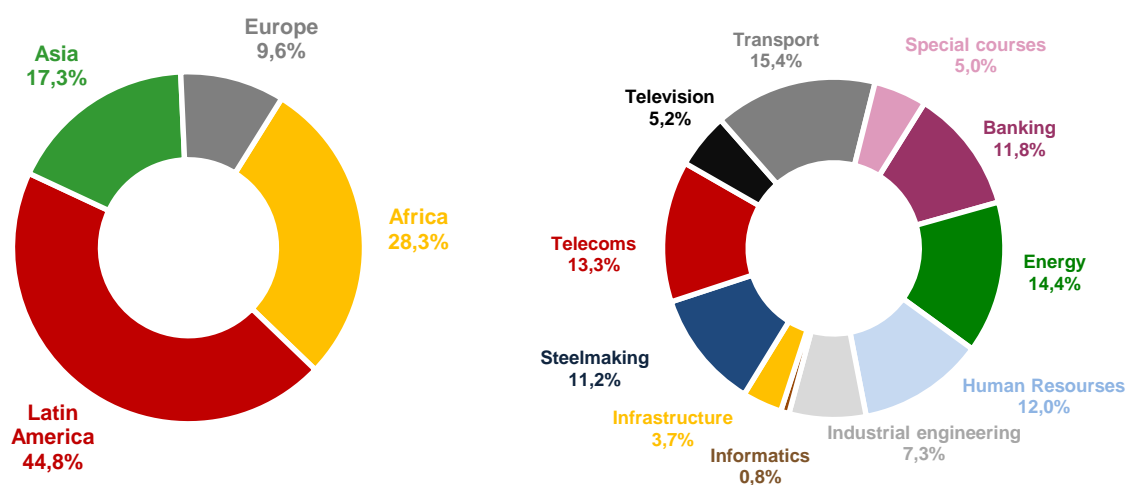


Figure 6.2: Origins of participants to the UCTI courses and areas of specialisation. Source: Author's elaboration from 'Annuario dei partecipanti alle iniziative di cooperazione tecnica internazionale (1962-1995)'.

²¹⁶ 'Annuario dei partecipanti alle iniziative di cooperazione tecnica internazionale (1963-1995)' Servizio Cooperazione Tecnica Internazionale [Roma, giugno 1995] (Archivio Storico IRI, Serie Nera, Ucti/925). Author's translation from Italian.

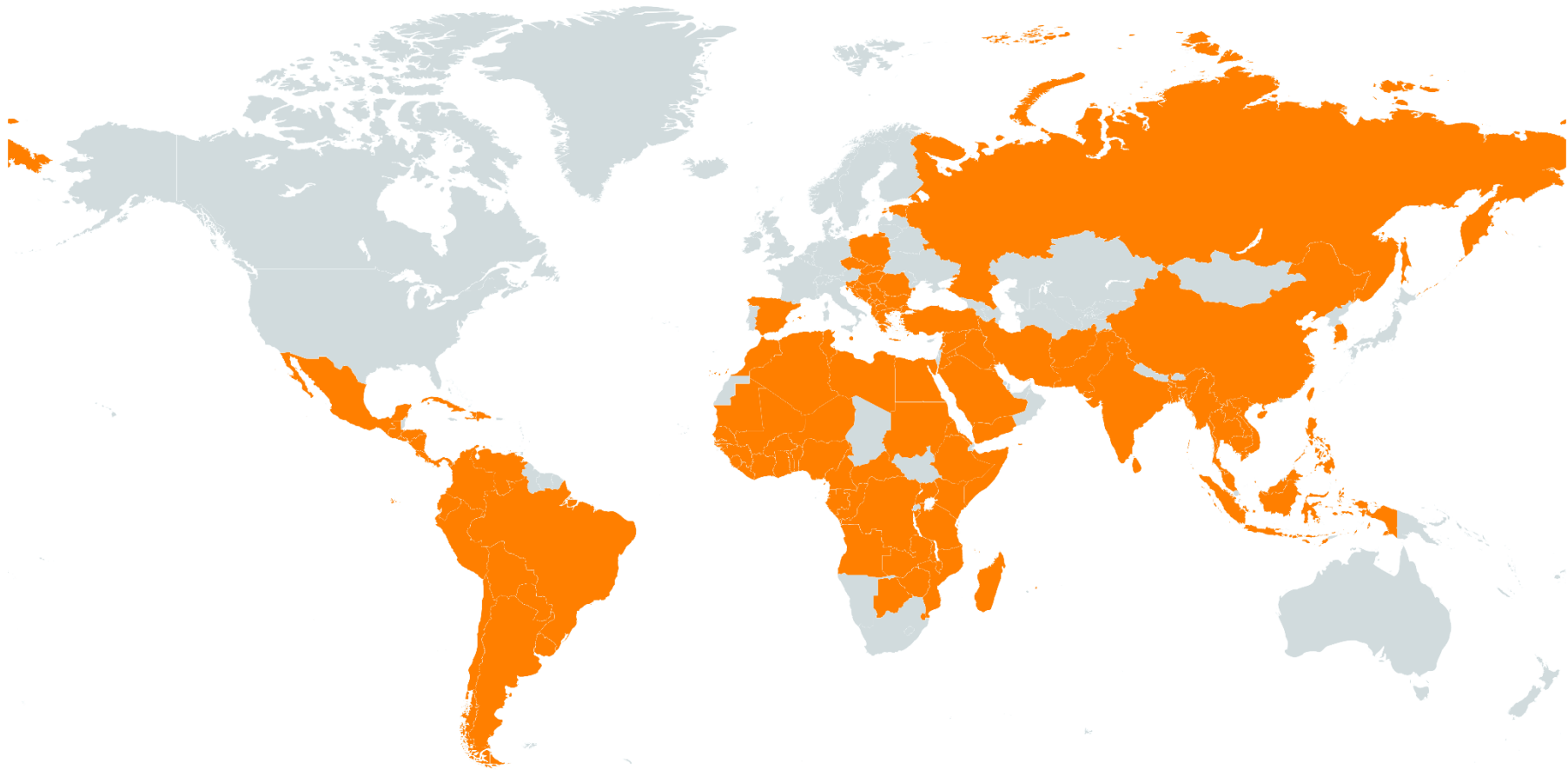


Figure 6.3: Countries of origin of the participants to IRI's international training courses. Source: Author's elaboration from 'Annuario dei partecipanti alle iniziative di cooperazione tecnica internazionale (1962-1995)'. Notes: The 106 countries of origin are coloured in orange.

2.5. Other training activities

The centralisation of training programmes under IFAP and the Institute (through UCTI) continued in parallel with the vocational training activities of IRI's subsidiaries. One notable example was represented by *Scuola Superiore Guglielmo Reiss Romoli* (SSGRR), a joint-stock subsidiary of STET's telephone service company SIP, established with dedicated facilities at L'Aquila in 1976. SSGRR was Italy's largest training institute for technicians and managers in the telecommunications sector, absorbing part of STET's training needs that were previously concentrated in IFAP-ANCIFAP. SSGRR's activity was also dedicated to organising international scientific conferences in the fields of telecommunications. SSGRR's teaching effort increased from less than 2,000 hours in 1977²¹⁷ to over 15,000 hours in 1990²¹⁸, when it totalled 101 permanent employees. In the same year, SIP absorbed 75% of SSGRR's training and specialisation courses, while 13% of them were provided to companies not belonging to the STET group. SSGRR was closed in 2000.

Throughout the decades, the training mission was also promoted with initiatives in which IRI played a sponsoring but less directive role. This happened firstly in 1965, with the establishment of *Formez*, a joint-consortium with the regional investment agency *Cassa del Mezzogiorno* and with the think-tank *Svimez*. *Formez* was conceived as a training centre for technical and managerial employees of companies and public administrations located in the underdeveloped South of Italy (see section 3). Training activities were held in Naples (head office) and Cagliari, while promotional and development activities were organised in Rome. At the end of the 1970s, *Formez*'s role was expanded to include consulting work for businesses and public administrations in the South. With the end of the Southern regional policy in 1993, *Formez* changed its mandate to become a consulting company for the modernisation of public administrations at all levels.

Another joint-initiative that IRI assumed was the establishment of a business school at Ercolano (near Naples) named *STOÀ*. This was founded in 1987 as a non-profit

²¹⁷ Figures from 'La Scuola Superiore Guglielmo Reiss Romoli' (Archivio Storico IRI, Serie Rossa, R2604).

²¹⁸ Figures from SIP 1990 annual report.

consortium participated by IFAP (80%) and the Institute (20%), later supplemented by the participation of IRI companies and non-IRI associates²¹⁹. The MBA programme of STOÀ – launched in 1990 in collaboration with the MIT-Sloan School of Management – aimed to combine a developmental vocation towards the South of Italy with an international outlook and a strong orientation to technology issues. In 1999 the IRI Group sold its remaining 46.9% stake in STOÀ to a consortium of local public authorities.

2.6. Concluding remarks on IRI's training mission

IRI's technical and managerial training efforts were not simply limited to improving the skills of its employees or updating the capabilities of its subsidiaries. IRI's dimensions, combined with the sectoral and technological variety of its activities, allowed the development of an open training structure with a national systemic impact. This emerged also from the widespread territorial dislocation of the training centres and managerial schools established throughout the years (Figure 6.4).

As stated by one of its Chairmen, IRI embraced the mission of technical training with the public aim of providing “greater efficiency for the economic system as a whole” (Petrilli, 1967, pp. 145-146).

With respect to the professional specialisation of managers, a leading advocate of IRI's training policy argued that IRI had become a “management centre” for the Country (Saraceno, 1975a, p. 55), training new cohorts of managers that would eventually move to executive positions in key national companies.

Moreover, even when its training activities were not destined to Italian employees, as in the case of the UCTI courses, the network of international relations that these were able to create had a long-term positive impact for the internationalisation of IRI and non-IRI companies alike.

The essence of IRI's training mission was to combine the practical needs of its companies with the openness of its training facilities and the dissemination in the

²¹⁹ Already in 1989, the overall participation of the IRI Group in STOÀ was reduced to 51.28%, while Banco di Napoli and Formez held minority shares of 35.9% and 12.82% respectively (Archivio Storico IRI, Serie Rossa, Busta R3913).

national productive system of technical capabilities embedded in the trained workers, technicians and managers. This became possible by centralising the coordination of training activities under the Institute and through IFAP, becoming a key item of IRI's four-year planning process. Table 6.3 provides a summary of IRI's training initiatives and its main features throughout the decades²²⁰.

²²⁰ Over the 1990s IFAP, the UCTI programmes, the SSGRR school were either liquidated or closed, as deemed weighting on the cost structure of their associates. According to Professor De Masi – former President of the national association of trainers (*Associazione Italiana Formatori*) – the closure of IFAP inaugurated “the decline’ of Italy’s managerial schools, some of which had emerged as imitations of IFAP’s model” (Interview with Domenico De Masi, 7 February 2020, author’s translation from Italian).



Figure 6.4: Territorial distribution of IRI's training centres. Source: Author's elaboration.

	Period	Location	Function	Responsibility	Participants	Type
Courses for industrial careers	1938-1941	Rome; Industrial plants located on the national territory	Centralised	Institute	IRI; Non-IRI	Management school; Technical training
Technical Industrial Institutes	1945-1953	Milan, Genoa, Naples, Castellamare	Company-level	Alfa Romeo, Navalmecanica, Ansaldo	IRI	Technical training
Istituto Siderurgico Finsider	1948-1952	Genoa	Company-level	Finsider	IRI	Technical training (manual workers and executives)
CAMIM	1955-1962	Naples	Inter-companies	IRI's companies	IRI	Technical training
IFAP	1959-1995	Rome	Centralised	Institute	IRI; Non-IRI	Management school
UTCI	1962-1995	Rome	International cooperation	Institute	Non-IRI	Technical and managerial training
Formez	1965- (IRI exited in 1999)	Rome, Naples, Cagliari	Centralised	IRI, Casmez, Svimez	IRI; Non-IRI	Technical and managerial training
ANCIFAP	1967-1992	Milan, Trieste, Genoa, Taranto, Naples	Inter-companies	Institute	IRI; Non-IRI	Technical training
SSGRR	1976-2000 (IRI exited in 1997 with the privatisation of STET)	L'Aquila	Company-level	SIP	IRI (STET); Non-IRI	Technical and managerial training
STOÀ	1987- (IRI exited in 1999)	Ercolano (Naples)	Centralised	IRI and others	Non-IRI	Management school

Table 6.3: Summary of IRI's training centres. Source: Author's elaboration.

3. IRI's Southern mission

IRI's Southern mission was embraced in the context of a dramatic and progressive economic divergence between the North and South of Italy – the latter also called *Mezzogiorno*²²¹, meaning 'midday'.

As illustrated in Figure 6.5, when the Kingdom of Italy was established in 1861, the North-South difference was marginal but increased slowly for three decades – the GDP per capita ratio between the South and the Centre-North was only 96% still in 1890. However, the gap between the two regions accelerated at the end of the 1890s and even more so after WWI, which favoured the expansion of Northern industrial activities. At end of WWII, the ratio was heading towards below 50%, as Southern industry suffered relatively greater war damages, due to the Allied bombing and to the looting of the occupation forces during their retreat (Saraceno, 1977b).

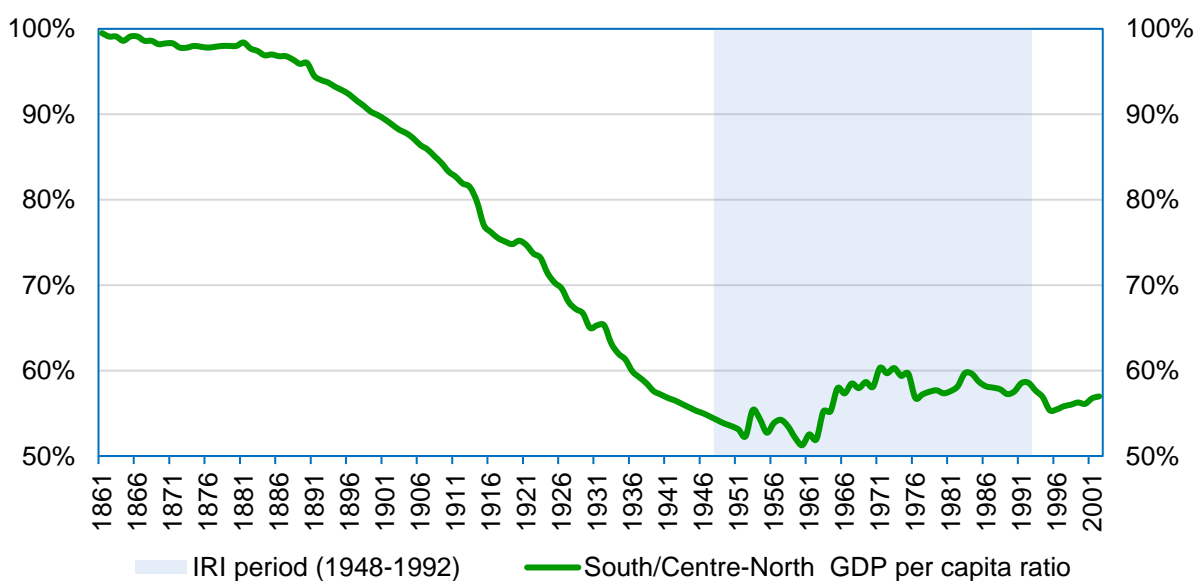


Figure 6.5: GDP per capita ratio of the South of Italy relative to the Centre-North. Source: Author's elaboration from Svimez (2011).

In 1951, despite representing 41% of the national territory and 37.2% of the overall population, the South accounted for only 23.8% and 25.9% of national GDP and investments respectively (Svimez, 2011).

²²¹ The expression *Mezzogiorno* normally refers to the regions of the peninsular South: Abruzzo, Molise, Campania, Puglia, Basilicata, Calabria; plus the two big islands of Sardinia and Sicily.

Italy was still a semi-industrialised economy, with more than one quarter (25.8%) of total value added accounted for by the agricultural sector, representing 43% of total employees, of which 59.3% were from the South. The Southern industry accounted for only 17.2% of national value added in this macro sector (Table 6.4).

	Value added				Employees			
	Agriculture	Industry	Services	Total	Agriculture	Industry	Services	Total
Italy	25.8%	35.7%	38.5%	100%	43.0%	27.8%	29.2%	100%
South	28.6%	23.3%	48.1%	100%	58.7%	16.8%	24.5%	100%
Centre-North	24.9%	40.1%	35.1%	100%	31.0%	36.3%	32.7%	100%
	Value added			Employees				
	Agriculture	Industry	Services	Agriculture	Industry	Services		
Centre-North	70.8%	82.8%	67.0%	40.7%	73.7%	63.4%		
South	29.2%	17.2%	33.0%	59.3%	26.3%	36.6%		
Total	100%	100%	100%	100%	100%	100%		

Table 6.4: Sectoral composition of Italy, the Centre-North and the South in 1951 relative to value added and employment. *Source:* Author's elaboration on Svimez (2011), Baffigi (2011) and Broadberry et al. (2011). *Notes:* Agriculture includes mining and fishing; Industry includes constructions; Employees are considered in terms of number of full-time equivalent workers.

Having missed the first industrialisation phase of the early 1900s, the structure of the Southern economy was essentially composed by small artisan-like production units. More specifically, the South was lacking the dynamic returns to scale provided by modern large industrial plants. With respect to the manufacturing sites with more than 1,000 employees, in 1951 the South presented only 21 units, accounting for 7.7% of the national total and for 6.2% of the total number of employees under this category (Table 6.5).

Southern Provinces and REGIONS	Number	Employees
Frosinone and Latina	-	-
ABBRUZZI and MOLISE	1	1,300
CAMPANIA	15	25,378
PUGLIA	4	6,821
BASILICATA	-	-
CALABRIA	-	-
SICILY	1	2,017
SARDINIA	-	-
Total Mezzogiorno >1,000	21	35,516
Total Italy >1,000	274	571,893
Mezzogiorno >1,000 share	7.7%	6.2%

Table 6.5: Manufacturing units in the South with more than 1,000 employees in 1951. *Source:* Author's elaboration on Italy's 1951 Census on Industry and Commerce.

This was the economic environment that prompted Italian authorities in the post-war period to introduce a regional development policy for the South called '*intervento straordinario*' (extraordinary intervention), with the concurrent establishment of the

Cassa per il Mezzogiorno in 1950²²² – a public law agency largely inspired by the model of the US Tennessee Valley Authority, with the aim of funding, planning and executing infrastructural and agricultural projects in the South (as represented in Figure 6.6).



Figure 6.6: The *Mezzogiorno* areas of the Italian national territory that qualified for the special legal provisions defined by Law n. 646 (10 August 1950) on 'extraordinary intervention'. Source: Saraceno (1975b).

The introduction of a deliberate Southern policy and the establishment of the *Cassa* were largely influenced and shaped by the work of Svimez²²³, a think tank for the

²²² With the passing of Law n. 646 (10 August 1950). The Law also defined the geographical areas over which its special provision would apply: all the Southern continental regions (Abruzzo, Molise, Campania, Puglia, Basilicata, Calabria), the two large islands (Sicily and Sardinia), the provinces of Latina and Frosinone in the Lazio region.

²²³ The acronym 'Svimez' stands for *Associazione per lo Sviluppo dell'Industria nel Mezzogiorno* (Association for the Development of Industry in the *Mezzogiorno*).

industrialisation of the South promoted by IRI officials²²⁴ in 1946 and funded by IRI. Svimez became the centre for analytical studies over the issue of Southern economic development, promoting from the early 1950s the need for the South to develop a modern local industry, in order to escape from its dependence on the industrialised North. Despite being a not-for profit association, Svimez was also significantly involved in the post-war national policymaking process, in particular with respect to the introduction of economic planning approaches. First, with the so-called ‘Vanoni Scheme’ of 1954, later with the establishment of the Ministry for the Budget and Economic Programming in 1967. Thanks to the intellectual and technical support of Svimez, whose members were actively involved in shaping those policy decisions, for the first time since the reunification, the national government incorporated regional development objectives in its policy framework.

The involvement of IRI in the extraordinary intervention began in the same years, and it was characterised by three distinct phases: an early one from 1950 to 1957 of modest but qualitatively significant initiatives; the second one from 1958 to 1973, in which IRI’s companies localised major manufacturing units in the South and invested to develop systemic infrastructures (i.e. motorways, telecommunications); a third one from 1974 to 1992, when IRI modified its modernisation strategy by focusing on more knowledge-intensive initiatives (i.e. high-tech sectors and research-intensive activities).

3.1. IRI’s presence in the South in 1950

IRI’s intervention in the South before WWII had been limited to the restructuring of the mechanical-shipbuilding complex in the area of Naples and to some new initiatives in cellulose (at Chieti and Capua) and in aircraft productions (at Pomigliano d’Arco). IRI-controlled companies were also involved in the electrification²²⁵ of the region.

However, IRI’s facilities were particularly affected by war events: 11 hydroelectrical power plants were either destroyed or severely damaged, the integrated steelworks of

²²⁴ Among them, Central Director Pasquale Saraceno and former General Director (then Governor of the Bank of Italy) Donato Menichella. For several decades after 1950, all of Svimez’s Presidents were also IRI’s officials. Professor Saraceno was appointed General Secretary of Svimez from its very foundation “as part of its duties for IRI” (Marsan, 1992, p. 132).

²²⁵ In 1939, with the incorporation of the IRI-controlled electric energy company UNES into the financial holding SME, IRI’s stake in the latter increased to 18%, becoming the largest shareholder (Saraceno, 1956).

Bagnoli (near Naples) were massively wrecked, whereas the aircraft production unit at Pomigliano d'Arco (near Naples) was entirely razed to the ground. As IRI's mechanical units in the South were also prevalently specialised in military productions, they were targeted by Allied bombardments and looted by the occupying Nazi forces. The few manufacturing units that survived the war, had to be reconverted to civil productions.

In 1950, IRI's employees in the South amounted to around 32,000, representing 14.6% of IRI's total, thus less than the national share of total employees in the South (26.3% and 36.6% in the industry and service sectors respectively). This resulted from IRI's origins as a bailing out agency for large industrial companies mostly located in the Centre-North. Even lower was the share of IRI's employees relative to the South in the steelmaking, mechanical and shipbuilding sectors.

Table A6.1 illustrates IRI's main Southern units in each sector of involvement in 1950. Figure 6.7 provides a representation of the modest geographical diffusion of IRI's manufacturing units, mostly concentrated in the area of Naples, especially the few largest sites with more than 1,000 employees.

3.2. Restructuring of existing productions and new initiatives (1950-1957)

The immediate post-war years marked the beginning of a deliberate Southern policy for IRI. The reconstruction programme approved by the Interministerial Committee for the Reconstruction²²⁶ in 1948 assigned to IRI the responsibility for rebuilding its pre-existing industrial capacity, converting military productions into civilian ones and providing further impulses to the industrialisation of the South (Marsan, 1992).

IRI's main operations in the South over the period 1950-1957 (Table A6.2) did not expand its quantitative presence in the area, but were rather significant in qualitative terms. The two most relevant ones were the establishment of a large cement making unit next to the restructured Bagnoli steelworks and the reorganisation of the mechanical industries (railway and aircraft engineering) in the areas of Naples.

²²⁶ The *Comitato Interministeriale per la Ricostruzione* (CIR) was established in 1945 to coordinate the post-war reconstruction programmes. IRI's Chairman and the Governor of the Bank of Italy attended its sessions. Abolished in 1967, its competences were transferred to the newly-established Interministerial Committee for Economic Programming (CIPE).



Figure 6.7: Geographical localisation of IRI's main units in the South in 1950. Source: Author's elaboration. Notes: Bigger symbols coloured in black represent production units with more than 1,000 employees, dark grey smaller symbols IRI production units with a few hundred employees.

As reported in Table A6.3, despite increasing by more than 12,000 units (largely driven by the acquisition of the telephone and textile companies), the share of IRI's employees in the South relative to the Centre-North remained relatively low in the period 1950-1957, increasing by only 3 percentage points. This is also explained by the overarching share of total investments (67.5%) allocated to the electric energy sector over that period, which had a very limited impact on net job creation and on induced industrial initiatives from within and outside IRI.

3.3. Localisation of modern manufacturing plants and development of infrastructural networks (1958-1973)

By the late 1950s, there was a growing awareness that the 'economic miracle' (1953-1962) was disproportionately benefiting Northern industries. Meanwhile, deepening regional imbalances were fuelling internal migrations from the Southern territory to the already crowded industrial cities in the North, putting pressure on public services and housing costs, while depriving the South of young and often skilled resources. More than two million people left the *Mezzogiorno* during that decade, a 11.5% loss of the 1953 population (Table 6.6).

It was during this period of profound transformations that the national Southern policy assumed a deeper quantitative impulse, with an acceleration at the end of the 1960s²²⁷.

1953-1962		
Absolute variation in total population	South	+767,950
	Centre-North	+2,153,370
Migration from the South	To the rest of Italy	-1,024,562
	Abroad	-1,035,965
Migration from the South relative to its 1953 population	11.5%	

Table 6.6: Demographic changes in the years of the 'economic miracle' (1953-1962). *Source:* Author's elaboration on Istat (2011).

²²⁷ Total expenditures for the extraordinary intervention in the South averaged 0.73% of national GDP in the period 1951-1957, increasing in the years 1958-1959 and then falling back on a 0.74% average between 1958 and 1965. They increased to an average of 0.83% in the period 1966-1970 and to 1.23% in the following five years (Svimez, 2011).

In 1957, IRI and other public enterprises were called to play a pilot industrialisation function by devoting a larger share of their new and total investments in the South²²⁸. IRI's programmes for the *Mezzogiorno* were already included in its first four-year plan²²⁹ (1957-60), but the new industrialisation strategy was incorporated only within its 1961-1964 plan²³⁰. 'Investments in the *Mezzogiorno*' was highlighted for the first time in IRI's 1959 annual report.

Table A6.4 reports the long list of IRI's major operations over this period. Its approach to the Southern mission could be resumed in three pillars.

The first pillar was the completion of infrastructural networks connecting Southern markets with the North. After the implementation of IRI's programmes, the motorways network reached an impressive extent by the early 1970s (Figure 6.8). Despite Italy's critical geographical configuration, its motorways network was only slightly behind Europe's leader (i.e. West Germany) and most of the expansion was realised by IRI's motorways company Autostrade in the South. The Milan-Naples '*Autostrada del Sole*' motorway was completed in 1964, followed by the realisation of the '*Adriatica*' motorway (A14, 743 Km) from Bologna to Bari (in 1973, later to Taranto in 1975), together with the connection of these two main motorways between Naples and Bari (A16, 246 Km) in 1969.

Extending the motorways network to the South had a positive impact on the localisation of productive activities. As reported by Marsan (1992, p. 309), a study conducted by the sectoral subsidiary Italtat recorded 1,186 newly-established enterprises along the motorways route, employing around 53,000 local workers by 1970. The localisation effect of new enterprises was particularly strong in the South, as confirmed by 80% of the surveyed local municipalities.

²²⁸ Law n. 634 (29 July 1957) obliged state holding companies under the Ministry of State Holdings to devote a minimum of 60% of new (and 40% of total) investments in Southern regions. Law n. 853 (6 October 1971) increased the share of Southern investments to 80% and 60% respectively. State holding companies did increase their shares of investments in the South in the following years, but those legal thresholds remained mostly indicative.

²²⁹ 'IRI – Programma quadriennale 1957-60' (Archivio storico IRI, Bilanci, Programmi quadriennali del Gruppo Iri).

²³⁰ 'IRI – I programmi di investimento e di finanziamento del gruppo a fine 1960' (Archivio storico IRI, Bilanci, Programmi quadriennali del Gruppo Iri).

The other major infrastructural programme concerned the development of the telecommunications network, which was significantly lagging behind at the end of the 1950s. The unification of the national telephone services under a single company (named SIP) in 1964 enabled IRI's telecommunications group to significantly reduce the divergence between the South and the Centre-North: the density of installations per 100 inhabitants in the South relative to the Centre-North more than doubled from 26.8% in 1957 to 53.7% in 1973 (Table 6.7). This convergence was even more remarkable when considering the relatively higher costs and lower revenues that the telephone services had to bear in the South, due to the broader dispersion of clients and to the higher share of subsidised households, compared to the Centre-North.

	1950	1957	1973	1992
South	0.7	1.9	14.6	34.7
Centre-North	3.3 ²	7.1 ²	27.2	45 ¹
Italy	2.6	5.7	22.9	42
Ratio South/Centre-North	21.2%	26.8%	53.7%	77.1%

Table 6.7: Density of telephone installations per 100 inhabitants in various years. *Source:* Author's elaboration on Bottiglieri (1987), Camera dei Deputati (1962), STET annual report 1974, SIP annual report 1992. *Notes:* ¹Unweighted average of Centre-North regions; ²Estimated from Bottiglieri (1987).



Figure 6.8: The three main motorways routes (A1, A14, A16) built and operated by IRI's company Autostrade, connecting the North with the South of Italy. Source: Wikipedia commons. Notes: Left figure shows the Milan-Naples A1 motorway; central figure shows the Bologna-Taranto A14 motorway; right figure shows the Naples-Bari A16 motorway.

The second pillar was the Southern localisation of modern manufacturing plants. The two most notable examples were the construction of the Taranto steelworks (began in 1959 and completed 1965) and the installation of Alfa Romeo's Alfasud car plant at Pomigliano d'Arco (began in 1968 and inaugurated in 1972).

The Taranto steelworks was an integrated plant specialising in rolled products and large tubes for gas and oil pipelines. The initial capacity of 3 million tons per year was increased to 10.5 by 1975, making it the largest steelworks in Europe, as well as one of the most technologically advanced (Romeo, 2019). At the end of 1973, the new Taranto plant was directly employing 17,670 workers, representing by far the largest industrial complex in the South²³¹. It had also created an estimated supply-chain of 315 subcontracting firms totalling over 20,000 employees by 1972 (Masi, 1987). Total investments in building and expanding the Taranto steelworks from 1960 to 1975 amounted to 23.8 billion euros (in 2018 prices), approximately 1.5 billion euros per year²³².

The Alfa Romeo car-making unit at Pomigliano d'Arco was the first integrated plant to be established outside the traditional areas of the automotive industry. It was dedicated to producing a middle-range car name 'Alfasud' (meaning literally 'Alfa South'), introducing a competitive impulse against FIAT's national quasi-monopoly²³³. In 1974, the production of vehicles at the Pomigliano plant had reached the number of 100,000 per year²³⁴. Total direct employment at the end of 1973 was around 15,000 headcounts (becoming the second largest manufacturing unit in the region). According to Alfa Romeo's procurement division²³⁵, by 1977 the Alfasud plant had activated a supply-chain of 72 contractors localised in the South (52 of these appearing after the localisation of the Alfasud plant), totalling over 21,000 employees (with the exclusion of approximately 20,000 employees from the Taranto steelworks). These accounted

²³¹ From '1657. Note sul bilancio Italsider 1973 e sulle previsioni 1974' (Archivio storico IRI, Serie Nera, Busta ISP/157).

²³² Author's elaboration based on Marsan (1992).

²³³ In 1968, FIAT's share of national production had reached 90.2% and was about to increase further with the acquisition of the car producer Lancia in 1969. At that time, Alfa Romeo's share was 7%. In 1975, with the Pomigliano plant in operation, Alfa Romeo's figure increased to 16.9% and FIAT's share was down to 83.3%.

²³⁴ It could not reach its 200,000 capacity due to the economic conditions that followed the 1973 oil crisis (Cerrito, 2010).

²³⁵ 'Indotto Alfa Romeo nel mezzogiorno' (Archivio Storico IRI, Serie Nera, Busta STU/665).

for 38.8% of total external orders by Alfasud, compared to only 10.7% of those placed by the other Alfa Romeo plants near Milan. Total investment in the Alfasud plant between 1969 and 1976 equalled 3.6 billion euros (in 2018 prices), approximately 450 million euros per year²³⁶.

The aim of those two significant initiatives was to transform the South from a dependent consuming market to an independent manufacturing area. The logic behind the Taranto steelworks was to activate forward linkages (Hirschman, 1958), by employing the local workforce to transform relatively cheap raw materials into complex steelmaking products, in order to stimulate the creation of an indigenous transforming industry. Alternatively, because of the technical nature of automotive productions, the Alfasud car plant activated local backward linkages of subcontractors for car components and deployed Taranto's steel plates for their car frames.

The third pillar was to invest in technologically advanced activities in aerospace, electronics and telecommunications. This was pursued by restructuring and relaunching existing productions, such as the electronic engineering company Selenia (created in 1960 from Microlambda), the telecommunications equipment manufacturer SIT-Siemens at L'Aquila, and the Aerfer aircraft site at Pomigliano, which was turned into the national pole for civil aircraft. At the same time, new production sites were localised in Southern areas such as the semiconductor plant built by ATES in Catania (1962), and the two telecommunications equipment manufacturing sites inaugurated at Santa Maria Capua Vetere (1962) and Palermo (1972). These sites constituted productive outposts²³⁷ in an area dominated by productions with a relatively modest technological content.

By the end of 1973 (Table A6.5), IRI's industrial presence in the South had increased by more than 80,000 employees compared to 1957. The share of IRI's employees in the South over the total number of employees reached 27.2%, almost ten percentage points higher than in 1957. This was largely driven by the expansion of steelmaking

²³⁶ Author's elaboration based on Marsan (1992).

²³⁷ With the exception of the SIT-Siemens sites, which followed the declining trajectory of the successor company Italtel (after its privatisation between 1995 and 2000), the legacy of those investments is still visible: the Selenia and Aeritalia sites are operating units of Leonardo, while the ATES factory in Catania constitutes one of the largest manufacturing and research sites of STMicroelectronics in Europe.

and mechanical activities, which absorbed 39.3% and 7.3% of total Southern investments respectively. Telecommunications (21.2%) and infrastructures (13.9%) in turn accounted for a relevant share of total fixed investments made by IRI companies in the South. Very significant was also the Southern presence of electronic engineering productions, which increased from less than 1,000 employees in 1957 (12.1% of IRI's total) to almost 16,000 in 1973 (37% of IRI's total).

3.3.1. The consolidated impact of IRI's industrialisation push

IRI's direct contribution to the industrialisation of the South can be appreciated in terms of its impact on the region's industrial structure, looking at the larger manufacturing units located in the area, especially over the period 1958-1973.

Manufacturing plants of modern steelmaking, mechanical and chemical productions with more than 1,000 employees provide an approximation of the region's industrialisation level. In the 1981 national census, the total number of employees in those plants in the South was around 21.7%²³⁸ of the national total, up from the 6.2% value in 1951. In 1980, employees in Southern manufacturing units above the 1,000 threshold accounted for 27.9% of total employment in manufacturing plants with more than 10 employees²³⁹ (Guglielmetti & Padovani 1981a; 1981b), up from 17.3% in 1951²⁴⁰.

With the average dimension of industrial units in the South relative to the Centre-North increasing from 15.8% in 1951 to 92.8% in 1981²⁴¹, the structural divergence between the two areas – relative to the localisation of large and modern industrial productions – was significantly reduced.

The underlying contribution of IRI's localised investments in creating an eco-system for the proliferation of industrial activities²⁴² can be evaluated from its 17 manufacturing

²³⁸ Author's estimate based on the 1981 National Census on Industry and Commerce (Istat, 1981).

²³⁹ A threshold that can broadly distinguish between a modern manufacturing facility and an artisan workshop.

²⁴⁰ Author's estimate based on the 1951 National Census on Industry and Commerce (Istat, 1951).

²⁴¹ Author's elaboration on Cafiero & Padovani's (1989) estimates of entropic averages.

²⁴² Saraceno (1980) estimates at around 100% the supply-chain employment activation from manufacturing units with more than 1,000 employees. This would imply that more than half of total Southern manufacturing employees (in units with more than 10 employees) were either part of the core of large enterprises or directly linked to them.

units with more than 1,000 employees as of 1980, of which 6 were new installations realised in the 1958-1973 period, while the remaining were either restructured or reconverted from previous activities.

As reported in Table 6.8, they expanded the diversification of the Southern industry with a broad sectoral range of productions – aerospace, electro-mechanical, semiconductors, electronic engineering, telecommunications, steelmaking, shipbuilding – in 4 out of 8 Southern regions (representing 77% of the *Mezzogiorno* population). With a total number of 78,513 employees, they represented 74.3% of IRI's total manufacturing employment in the South, demonstrating IRI's prevalent involvement in large systemic productions. Figure 6.9 provides a geographical representation of the structural transformation achieved by IRI's manufacturing units in 1980.

Rank	City	Year	Company	Economic activity	Sector	Number of employees	Share of company's total
1	Taranto	1961	Italsider	Pig iron, crude steel, steel tubes	Steelmaking	21,785	41.3%
2	Pomigliano d'Arco	1968	Alfa Romeo Auto	Car assembly	Automotive	14,910	42.5%
3	Bagnoli	1910	Italsider	Pig iron, crude steel, rolled products	Steelmaking	7,491	14.2%
6	L'Aquila	1964	Italtel	Telecommunications equipment	Telecommunications	4,752	16.4%
8	Santa Maria Capua Vetere	1962	Italtel	Telecommunications equipment	Telecommunications	4,613	16.1%
9	Pomigliano d'Arco	1952	Aeritalia	Aircraft and aerospace components	Aerospace	4,238	36.9%
11	Palermo	1850	Cantieri Navali Riuniti	Shipbuilding and ship repairing	Shipbuilding	3,344	38.1%
19	Bacoli	1952	Selenia	Civil and military radar systems	Electronics	2,272	36.2%
20	Castellamare di Stabia	1783	Italcantieri	Shipbuilding	Shipbuilding	2,241	23.1%
21	Palermo	1972	Italtel	Telecommunications equipment	Telecommunications	2,160	7.5%
22	Taranto	1966	ICROT	Scrap material for steelmaking	Steelmaking	1,978	44.9%
24	Catania	1961	SGS-ATES	Semiconductors	Electronics	1,929	39.0%
25	Pomigliano d'Arco	1938	Alfa Romeo Veicoli Commerciali	Commercial vehicles	Automotive	1,710	100.0%
32	Pomigliano d'Arco	1938	Alfa Romeo Avio	Aircraft engines	Aerospace	1,360	100.0%
36	Napoli	1954	SEBN	Ship repairing	Shipbuilding	1,248	100.0%
39	Napoli	1940	Ansaldo Trasporti	Transformers	Electromechanical	1,245	74.7%
40	Napoli	1930	FMI Mecfond	Oil-hydraulic machinery	Mechanical	1,237	100.0%
Total						78,513	
Share of IRI's manufacturing employment in the South						74.3%	

Table 6.8: IRI's manufacturing plants with more than 1,000 employees located in the South (1980). Source: Author's elaboration on IRI Database.

IRI's 17 large manufacturing sites in the South were approximately one-third of the total in the region (amounting to 52), despite accounting for 52.5% of total employment in manufacturing sites with more than 1,000 employees (Table 6.9) – reflecting an average larger size relative to the non-IRI ones²⁴³.

Group of control	N. of plants	N. of employees	Share of employees
Private ITA South	1	1,004	0.7%
Private ITA Centre-North	15	31,550	21.1%
Private non-ITA	7	8,653	5.8%
Mixed public-private	4	13,671	9.1%
Public non-IRI	8	16,024	10.7%
IRI	17	78,513	52.5%
Total	52	149,415	100%

Table 6.9: Manufacturing units in the South with more than 1,000 employees by group of control (1980). Source: Author's elaboration on IRI Database.

Furthermore, IRI's role in facilitating the creation of an eco-system for the localisation of new industrial activities resulted from the almost complete absence of indigenous large manufacturing units. With the exclusion of IRI and other public or mixed-ownership groups – accounting respectively for 10.7% and 9.1% of the total workforce – the other largest set of large manufacturing units depended on Italian groups from the North (mostly companies belonging to the FIAT Group, but also Olivetti and the electric appliances producer Indesit). Italian private groups localised some of their new large manufacturing units in the South only in a later phase, especially after IRI's Alfasud initiative.

²⁴³ In 1980, IRI had also 16 Southern manufacturing units (out of 108 overall in the region) with a number of employees ranging from 999 to 500, amounting to further 11,233 employees.



Figure 6.9: IRI's manufacturing units in the South with more than 1,000 employees in 1980. Source: Author's elaboration.

3.4. Peak, rationalisation and upgrade of the industrial structure (1974-1992)

Having peaked at 150,000 employees in 1977, by 1984 IRI's industrial presence in the South started to diminish (in employment terms) and entered a new phase. At that time, the sectoral composition of IRI's activities was not so dissimilar to ten years earlier. Manufacturing activities in both employment and investments terms were slightly receding – although mechanical and electronic engineering preserved their weight, steelmaking was downsizing – while telecommunications and infrastructure were assuming a more relevant role (accounting for over 50% of total investments in the years 1974-1984).

IRI's operations in the South over the 1974-1991 period were numerous (see Table A6.6 for a complete list), especially from the late 1970s, but less focused on expanding production capacity and more targeted to deepening or renovating existing activities. In particular, IRI's undertook a series of new initiatives in high-technology sectors such as aerospace, electronics and telecommunications. At the same time, quite relevant was the restructuring of steelmaking activities, suffering from the 1975-1985 global crisis.

As the process of rationalisation and reorientation accelerated in the second half of the 1980s, IRI's total employment in the South was reduced by almost one-third compared to its peak levels²⁴⁴. However, as IRI's General Director reported in 1989, the IRI-induced employment at that time was higher than the number of IRI's direct employees²⁴⁵:

As a result of the 95,000 employees in IRI's companies in the South, it is possible to estimate an induced employment of 56,000 workers, which has to be added to other 62,000 ones deriving from the supply-network of productions plans of IRI's units localised in the Centre-North, amounting to an overall induced employment that could be evaluated around 118,000 units.

²⁴⁴ Of a 50,000 net reduction in IRI's Southern employees between 1980 and 1991, approximately 12,000 could be attributed to the privatisation of Alfa Romeo (sold to FIAT in 1986), which involved also the ownership transfer of the Pomigliano d'Arco plant.

²⁴⁵ Author's translation from Italian of IRI's General Director Tedeschi 1989 speech at the 'Fiera del Levante' (7 September 1989): 'La politica dell'Iri per lo sviluppo del Mezzogiorno' (Archivio Storico IRI, Serie Nera, Busta DPC/40).

Moreover, elaborating on a suggestion from IRI's Studies Division²⁴⁶, it is possible to estimate that IRI's net job creation in the South over the period 1960-1990 had been 47.2% higher than the rest of the Italian economy²⁴⁷.

In 1990, all of IRI's sectoral subsidiaries had a significant presence in the South (see list in Table A6.7), with an established predominance of STET's telecommunications activities, accounting for over three-quarters of IRI's total investments in the South. The Ilva steelmaking group was significantly reduced in importance, with the closure of its Bagnoli site in 1989, while the Taranto steelworks were undergoing a three-year investment plan for their modernisation. Finmeccanica was also firmly located in the three Southern regions of Campania, Puglia and Sicily with production units for aerospace, electronics and semiconductors.

The qualitative shift of IRI's Southern mission towards a technological upgrading of its productions could also be traced in the focus placed on establishing and transferring its research activities to the South.

IRI's R&D in the South was essentially non-existent before the expansion of its aerospace and electronics productions during the 1960s. However, IRI's research efforts in the *Mezzogiorno* increased further from the late 1970s, attempting to close an even larger gap in this area relative to the Centre-North.

Apart from expanding the R&D activities of its corporate labs (amounting to 28 by 1987), IRI located two new inter-companies R&D centres in Campania, specialising in food technologies (CRAI) and informatics (Teciuel) – adding up to the existing R&D centre on metal materials *Centro Sviluppo Materiali* (CSM), founded in 1963 in the Southern periphery of Rome. Moreover, two so-called '*Città Ricerche*' (City Researches) research consortia – applied research centres for technology transfer

²⁴⁶ This argument was put forward – with differing reference years but similar figures – by IRI's Studies Division in an internal document from December 1991 titled 'Rapporto sull'IRI' (Archivio Storico IRI, Bilanci, Ufficio Studi).

²⁴⁷ The net job creation by IRI in the South in the period 1960-1990 amounted to 77,000 units. This figure excludes approximately 17,000 employees – from the Alfasud Pomigliano d'Arco plant and from SGS's Catania plant – that were effectively created by IRI. The overall net job addition by the non-IRI economy (agriculture excluded) in the South was around 1.35 million over the same period. Given that the size of the non-IRI economy in those years was on average 25.8 times IRI's size, more than 600,000 additional net jobs could have been created if the first had undertaken the same job creation effort of IRI's companies. These values are author's estimates elaborated from IRI Database.

between universities and the business sector (see section 4.3.3.) – were established in Catania (1987) and Naples (1989).

Furthermore, in 1989²⁴⁸ IRI signed a four-year 'Planning Agreement'²⁴⁹ for an investments programme of 1,560 billion lire²⁵⁰, of which two-thirds dedicated to research projects as well as to the expansion and modernisation of 13 corporate labs, with the remaining one-third devoted to the technological renovation of 12 existing production sites in the South. The Agreement eventually involved 6,164 employees of Finmeccanica and STET companies, enabling the creation of 1,860 specialised jobs²⁵¹.

As reported in Table A6.8, by 1991 IRI had 2,176 research employees in the South and spent 283.2 billion lire²⁵² annually on R&D in its Southern units. This amounted respectively to 17.4% and 13.4% of IRI's total research efforts²⁵³, compared to a mere 5.3% of Italy's R&D employees and 5% of national business R&D expenditure accounted for by non-IRI companies in the *Mezzogiorno*. Consequently, IRI accounted for 40.9% of total R&D employees and for 41.8% of total R&D expenditure in the Southern area.

²⁴⁸ CIPI Deliberation (21 March 1989) 'Contratto di programma tra il Ministro per gli interventi straordinari nel Mezzogiorno e il gruppo IRI'.

²⁴⁹ Planning Agreements were introduced by the new legislation on the 'extraordinary intervention' (Law n. 64, 1st March 2022), representing formal contracts signed between industrial partners and the Ministry for the South, to support specific investment projects with public funds.

²⁵⁰ Approximately 1.6 billion euros in 2018 prices.

²⁵¹ Consolidated figures from CIPE Deliberation n. 1 (15 February 2000) 'Assetto finale del contratto di programma stipulato in data 17 maggio 1989 tra il Ministero per gli interventi straordinari nel Mezzogiorno e il gruppo I.R.I.'.

²⁵² Approximately 264.1 million euros in 2018 prices.

²⁵³ Following the redefinition of the *Mezzogiorno* area in 1990, these figures do not include CSM and Alenia's research lab located in the area of Pomezia, South of Rome. Moreover, R&D figures relative to SGS-Thomson's semiconductor unit at Catania were not included in the survey, due to the company's exit from IRI's consolidated perimeter. If these were taken into account, IRI's R&D presence in the South would amount to an estimated 23.1% relative to IRI's overall research employees and to 19.3% relative IRI's total R&D expenditure – which would still exclude the R&D personnel and expenditure of the Alfasud research unit (privatised in 1986). These values are author's estimates elaborated from IRI Database.

3.5. IRI's figures on employment and investments in the South (1950-1992)

IRI's quantitative presence in the South throughout the period 1950-1992 can be appraised by looking at the evolution of its employment and investments variables²⁵⁴.

The share of IRI's employees in the South was lower than the share of IRI's total employees in the national economy (Figure 6.10). However, the gap narrowed since the 1960s and was almost completely closed in the first half of the 1970s, when IRI's share of Southern employees went from below 0.7% in the 1950s to above 2% from 1972. In line with IRI's employment trend (Chapter 5), it subsequently fell towards 1.5% by the early 1990s.

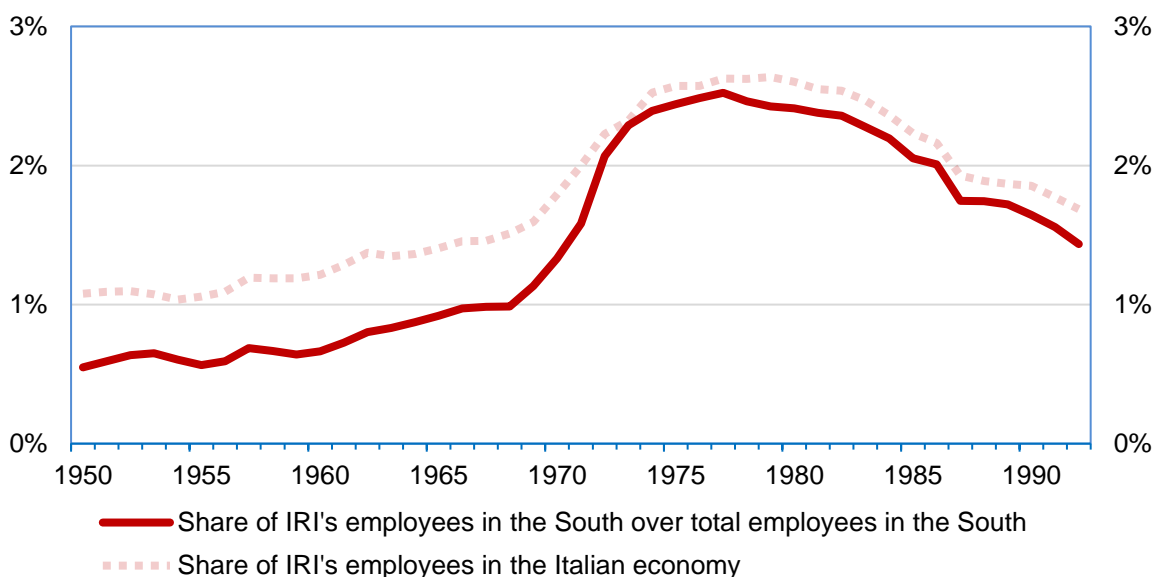


Figure 6.10: Share of IRI's employees in the South over total employees in the South. Source: Author's elaboration on IRI Database.

The narrowing gap in IRI's share of employment in the South was driven by a progressive increase in the Southern share of employees within the IRI Group (Figure 6.11). Representing approximately 15% of IRI's total employees still in the mid-1950s, from 1972 onwards more than one-quarter of IRI's workforce was employed in the South²⁵⁵, getting closer to the share of Southern employees in the Italian economy (below but close to 30% from 1970 onwards). These figures point to a significant effort

²⁵⁴ These are the only two variables on the Southern presence of IRI for which it is possible to reconstruct complete series from 1950 to 1992.

²⁵⁵ The 1986 fall in share appearing in Figure 6.10 is mostly explained by statistical exclusion of Alfa Romeo and SGS-Thomson from the consolidated number of employees on that year.

by IRI in creating industrial jobs in the South of Italy (at least until the mid-1970s), which suffered from structural unemployment conditions.

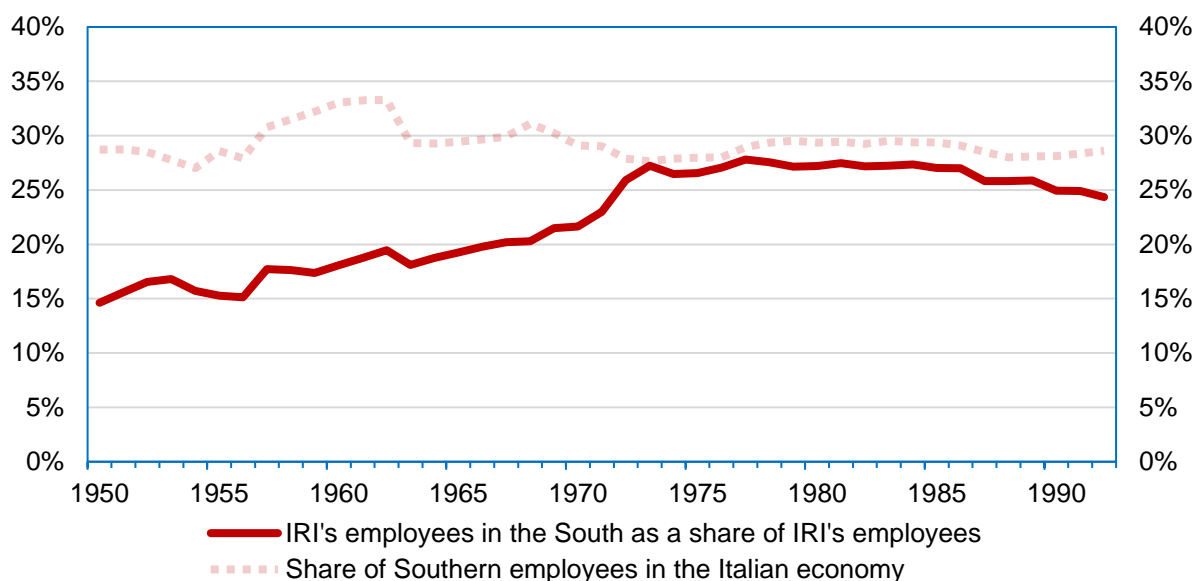


Figure 6.11: IRI's employees in the South as a share of IRI's employees. Source: Author's elaboration on IRI Database.

The absolute number of IRI's employees in the Centre-North compared to the South is visible from Figure 6.12.

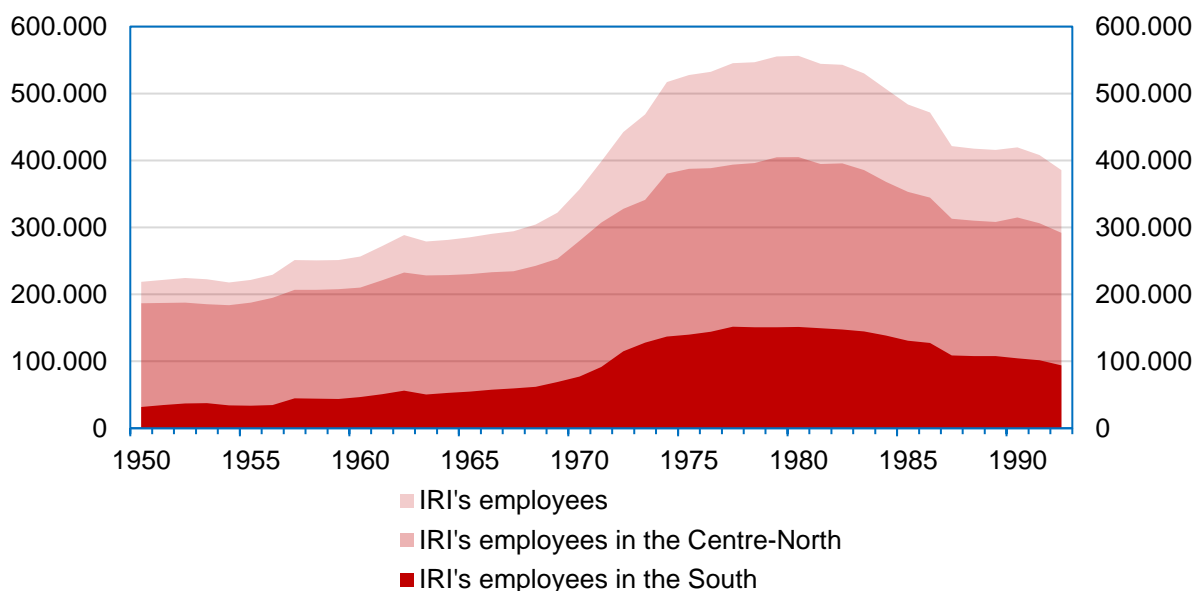


Figure 6.12: Number of IRI's employees in the South and in the Centre-North. Source: Author's elaboration on IRI Database.

IRI's investments in the South followed a distinct pattern (Figure 6.13): on average their share over total Southern investments was lower than IRI's share of national

investments (reflecting IRI’s relatively minor presence in the South), with the notable exception of the years 1964-1966 and 1970-1975 – particularly in the latter period, coinciding with the expansion of the Taranto steelworks and with the completion of the Alfasud car making plant.

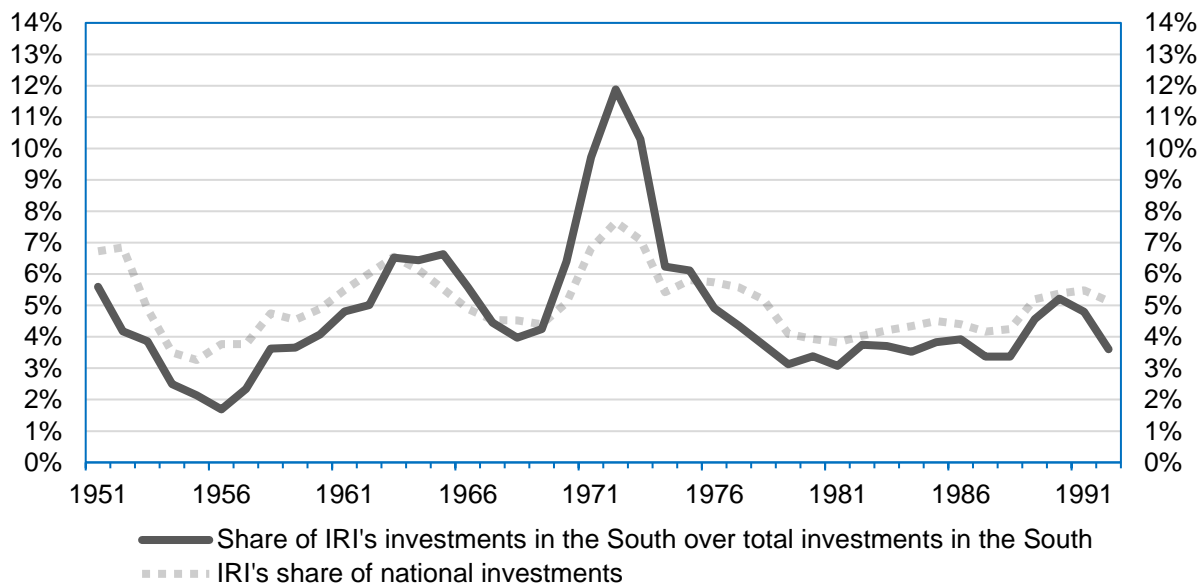


Figure 6.13: Share of IRI's investments in the South over total investments in the South. Source: Author's elaboration on IRI Database.

The share of IRI’s investments in the South over total IRI’s investments fluctuated consistently from a low of 14.8% in 1957 to the 1972 peak, when IRI devoted 55.8% of total annual investments to its Southern units (Figure 6.14).

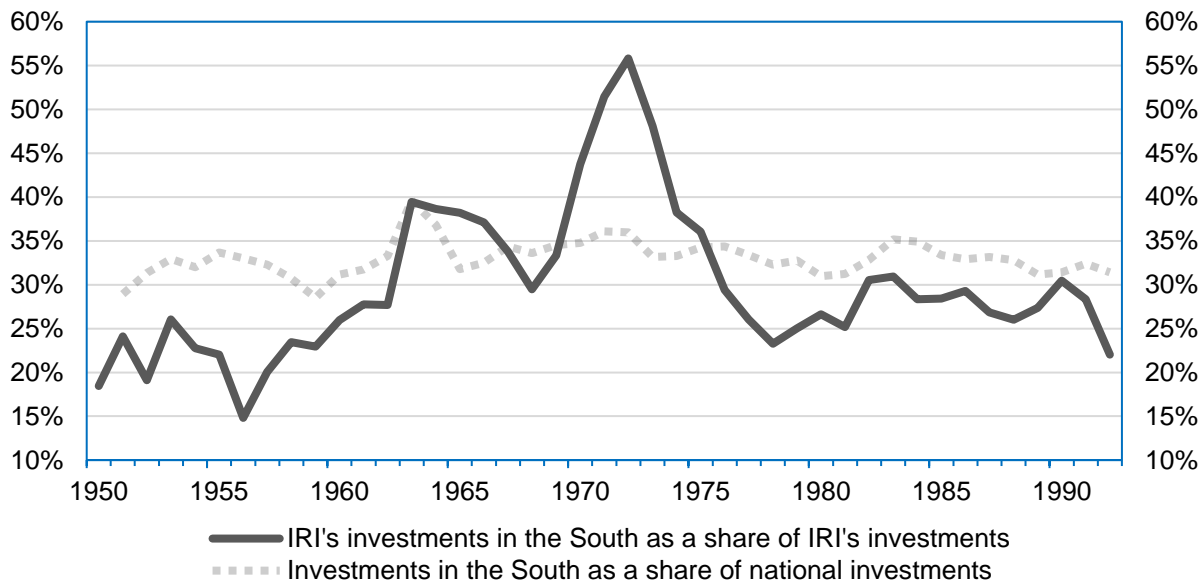


Figure 6.14: IRI's investments in the South as a share of IRI's investments. Source: Author's elaboration on IRI Database.

Figure 6.15 compares the shares of IRI's employment and investments in the South with the share of Southern employees and investments relative to the national economy. It appears that the intensity of IRI's capital investments in the South was higher than the employment intensity until 1976, accounting for the industrialisation push operated by IRI, especially in the 1958-1973 years. Except for the year 1990, in the 1977-1992 period, the employment intensity prevailed, explained by the lowered importance of capital-intensive industrial installations and by IRI's consolidated Southern workforce in the area.

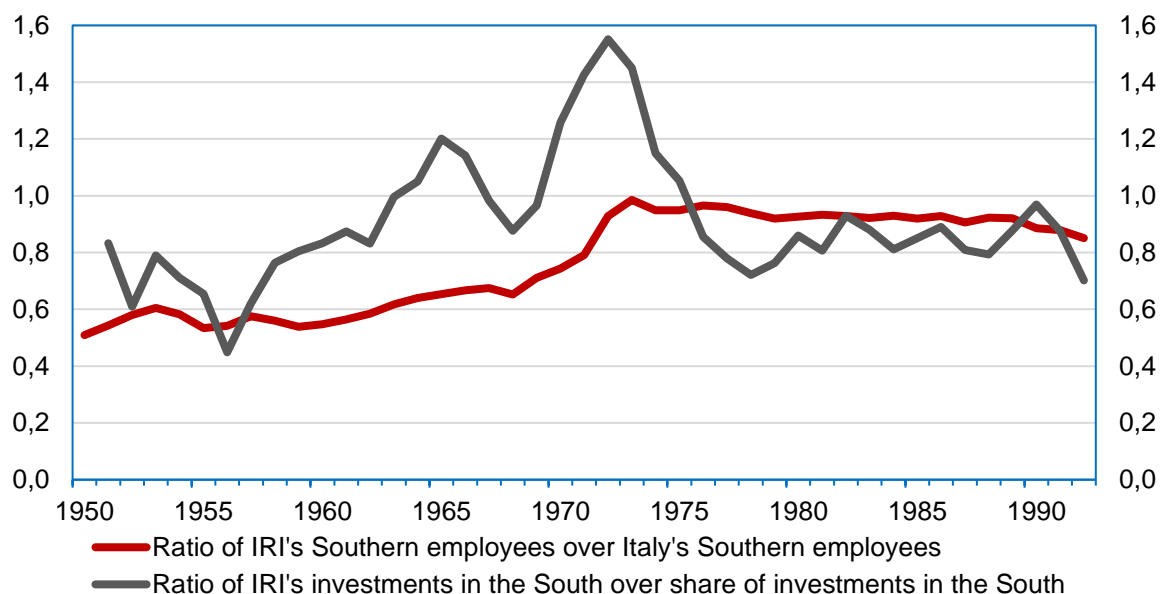


Figure 6.15: Ratios of IRI's employment and investments intensity in the South. Source: Author's elaboration on IRI Database.

3.6. Concluding remarks on IRI's Southern mission

The economic convergence of the South at the beginning of the 1990s was far from complete, if anything it had slowed somewhat. However, during the previous four decades, the secular divergence with the Centre-North was halted and partially inverted. The South was endowed with modern infrastructures and certain areas in the region were finally disposing of advanced manufacturing centres that had never existed before. Labour productivity in the industrial sector in the South relative to the Centre-North increased from 56.7% in 1951 to 85.7% in 1992 (Figure 6.16).

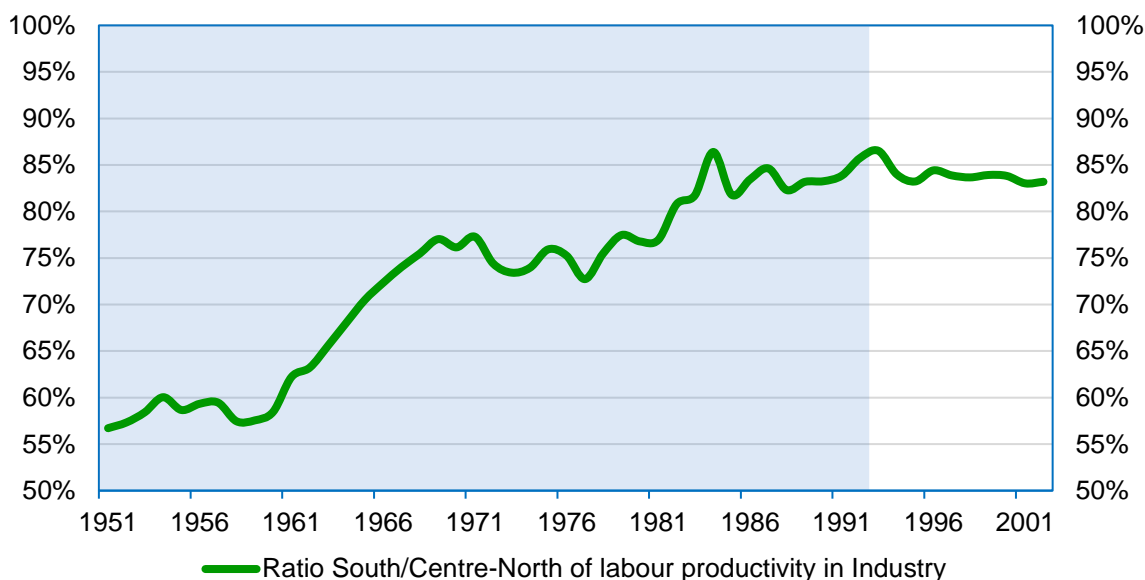


Figure 6.16: Labour productivity ratio between the South and the Centre-North of Italy in Industry. Source: Author's elaboration from Svimez (2011).

Although this was the result of a comprehensive national policy effort under the 'extraordinary intervention' programme, IRI did take a major part in the process. It preserved and rebuilt key production facilities that had been severely damaged during WWII. It was also largely involved in systemic infrastructural projects: electric energy at first, then telephone networks and motorways. Later, particularly in the 1958-1973 period, it contributed to creating a stronger production base in the South with the localisation of modern manufacturing plants of significant dimensions.

The accusation of representing 'white elephants' – or 'cathedrals in the desert' in the Italian version (Saraceno, 1980) – should be rebutted in the case of IRI's large-scale manufacturing investments.

First, because the direct creation of specialised manufacturing jobs in the territory was fundamental in halting the internal migration of workforce towards Northern congested cities.

Second, IRI's first-mover investments favoured external economies and industry linkages that were essential for the creation of an indigenous industrial basis. The development of a Southern industrial ecosystem later attracted Northern companies, as demonstrated by the sequence of industrial initiatives that private Northern groups embarked on from the late 1960s. Most notably, FIAT – the largest national car

manufacturer – established its first car assembly plant in the South in 1970 at Termini Imerese (Sicily) and in the following decades continued shifting its manufacturing weight towards Southern regions, with the installation of subsidiary productions as well as with other assembly plants, among which Italy's largest at Melfi in 1993. These investments would not have happened under a mere subsidisation from the state, without the creation of a pre-existing industrial ecosystem. IRI significantly contributed to the Southern industrial ecosystem with the installation of specialised manufacturing plants and with the realisation of national motorways and telecommunications networks connecting Southern productions to Northern markets and vice versa.

Third, IRI's industrial facilities – further modernised throughout the 1980s and early 1990s – constitute to this day a positive legacy in terms of employment and technological competitiveness. The Taranto steelworks – aside from the unresolved environmental issues – is still the largest integrated plant of its kind in Europe. The former Alfasud plant at Pomigliano d'Arco is currently the second largest car assembly plant in Italy. Most of IRI's aerospace and electronics productions in the South are still operative under the company Leonardo. Catania still hosts one of the largest and most-advanced front-end semiconductor production sites in Europe, currently owned by STMicroelectronics²⁵⁶. Palermo and Castellammare di Stabia remain two key shipyards for Fincantieri, Italy's world leading shipbuilding company. Other advanced productions – for instance, optical fibre cables at Battipaglia (Salerno) by Prysmian and rolling stock manufacturing at Reggio Calabria by Hitachi Rail – have their roots in IRI's Southern investments.

Very few comparable industrial initiatives can be traced from 1992, when the legal provisions of the extraordinary intervention were abolished and the process of structural change in the South came to a halt. In the same year, IRI was transformed into a joint-stock company and any reference to the '*Mezzogiorno* mission' disappeared from its working documents and annual reports.

²⁵⁶ The creation of a microelectronics industrial ecosystem at Catania represented the precondition for later initiatives such as the establishment of the '3SUN' solar panel factory in 2011, from a joint-venture between Enel, Sharp and STMicroelectronics. 3SUN, currently 100% owned by Enel Green Power, is set to become one of Europe's largest production units of photovoltaic panels, with approximately 1,000 jobs by 2024.

4. IRI's research mission

4.1. The development of IRI's research mission

The importance of scientific research within IRI was acknowledged already in the pre-war period, as testified by the funding of research institutes, jointly-established with industrial partners and with the National Council of Researches (Gasperin, 2022). For instance, the initiative with the tyre manufacturer Pirelli in 1937 led to the creation of a research institute focused on synthetic rubber²⁵⁷, where Professor Giulio Natta began his work on stereospecific polymerisation, leading to the discovery of the isotactic polypropylene, for which he was later awarded the Nobel Prize in Chemistry in 1963 (Redondi, 2013).

In the post-war years, only few research initiatives were undertaken, the most notable being the establishment of the 'National Centre for Agricultural Mechanics' in 1955 with the University of Naples. During the 1950s, some of IRI's most advanced companies inaugurated their R&D divisions and corporate laboratories.

R&D units	<ul style="list-style-type: none"> • 36 companies with R&D activities (~87% of IRI's revenues), of which 17 with autonomous specialised centres/divisions purely dedicated to R&D activities
R&D activities	<ul style="list-style-type: none"> • 110 R&D activities, 94 internal and 16 outsourced, divided into: <ul style="list-style-type: none"> - 4.5% fundamental research - 33.6% new products and services - 13.6% new materials - 22.7% new processes - 25.4% new applications
R&D employees	<ul style="list-style-type: none"> • 1,600 R&D employees (0.7% of IRI's employees), of which 950 in specialised R&D labs • 28% pure researchers
R&D expenditures	<ul style="list-style-type: none"> • 7.7 billion lire for <i>intra-muros</i> R&D (0.5% of IRI's revenues) • 5.6 billion lire for external R&D (41.2% of total R&D expenditures) • 62% covering the cost of R&D personnel

Table 6.10: IRI's R&D activities in 1963. Source: 'Ricerca e sviluppo nel Gruppo IRI' (Archivio Storico IRI, Serie Nera, Busta DPL/41).

The turning point for IRI's research mission can be traced in the November 1964 conference – organised by the Institute – titled 'Research and Development in the IRI Group'²⁵⁸, gathering executives of IRI's main companies, officials from the Institute and

²⁵⁷ The research centre was called '*Istituto per lo Studio della Gomma Sintetica*' and it was based in Milan.

²⁵⁸ 'Ricerca e sviluppo nel Gruppo IRI', proceedings of a conference organised by IRI on 5-6 November 1964 in Rome (Archivio Storico IRI, Serie Nera, Busta DPL/41).

international experts – such as the dean of the MIT School of Science and the executive vice-president of the Stanford Research Institute.

During that conference, the Central Director of IRI's Inspectorate exposed the results of a review – made by a working group composed by representatives from IRI's main sectoral subsidiaries and largest companies²⁵⁹ – over the state of IRI's research, relative to the year 1963 (Table 6.10).

R&D within IRI appeared to be at an embryonic stage, both quantitatively and qualitatively, with only few corporate units and employees specialising in pure R&D activities, mostly aimed at the immediate needs of single companies. In particular, the working group lamented: the lack of an R&D culture within IRI and its companies (emerging from the preference for outsourcing 42.1% of total R&D expenditures); the inadequacy of financial resources dedicated to R&D; the low degree of connection with the production centres; the scarcity of pure corporate researchers (28% of the total R&D employees).

The study outlined a series of recommendations for IRI's future R&D strategy. First, the destination of more financial resources to R&D activities. Second, the internalisation of research activities to lower the dependence on external R&D. Third, the concentration of existing activities to reach economies of scale. Fourth, the need to develop research collaborations with other groups and public institutions. Fifth, the further development of specialised inter-companies R&D centres, focusing on upstream and generic research segments. Finally, a more holistic and long-term oriented R&D strategy at the level of the IRI Group, integrated in its four-year planning process.

These recommendations were embraced by the Institute, which assumed the central responsibility for IRI's overall R&D strategy, imposing the formulation of four-year plans on R&D by IRI's subsidiaries, to be submitted and incorporated in IRI's four-year

²⁵⁹ The working group included representatives from the Institute, IFAP, Finsider, Fincantieri, Finmeccanica, Finmare, STET, Autostrade, Alitalia.

programmes starting from 1965/1968²⁶⁰. The 1965 annual report was IRI's first to include a section on 'Research'.

In 1966, the new course became fully operative, as the Institute outlined its new "rules for the group's planning"²⁶¹ containing a specific chapter on R&D, with a shared definition of R&D activities and their organisation.

As represented in Figure 6.17, IRI's R&D strategy was defined by the Institute in collaboration with its main sectoral subsidiaries, which were responsible for coordinating the specialised inter-companies R&D centres and the R&D corporate labs of the controlled operating companies (jointly with the Institute).

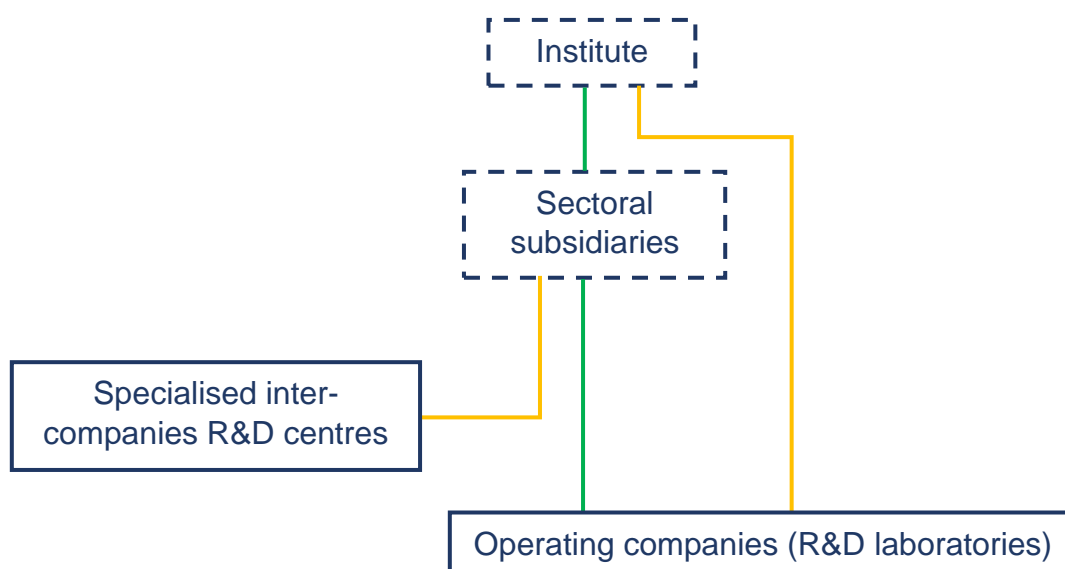


Figure 6.17: Organisation of IRI's R&D policy. Source: Author's elaboration. Notes: ¹Dotted-line boxes represent centres of coordination for R&D policy, while continuous-line boxes represent operative centres of R&D activities; ²Green connectors represent shareholding relations among IRI's levels, while yellow connectors represent coordinating relations on R&D management.

IRI's subsidiaries reported on their current research activities and submitted their four-year R&D plans to the Institute, indicating: a) the organisation of R&D (e.g. responsible figures, units where it was performed, planning procedures, etc.); b) the research objectives, both achieved and planned; c) the main research themes, how they were selected and whether they implied the collaboration of external entities; d) R&D

²⁶⁰ The inclusion of an R&D chapter appeared firstly in IRI's 1965/1968 plan 'I programmi di investimento e di finanziamento del gruppo a fine 1965' (Archivio Storico IRI, Bilanci, Programmi quadriennali del Gruppo Iri).

²⁶¹ 'Norme per la programmazione di gruppo' (Archivio Storico IRI, Serie Nera, Busta AG/3258).

acquired from external sources (e.g. licences, technical assistance); e) R&D personnel and its characteristics (e.g. specialisation, costs, etc.); f) R&D expenditures and how to finance them. A dedicated ‘Organisation and research’ division under the Inspectorate collected the detailed programmes submitted by IRI’s subsidiaries and elaborated a synthesis²⁶² for the Institute, to be included in IRI’s overall planning process (Chapter 4).

However, not only did the 1964 conference mark the formal beginning of an R&D strategy for IRI, it also inaugurated IRI’s research policy projection over Italy’s national system of innovation. In the words of IRI’s Chairman²⁶³ (p. 255), through its R&D effort, IRI was called to give a “new contribution to the economic and social development of the Country”. By embracing an explicit and outward-looking R&D policy, IRI was committing to a “public propulsive function”²⁶⁴ for Italy’s industrial research, which was significantly lagging behind other comparable European economies (Figure 6.18).

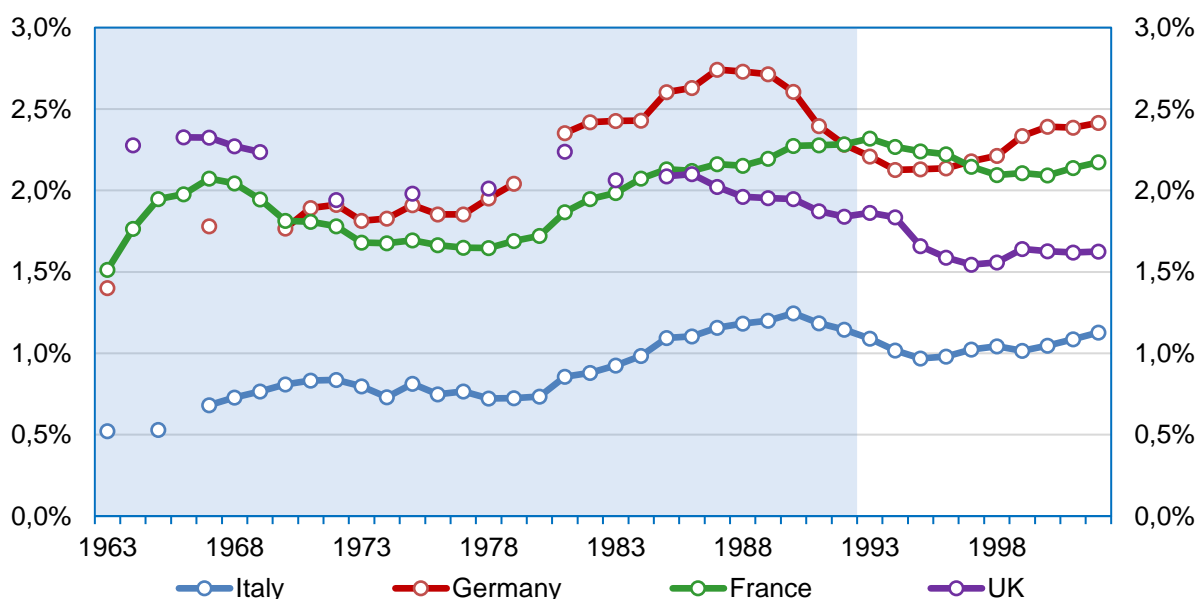


Figure 6.18: Gross R&D expenditure over GDP in Italy, France and the UK (1963-2002). Source: Author’s elaboration on IRI Database. Notes: ‘Germany’ refers to West Germany until 1990.

²⁶² Starting from the 1966/1969 R&D plans ‘Ricerca e sviluppo nel gruppo Iri. Sintesi dei capitoli “R&S” dei programmi quadriennali 1966/69’ (Archivio Storico IRI, Serie Nera, Busta AG/3249).

²⁶³ ‘Ricerca e sviluppo nel Gruppo IRI’ (Archivio Storico IRI, Serie Nera, Busta DPL/41). Author’s translation from Italian.

²⁶⁴ As reaffirmed by IRI’s Chairman Petrilli during a hearing to the Chamber of Deputies on the relation between scientific research and industry (Camera dei Deputati, 1967, p. 116). Author’s translation from Italian.

4.2. IRI's figures on research and innovation

The information system for R&D established by IRI in the 1960s enables the detailed quantitative of IRI's R&D-research dimensions. In what follows, figures on the evolution of R&D variables refer to the IRI Group as a whole, providing a first picture of its impact in Italy's system of innovation. This is particularly important because, from the 1970s, IRI became the most important R&D industrial player in the national context.

4.2.1. IRI's R&D expenditure

In the 1963-1992 period, R&D expenditure performed by the public enterprise sector in Italy was a significant and growing share of total business R&D (Figure 6.19). It represented an average of 29.6%, moving from 13.7% in 1963 to a peak of 38.4% in 1984. From 1979 onwards, it never fell below 30% of the total. Of total public enterprise R&D expenditure, IRI was by far the largest contributor, with an average of 69.8% over the period, fluctuating between 50% and more than 75% in certain years (in late 1960, late 1970 and early 1990s).

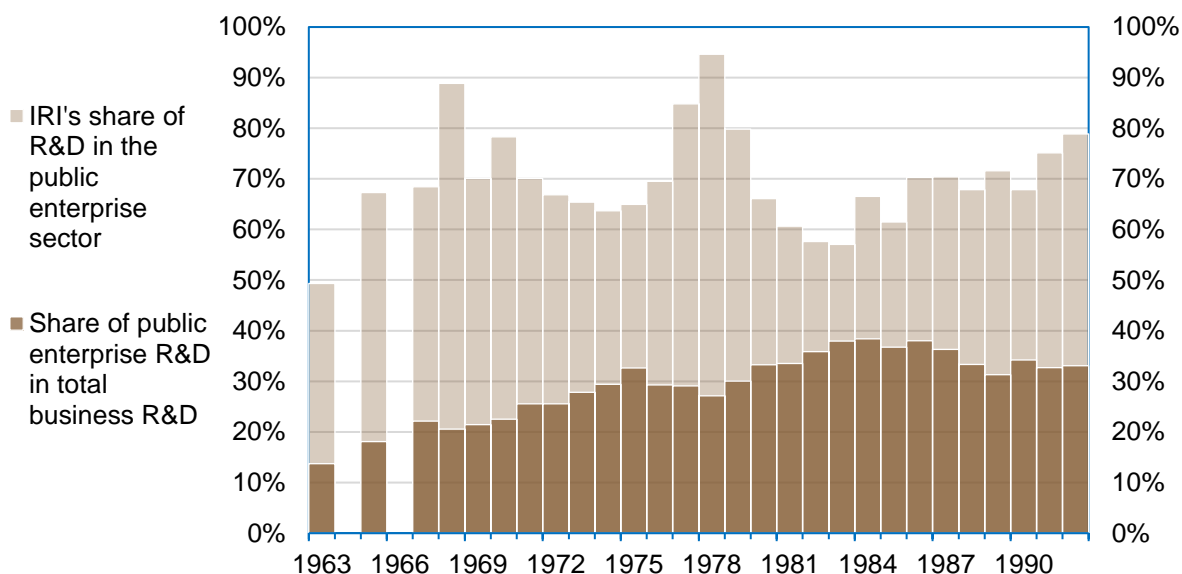


Figure 6.19: Share of public enterprise R&D in total business R&D and IRI's contribution to public enterprise R&D. Source: Author's elaboration on IRI Database.

Therefore, IRI's R&D expenditure constituted a large and increasing share of Italy's R&D (Figure 6.20). Throughout the 1963-1992 period, IRI's average share of Italy's R&D was 11.6%, but growing from a 4.2% value in 1963 to 14.5% in 1992. With respect to total business R&D expenditure, IRI averaged 20.6% in those four decades, climbing

from 6.8% in 1963 to 26.1% in 1992. Since 1975, more than one-fifth of national business R&D was performed by IRI's companies, making IRI the largest industrial performer of R&D in the Country.

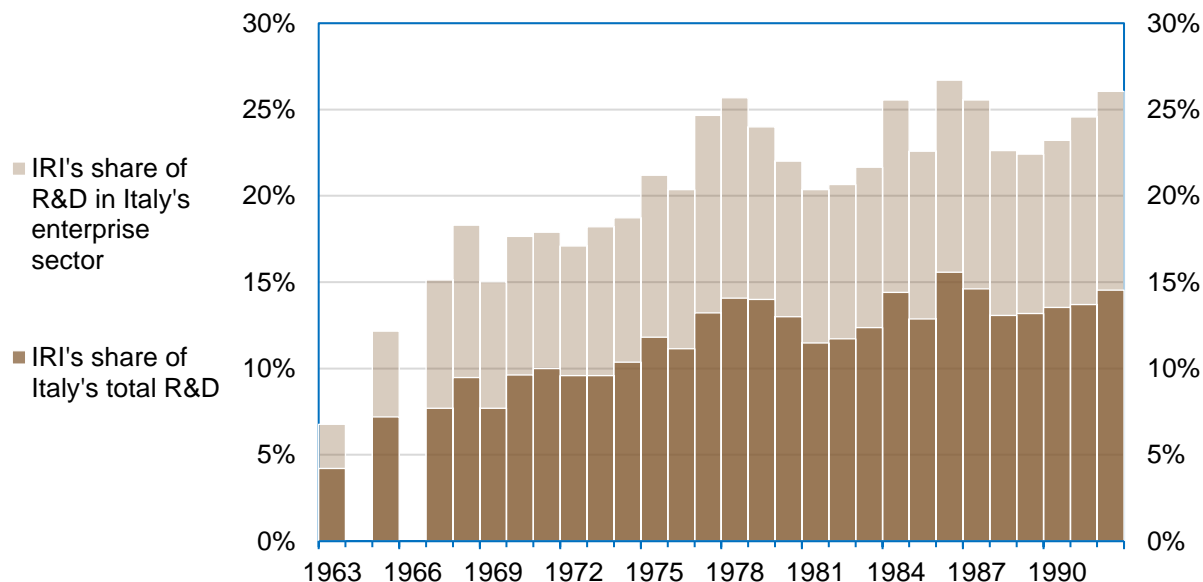


Figure 6.20: IRI's national shares of R&D expenditures. Source: Author's elaboration on IRI Database.

These figures capture a deliberate and growing effort by IRI in promoting industrial research at the national level. IRI's R&D expenditure was no substitute for private R&D, as both grew proportionally more than the Italian economy. Relative to national GDP, IRI's share of R&D increased from a 0.02% value in 1963 to 0.17% in 1992, an identical 0.15 percentage points increase registered by the 25 times larger private enterprise sector (moving from 0.28% to 0.53% of Italy's GDP over the same period).

IRI's increasing R&D effort was essentially explained by a higher intensity of R&D activities, rather than being the mere statistical match of the Group's relative expansion in employment and revenues terms. In fact, whereas from the early 1980s IRI underwent a significant reduction in its total workforce (as reported in Chapter 5), the amount of resources devoted to R&D continued to increase. Consequently, R&D expenditure per employee in real terms²⁶⁵ augmented from approximately 2,000 euros in 1982 to almost 6,700 euros in 1992, while amounting to only 364 euros in 1963 (Figure 6.21, right axis).

²⁶⁵ Values in constant 2018 euros.

Until the early 1980s, IRI's R&D expenditure increased proportionally with the number its R&D personnel (around 80,000 euros per R&D employee). Then in the decade 1982-1992 it doubled to 180,000 euros, pointing to a significant intensification of R&D expenditure (Figure 6.21, left axis).

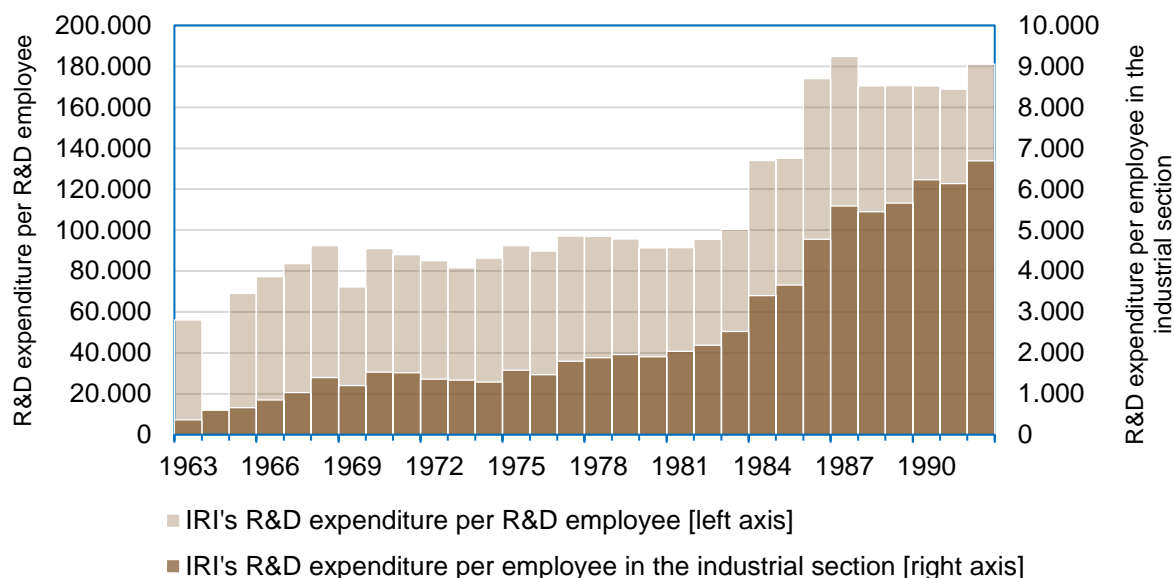


Figure 6.21: IRI's R&D expenditure per employee in the industrial section and relative to IRI's R&D employees. *Source:* Author's elaboration on IRI Database. *Notes:* Values are expressed in constant 2018 euros.

The growing intensity of R&D activity is also captured by the increasing share of R&D costs accounted for by the purchase of goods and services and by the growing commission of research to third parties in the 1980s (Figure 6.22). The share of costs for the personnel, which amounted to an average of 48.9% of total R&D costs until 1981, fell to 35.9% in the following decade. Another figure conveys the increased quality of IRI's R&D in this later period: by 1991, more than 90% of IRI's R&D facilities had been either installed or updated in the second half of the 1980s²⁶⁶.

²⁶⁶ P. 45 from 'Le unità di ricerca del gruppo Iri' (Archivio Storico IRI, Serie Nera, Busta STU/601).

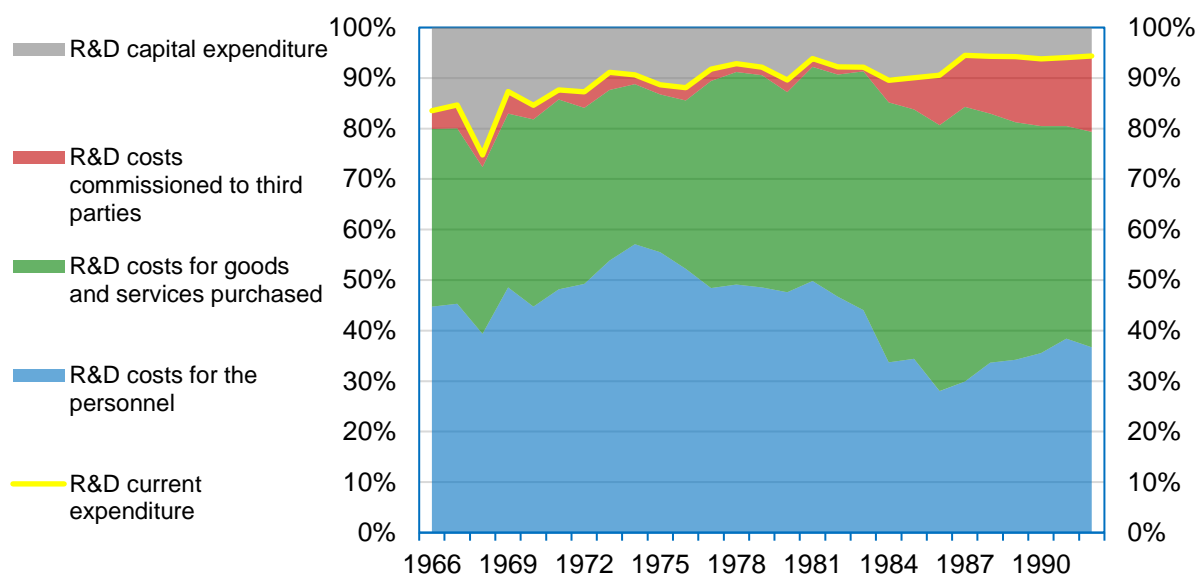


Figure 6.22: Internal composition of IRI's R&D costs. Source: Author's elaboration on IRI Database.

Given the significant variation in the research-intensive nature of IRI's activities, the overall value of R&D over total revenues was not particularly significant. However, IRI's R&D-revenues intensity increased considerably in the 1963-1992 period, from 0.5% in 1963 to an average of 3.6% since 1986 (Figure 6.23).

A more revealing comparison with the rest of the economy can be drawn at the sectoral level, relative to the available year 1987. As reported in Table 6.11, IRI's R&D intensity over total revenues was higher than the national average in all sectors except 'food'—where the difference was nonetheless marginal.

Sector	IRI	National value
Telecommunications	15.5%	(Not available)
Industrial electronics	15%	9.85%
Informatics	4.7%	(Not available)
Aerospace	34.9%	25% ¹
Energy engineering	5.8%	0.98%
Transport engineering	6.8%	3.84%
Steelmaking	2.5%	0.7%
Food	1%	1.07%

Table 6.11: Sectoral R&D intensity over total revenues of IRI compared to the national value (year 1987). Source: Figures come from IRI Chairman's hearing to the Italian Senate (Senato della Repubblica, 1989). Note: ¹Value estimated from author's elaboration on Istat (1989a, 1989b).

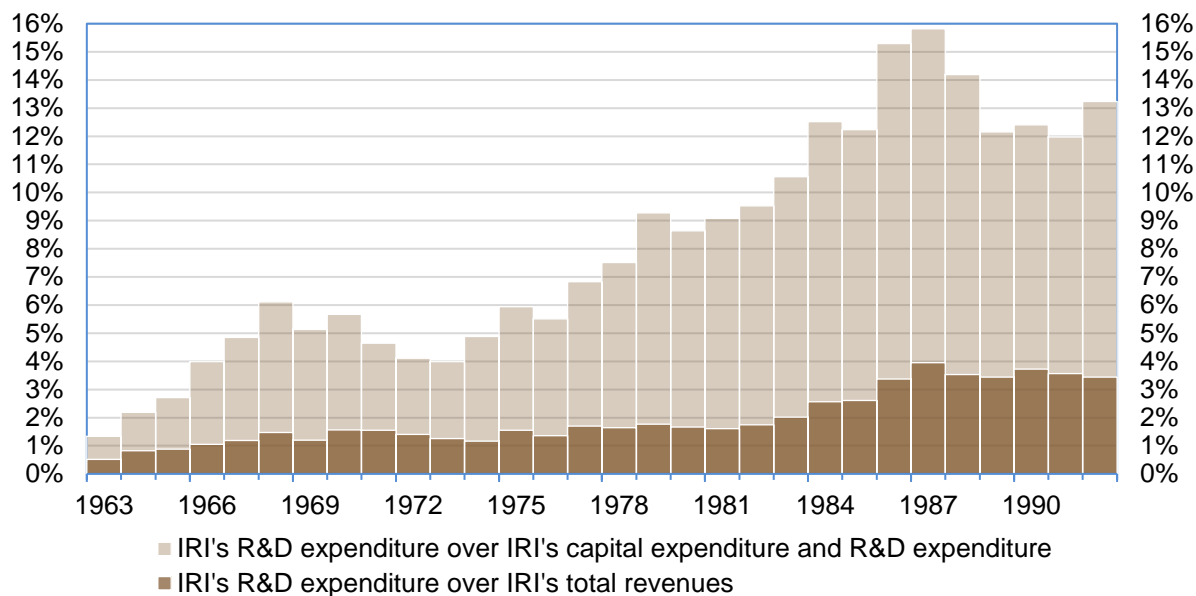


Figure 6.23: IRI's R&D expenditure over total revenues and over total capital and R&D expenditure. Source: Author's elaboration on IRI Database.

Finally, as investments in physical capital reduced their importance in the less capital-intensive sectors where IRI became involved from the mid-1970s, the share of R&D investments over total capital and R&D expenditure rose from below 6% to an average of more than 12% over the 1980s (Figure 6.23).

4.2.2. IRI's R&D employees

As illustrated in Figure 6.24, the share of R&D personnel in public enterprises over total R&D personnel in Italian business enterprises was marginally lower than the corresponding R&D expenditure share, averaging at 28.5% in the years 1975-1992 (compared to 33.5% for the R&D expenditure share over the same period). However, the corresponding share of R&D pure researchers was higher, amounting to an average of 32.3% over the same years. IRI's shares of public enterprise R&D employees and researchers was similarly elevated, averaging at 72.8% and 69.4% respectively from 1975 to 1992.

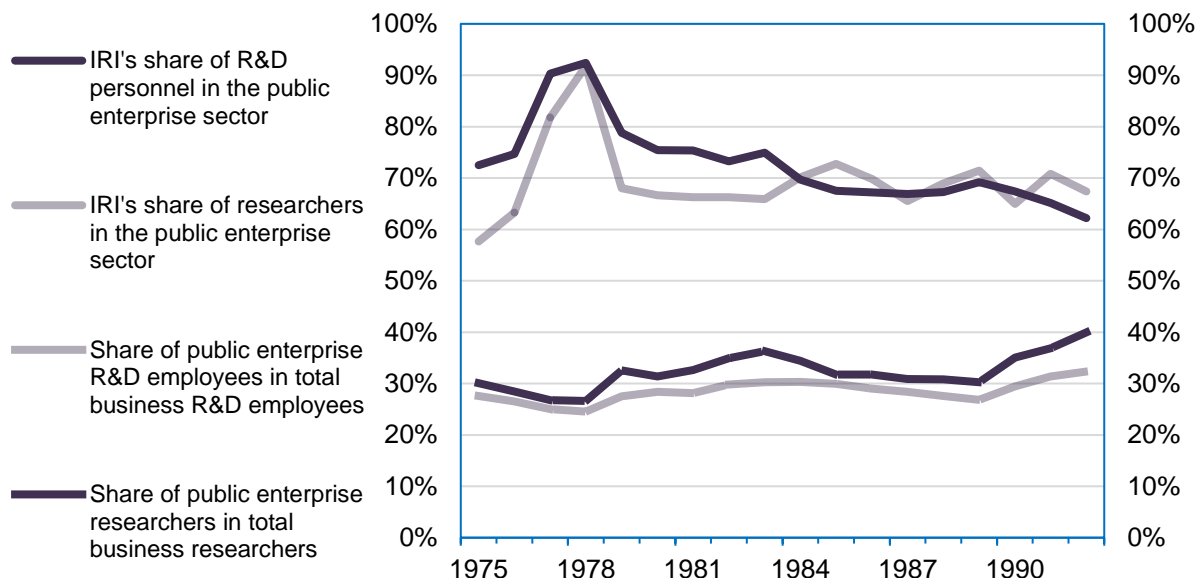


Figure 6.24: Share of public enterprise R&D employees and researchers over total business R&D employees and researchers; IRI's share of public enterprise R&D employees and researchers. Source: Author's elaboration on IRI Database.

IRI's national share of R&D employees was thus very significant, especially from the late-1970s, when it represented more than 10% of national R&D employees and more than 20% of national R&D employees in the enterprise sector, while it amounted to only 3% and 6.4% respectively in 1963. During the 1980s, the national shares of IRI's R&D employees declined, but rebounded above the 20% share of the enterprise sector in the early 1990s (Figure 6.25).

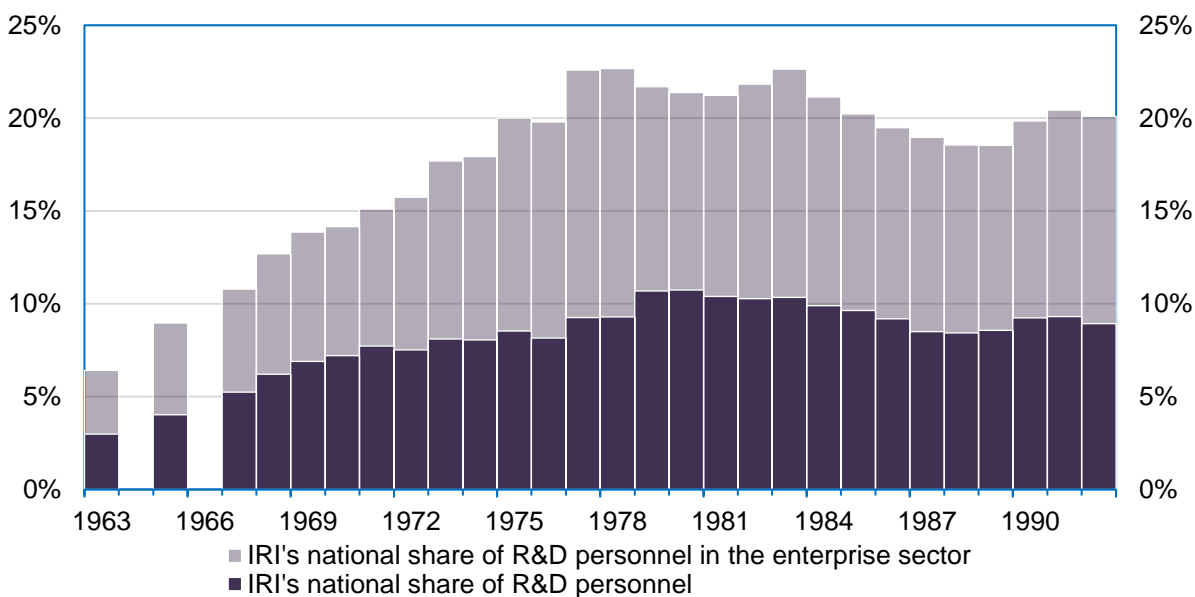


Figure 6.25: IRI's national shares of R&D employees. Source: Author's elaboration on IRI Database.

A similar pattern occurred with respect to IRI's share of national researchers (Figure 6.26). In 1963, IRI's researchers were only 2.1% of the national total and 5.6% relative to the enterprise sector. The national share of IRI's researchers increased constantly throughout the 1963-1992 period, but remained below the 10% value until 1991, due to the higher number of researchers in the public sector (i.e. universities and public research centres). Conversely, IRI's share of researchers with respect to the enterprise sector increased sharply in the first half of the 1970s, remaining above the 20% value ever since 1977 and peaking at 26.9% in 1992.

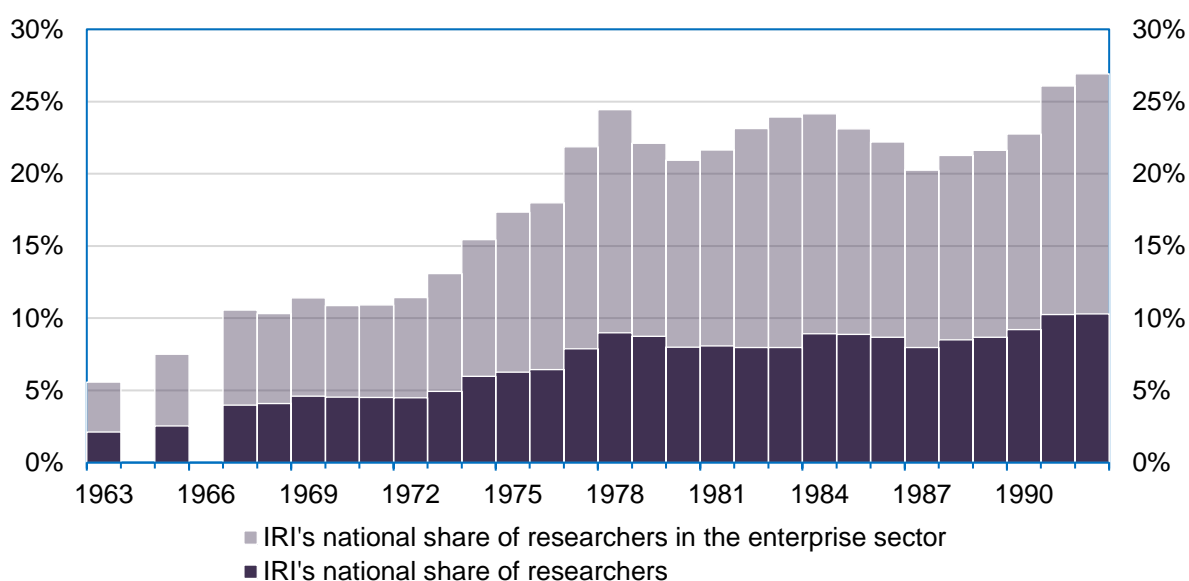


Figure 6.26: IRI's national share of researchers. Source: Author's elaboration on IRI Database.

From 1978, IRI's share of researchers in the enterprise sector surpassed IRI's share of R&D employees and since then the gap progressively widened, signalling a higher and increasing share of pure researchers over the total number of R&D personnel in the IRI Group, compared to the rest of the economy. This was the outcome of an internal shift in the composition of IRI's R&D employees throughout the decades (Figure 6.27). Whereas in 1972 IRI's researchers represented only 22.6% of IRI's R&D employees – 66% of them having various technical backgrounds – twenty years later they accounted for 64.1% of the total.

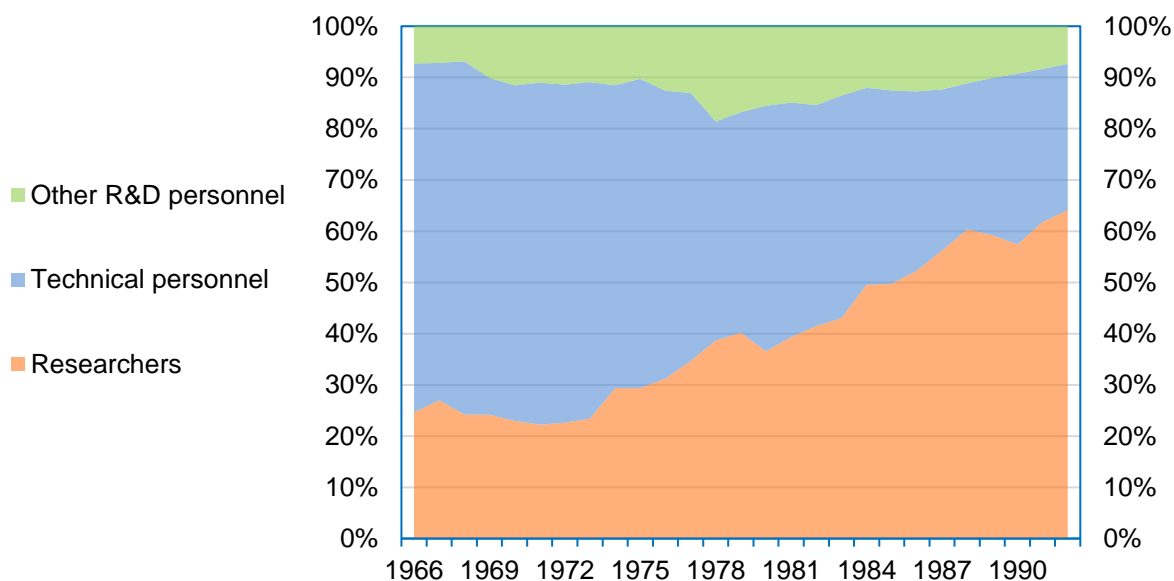


Figure 6.27: IRI's internal composition of R&D employees. Source: Author's elaboration on IRI Database.

Moreover, IRI's national share of R&D expenditure was higher than its national share of R&D employment, pointing to a higher R&D expenditure intensity per employee relative to the rest of the economy. At the end of 1991, the IRI Group disposed of the largest national 'army' of R&D employees: approximately 13,400 headcounts, of which 7,700 pure researchers.

4.2.3. IRI's patents

The reconstruction of IRI's patenting activities²⁶⁷ highlights some distinctive elements of its research mission. The total number of IRI's patents granted by the United States Patent and Trademark Office (USPTO) over the available period 1950-1987 is estimated to be 735²⁶⁸. IRI's USPTO patents increased throughout this period from below 10 each year in the period 1950-1965 to more than 25 annually from the early 1970s (Figure 6.28). IRI's patenting effort rose gradually until the mid-1960s, then accelerated due to the impulse of its telecommunications companies, while the previous period was dominated by steelmaking-related patents (Pastorelli, 2006). The

²⁶⁷ Most of the figures and information come from an internal document commissioned by IRI's Studies Division titled 'L'attività tecnologica del gruppo I.R.I. Un'analisi del portafoglio brevettuale' (Archibugi, 1990), kindly made available by the author.

²⁶⁸ This calculation excludes the semiconductor company SGS-ATES over the period 1971-1987, which was responsible for 56 USPTO patents between 1969 and 1984, of which 42 in the period 1977-1984. It accounted for 7.1% of Italy's USPTO patents in the technological group 'electric and electronic components' between 1969 and 1984 (12.4% over the period 1977-1984).

progressive intensification of IRI's patenting appeared also relative to its total revenues in real terms, moving from an average of 0.17 patents per billion euros²⁶⁹ during the period 1950-1965, to an average of 0.72 over the years 1971-1987.

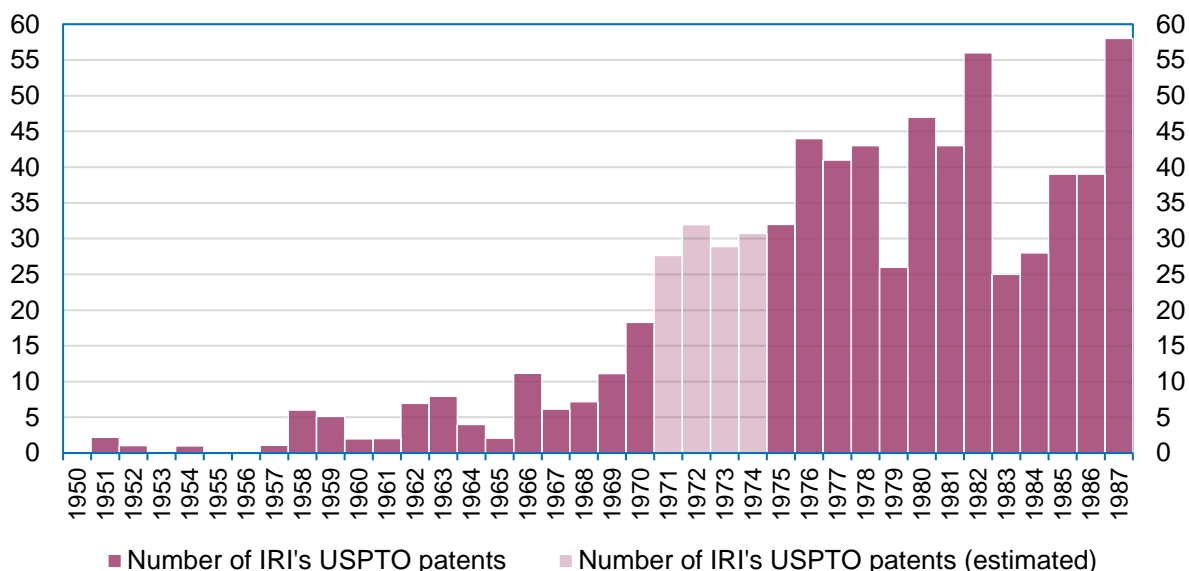


Figure 6.28: Number of IRI's USPTO patents. Source: Author's elaboration on IRI Database.

The national share of IRI's USPTO patent was nonetheless much lower than other national industrial groups. On average over the period 1969-1987, IRI's share of national patents amounted to 4.2% of the national total, a significantly lower value compared to the average share of IRI's R&D expenditure in Italy's enterprise sector over the same period (21.3%). Despite being Italy's largest R&D investor, IRI ranked fourth with respect to its patenting activities, after the chemical group Montedison (8.1%), the conglomerate FIAT²⁷⁰ (5.2%) and the state holding energy company ENI (4.9%). IRI's patenting efforts were lower in quantitative terms also with respect to similar industrial groups at the global level (Brasili et al., 1995).

IRI's apparent patenting underperformance is explained by three features. First, its absence from some patent-intensive technological activities, most notably those linked to the chemical-pharmaceutical sector²⁷¹, that together accounted for 37.1% of Italy's

²⁶⁹ In 2018 constant prices.

²⁷⁰ Patents granted to the car-making company Alfa Romeo were attributed to FIAT instead of IRI, because of its 1987 transfer.

²⁷¹ With the related groups: chemical and petrochemical; pharmaceutical, bio-engineering; plastic and rubber products; machinery for chemical productions.

USPTO patents between 1969 and 1984 (Archibugi, 1987). Second, IRI's manufacturing activities were largely focused on certain areas – such as steelmaking, cement production, shipbuilding, etc. – where process innovations (typically less patentable) prevail over product innovations. Third and crucially, the public nature of the IRI Group implied a lower propensity to patent – if not even the lack of a deliberate patenting strategy – to appropriate the economic returns of innovative activities by restricting access to knowledge and its diffusion.

Although low in comparative terms, IRI's patenting effort relative to the rest of the economy increased throughout the years (Figure 6.29). From 1970 to 1987, IRI's USPTO patents accounted for 4.7% of Italy's total on average, up from a value of 1.3% in the years 1950-1969. Due to Italy's share of non-US USPTO patents reaching a peak of 4.1% in 1963 but then gradually declining to an average of 3% during the 1980s (Antonelli and Barbiellini Amidei, 2007), IRI's share of all non-US USPTO patents increased from an average of 0.04% in the first two decades to 0.15% in the period 1970-1987.

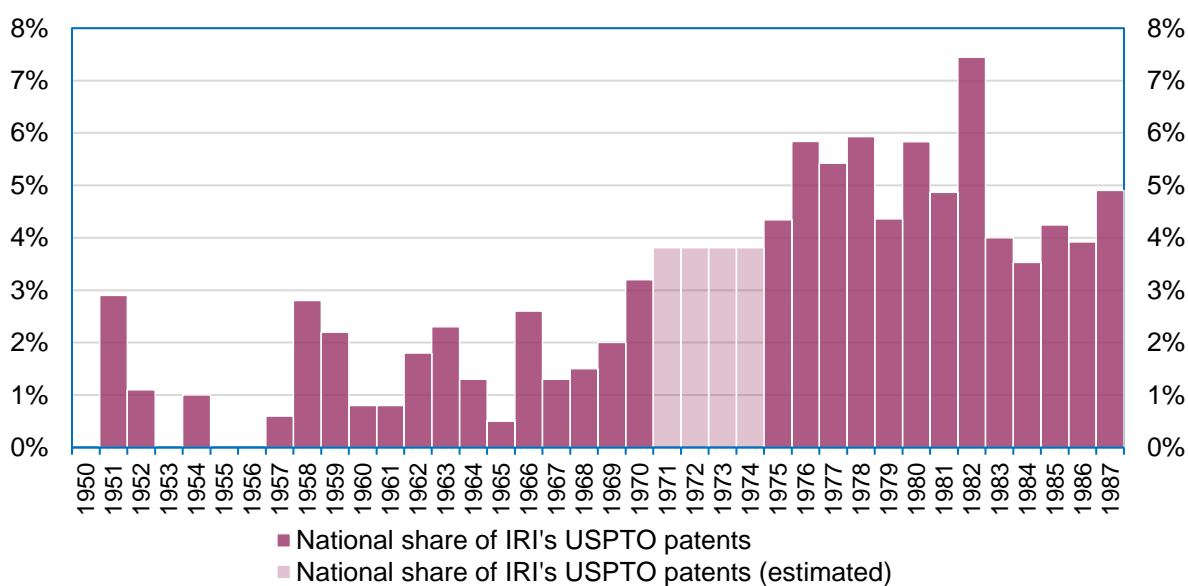


Figure 6.29: National share of IRI's USPTO patents. *Source:* Author's elaboration on IRI Database.

Further qualitative specifications on IRI's patenting activities could be drawn from an internal study on IRI's patent portfolio (Archibugi, 1990), focusing on the period 1975-1987. The impact of IRI's patents – measured in terms of most cited patents – appeared to have increased in the early 1980s. Moreover, the scientific intensity of

IRI's patents – calculated on the average number of references to the scientific literature cited in each patent – also increased in the 1980s to above the world's average level.

With reference to the internal specialisation of IRI's USPTO patents (from 1975), their product class distribution was quite broad – reflecting IRI's sectoral involvement – yet dominated by electronic components and telecommunications (42.8%), followed by professional and scientific instruments (9.6%), electrical equipment (8.6%), machines for metalmaking processes (5.6%), computers and office machines (4.8%), metal products (3.9%), general industrial machinery (3.4%) and other 25 product classes accounting for the remaining part (21.4%). The concentration of patenting activities by IRI's subsidiaries was even higher (Table A6.9): the first four companies – of which two specialised R&D centres (CSELT and CSM) – accounted for almost three-quarters of IRI's total patents over the period 1975-1987.

Finally, the number of auto-citations by IRI's companies was significantly low compared to other industrial groups with a similar amount of USPTO patents. At the same time, IRI's USPTO patents were predominantly cited by those of leading global companies (Table A6.10). This evidence confirms the high quality of IRI's patented research but also the lack of a cumulative patenting strategy aimed to appropriate the returns of its innovative activity.

In conclusion, the technological content of IRI's patents was elevated and reflected a broad range of product classes, with a specialisation on telecommunications and electronics. However, the low share of national patents and the low level of auto-citations implied the absence of any systemic approach to monetise the fruits of IRI's innovative activities.

This could be ultimately appraised by the ratio of IRI's patents over total R&D expenditures, which remained constant during the 1970s and even decreased during the 1980s (Figure 6.30), confirming IRI's publicly-oriented preference for the creation and diffusion of technological knowledge over its appropriation for internal economic returns.

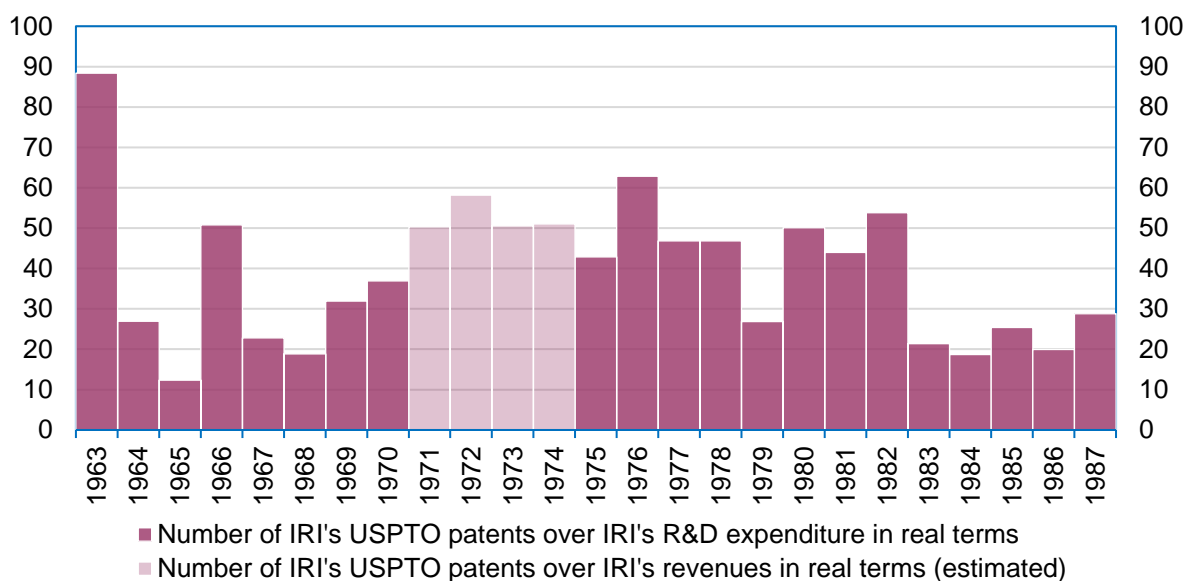


Figure 6.30: Ratio of IRI's USPTO patents over IRI's R&D expenditure in real terms. Source: Authors elaboration on IRI Database. Notes: R&D expenditure is measured in billions euros (constant 2018 prices).

4.2.4. IRI's receipts from R&D commissioned by third parties

Particularly elevated was the degree of IRI's R&D activities commissioned by third parties (Figure 6.31). R&D receipts amounted to a fluctuating share of 20% to 30% over IRI's R&D expenditure until the mid-1980s, when it drastically increased to over 40%, reaching the value of 48.8% in 1992 (and 1.7% of IRI's revenues). Higher receipts from R&D commissioned by third parties meant that IRI's companies performing R&D could increasingly self-finance their own internal R&D activities. More relevantly, such high value of externally commissioned R&D highlights the open nature of IRI's R&D infrastructure.

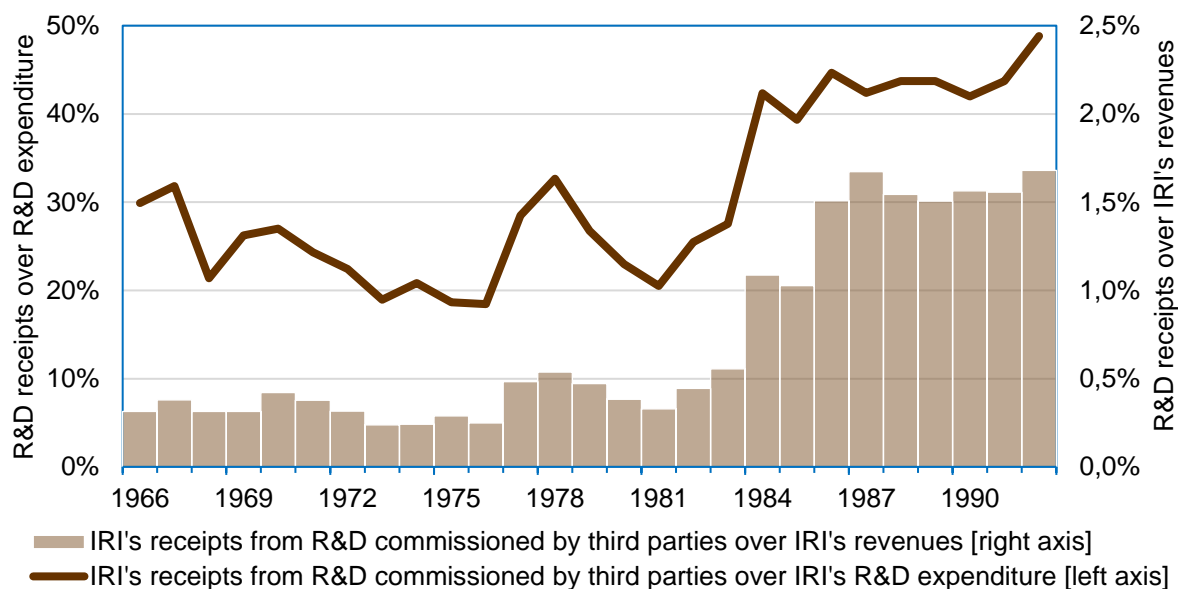


Figure 6.31: IRI's receipts from R&D commissioned by third parties. Source: Authors elaboration on IRI Database.

4.2.5. IRI's technology balance of payments

The pattern of IRI's technology balance of payments – especially on the expenditure side – reveals the progressive development of IRI's R&D effort from the mid-1960s. During the 1950s and until the end of the 1960s, IRI's technological progress was significantly dependent from abroad, with Finsider's foreign licences and technical assistance acquired by its steelmaking companies accounting for an average of more than half of IRI's total foreign technology expenditure²⁷². However, from the early 1970s onwards, IRI's technological dependence from abroad drastically diminished and the import of foreign technologies became dominated by STET and Finmeccanica's companies.

Whereas in 1963 the value of IRI's foreign technology expenditure over its total technology expenditure²⁷³ amounted to 42.1% – higher than Italy's corresponding figure (31.9%) – in 1970 it was already below 15% and gradually fell towards less than 5% by the mid-1980s. Meanwhile, Italy's ratio remained stable above 25% until 1985 and then only marginally decreased towards 20% (Figure 6.32).

²⁷² From a 1965 internal note 'La dipendenza tecnica del gruppo Iri dall'estero' (Archivio Storico IRI, Serie Nera, Busta AG/3247).

²⁷³ Total technology expenditure refers to the sum of IRI's R&D plus the foreign acquisition of technology in the form of licences and technical assistance.

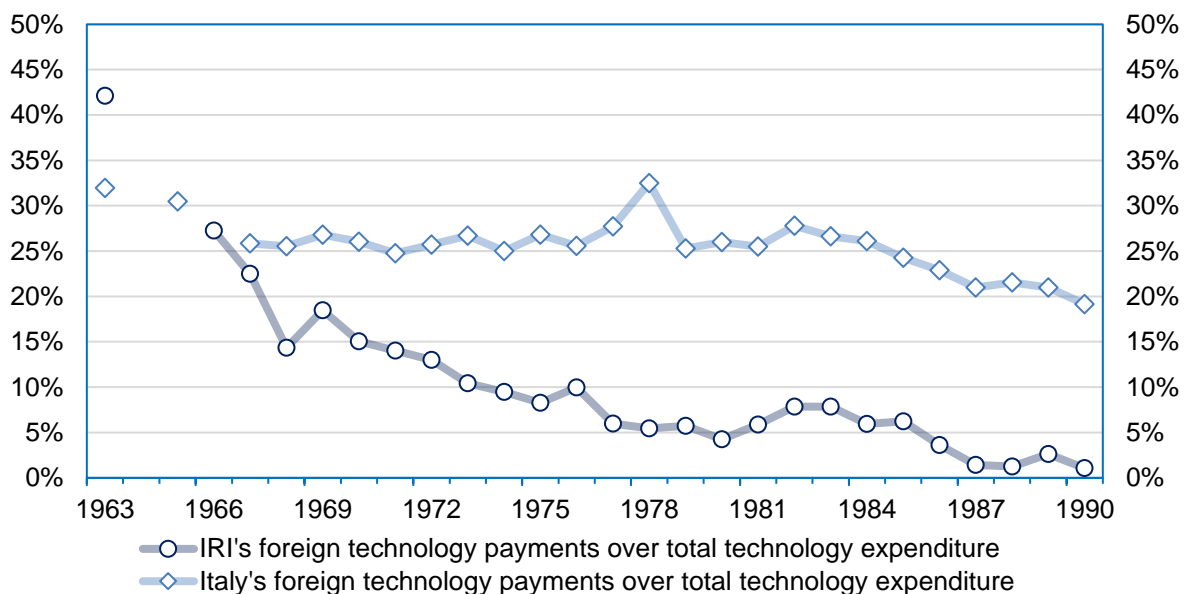


Figure 6.32: Comparison between IRI and Italy's foreign technology payments over total technology expenditure. Source: Author's elaboration on IRI Database. Notes: Total technology expenditure here refers to the sum of IRI's R&D plus the foreign acquisition of technology in the form of licences and technical assistance.

At the beginning of the period, IRI's acquisition of foreign technology amounted to a significant 7% of the national total, matching IRI's R&D national share in the business enterprise sector. At the same time, IRI's share of national foreign technology receipts was lower than 1%. The progressive narrowing of IRI's technology balance of payments gap and its eventual inversion at the end of the 1980s was due to the reduced weight of foreign technology payments (to below 1%), while the share of foreign technology receipts remained nearly constant through time (Figure 6.33).

IRI's overall deficit in the technology balance of payments was reduced to a slim value by the end of the 1970s and turned into a surplus at the end of the 1980s. Relative to total R&D expenditure, IRI's technology balance of payments deficit was on average 9 percentage points lower than Italy's corresponding ratio over the period 1967-1990, with the exception of the year 1967²⁷⁴ (Figure 6.34).

As noted by Antonelli et al. (2014), this points to a progressively lower foreign technology dependency of IRI relative to the rest of the economy, driven by a strategy of autonomous knowledge creation through internal R&D expenditure. At the same

²⁷⁴ Most likely, the same would be valid for the year 1966, for which R&D figures are unavailable at the national level.

time, the constant and low value of foreign technology receipts indicates a low effort in exporting proprietary technology to foreign competitors, confirming IRI's preference for an open and nationally-focused R&D strategy.

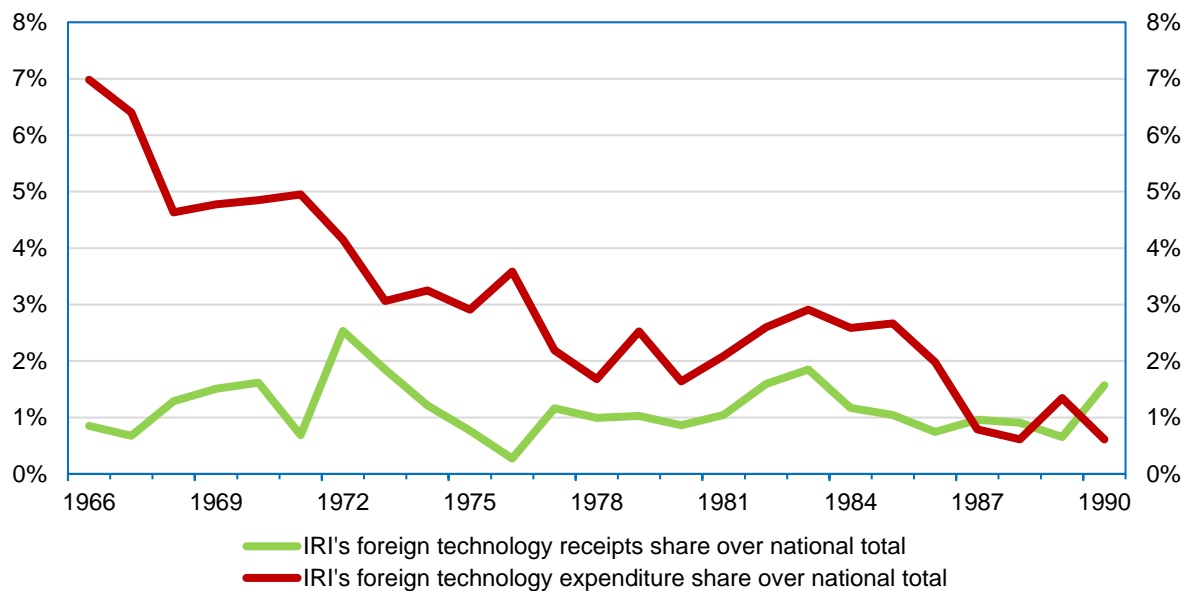


Figure 6.33: IRI's national share of foreign technology payments and receipts. Source: Author's elaboration on IRI Database.

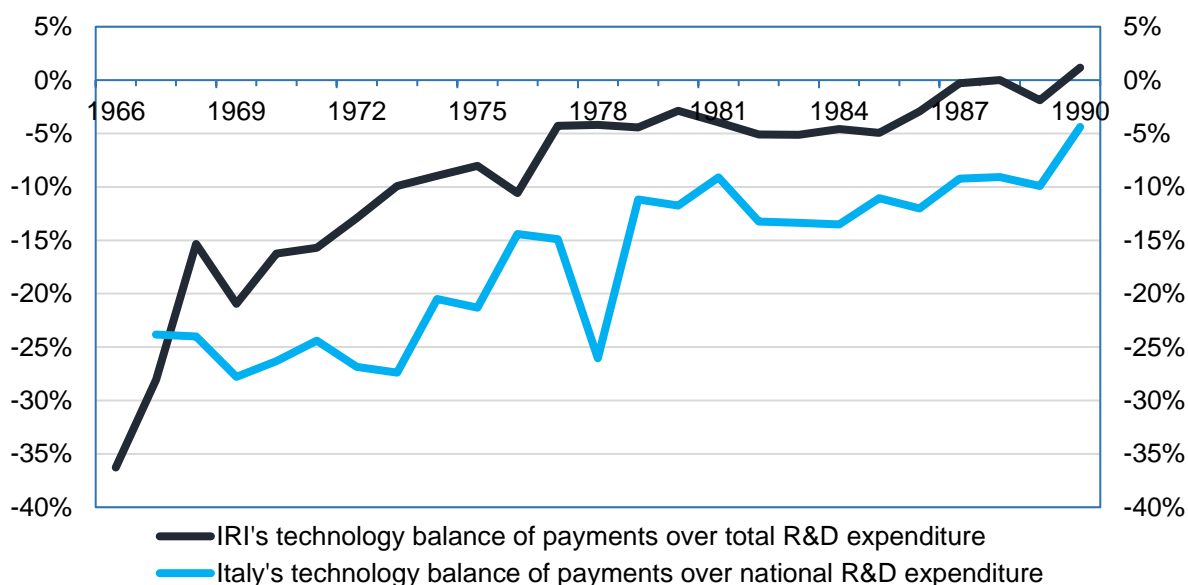


Figure 6.34: IRI and Italy's technology balances of payments over R&D expenditure. Source: Author's elaboration on IRI Database.

4.3. IRI's national research infrastructure

In less than three decades, IRI developed a national infrastructure of territorially distributed research centres (Figure 6.35). By 1991, they operated in 16 out of 21

administrative regions, comprising 7 specialised inter-companies R&D centres with 9 associated local branches, 114 corporate labs and 9 city-based research consortia.



Figure 6.35: IRI's R&D activities over the national territory by region (year 1991). Source: Author's elaboration on 'La ricerca scientifica nelle regioni italiane 1991', internal document from the Studies Service (Archivio Storico IRI, Serie Nera, Busta STU/307).

4.3.1. Specialised inter-companies R&D centres

From the early 1960s, IRI and its main sectoral subsidiaries established a series of specialised inter-companies R&D centres with the purpose of working on research projects to be performed autonomously or upon commissioning. Typically founded as joint-stock companies with the participation of several contributing shareholders (Table 6.12), IRI's R&D inter-companies centres represented open research infrastructures of the national system of innovation. Some of them had non-IRI shareholders, while in other cases specific research projects could be commissioned by third parties. They were broadly distributed over the national territory, with their main research facilities located in Trieste, Turin, Ivrea, Genoa, Rome, Naples, Caserta plus local branches settled in other regions. With few notable exceptions, all of these R&D centres have been either substantially downsized or entirely closed following IRI's privatisation.

CSELT (*Centro Studi E Laboratori Telecomunicazioni*²⁷⁵) was the leading national research centre for telecommunications and electronics technologies. Founded as the study division of the telephone concessionaire Stipel in 1961, from 1964 it became STET's R&D company for telecommunications researches with a dedicated laboratory in Turin (built in 1967). CSELT's model was based on the US Bell Labs, it performed basic and applied R&D of its own and through external commissions, covering research areas such as numerical switching, optical fibres, voice recognition technologies, international standardisation of protocols and others. CSELT obtained prestigious technological results at the international level (CSELT, 1994). In 1977, it overcame the US and Japanese leadership²⁷⁶ by implementing the world's first installation of an operational four-kilometre optical fibre cable (named COS2) in an urban settlement (Buzzelli et al., 1980). In the late 1980s, CSELT was the founding organisation behind the Moving Picture Experts Group (MPEG), a working group of ISO/IEC in charge of developing international standards for the compression, decompression, processing, and coded representation of moving pictures, audio and their combination – which developed the MP3 audio standard. Before STET's

²⁷⁵ 'Telecommunications Studies Centre and Laboratories'.

²⁷⁶ As proudly boasted by CSELT's Director Basilio Catania in a hearing to the Italian Senate (Senato della Repubblica, 1988).

privatisation in 1997, CSELT had 1,218 R&D employees, of which 89% researchers²⁷⁷. In 2001, CSELT changed its name into TI-Lab, but in the past two decades its innovative effort has been significantly curtailed by progressive reductions in personnel and funding.

CETENA (*Centro per gli Studi di Tecnica Navale*²⁷⁸) was founded in 1962 as Fincantieri's research association for naval engineering technologies from a consortium of different IRI companies. Fincantieri has preserved CETENA's existence to this day, expanding its activities to consultancy, test, simulation, training and research²⁷⁹. In 1986, accompanying its diversification into the field, Fincantieri inaugurated an R&D centre for applied research on diesel engines named Diesel Ricerche.

CSM (*Centro Sperimentale Metallurgico*²⁸⁰), a joint-stock research company founded in 1963 by Finsider in cooperation with other IRI's subsidiaries and non-IRI private steel producers. Despite its initial dependency on the technical assistance of US Steel and Yawato, it soon developed its own scientific competences, becoming a leading European centre for research and innovation in metallurgy. In 1987, CSM changed its name into *Centro Sviluppo Materiali*²⁸¹, as its fields were stretching beyond research on traditional steel products, focusing on other areas such as special steels, new materials, alloys and composites. CSM's activities ranged from research on chemical, physical and mechanical properties to the engineering and processing of its innovations. CSM was able to develop an autonomous technological know-how and sometimes a global leadership in certain applications such as with the 'Antares joint' for special tubes deployed in oil fields²⁸². When IRI's steelmaking companies were privatised during the years 1994-1996, CSM was spun off from Ilva and privatised separately. Deprived of its privileged relations with the parent company, over the last

²⁷⁷ From STET's 1996 annual report.

²⁷⁸ 'Centre for Naval Engineering Studies'.

²⁷⁹ From CETENA's website.

²⁸⁰ 'Metallurgical Experimental Centre'.

²⁸¹ 'Materials Development Centre'.

²⁸² This technology is described as a case study in the 1992 report 'Ricerca, sviluppo e innovazione nel Gruppo IRI', focusing on R&D and innovation in the IRI Group (Archivio Storico IRI, Serie Nera, STU/307).

25 years CSM's pure research activities were progressively downsized and the centre was transformed into a consulting company.

RTM (*Istituto per le Ricerche di Tecnologia Meccanica*²⁸³) was established jointly by Finmeccanica, FIAT and Olivetti in 1965 to become the national leading centre for scientific research on mechanical machine tools technologies. In 1988, it was transformed into a joint-stock company owned equally by Finmeccanica and Olivetti, with a renewed focus on mechanical automation. In 2007, Finmeccanica sold its remaining stake in RTM, which was eventually liquidated in 2014.

Name	Year	Location	Sectors	Shareholders at their foundation	Employees in 1991
CSELT	1961; 1964	Turin	Telecommunications and electronics	Stipel's study division From 1964: STET (100%)	842
CETENA	1962	Genoa	Shipbuilding	Association with founding members: IRI; Fincantieri; Finmare; CRDA; Ansaldo; Navalmeccanica From 1976, joint-stock company: Fincantieri (60%); SEAF (60%); Mecfin (10%); Finmare (10%)	90
CSM	1963	South of Rome	Metallurgy	Finsider (55%); IRI (10%); Finmeccanica (10%); Fincantieri (5%); FIAT (10%); Falck (5%); Cogne (2.5%); Redaelli (2.5%)	556
RTM	1965	Ivrea	Mechanical and industrial automation	Association with founding members: Finmeccanica; FIAT; Olivetti From 1988, joint-stock company: Finmeccanica (50%), Olivetti (50%)	49
SME Ricerche	1978	Caserta	Food technologies	SME (50%); SEBI (50%)	70
Tecsiel	1983	Naples-Rome	Informatics	Finsiel (40%); Sogei (30%); Italsiel (30%)	250
Diesel Ricerche	1986	Trieste	Diesel engines	Fincantieri (51%); Seiaf (49%)	295
Ansaldo Ricerche	1991	Genoa	Energy, transport and plant engineering	Ansaldo (100%)	170

Table 6.12: IRI's inter-companies R&D centres. Source: Author's elaboration.

²⁸³ 'Institute for Researches on Mechanical Technology'.

SME Ricerche, established as CRAI (*Centro di Ricerca Agro Industriale*²⁸⁴) in 1978, was specialised in food technologies, studying chemical and physical properties of products and their packaging, aiming at a perfecting food preservation. SME Ricerche focused also on process innovation for control and testing processes. It was privatised together with the company Cirio in 1993 and its research facilities were eventually closed in 2013.

Tecsiel, established by Finsiel and its main companies in 1983, was the national leading R&D centre for designing, operating and managing advanced information systems for data management, industrial automation, computerised graphics, and others. In 1994, Tecsiel was incorporated in Finsiel, which in turn had been incorporated in STET in 1992. When Finsiel was sold by Telecom Italia in 2007, Tecsiel's original research activities had long been discontinued.

Ansaldo Ricerche was the last inter-companies R&D centre to be established (in 1991), from a previous division of Ansaldo – a Finmeccanica company. It operated research activities in the three main technological areas of Ansaldo's subsidiaries – energy, transport and plant engineering. Towards the end of the 1990s, the R&D focus of Ansaldo Ricerche was restricted to renewable technologies and energy efficiency. In 2006, it was incorporated in Ansaldo Energia as a small R&D division.

4.3.2. Corporate R&D labs of IRI's companies

The dense network of IRI's corporate R&D labs reflected the localisation of its major production units. In 1991, they were mostly concentrated in the regions Lazio, Lombardy, Campania and Liguria (Table 6.13).

The largest corporate R&D lab – Italtel Sit in Lombardy – had 1,573 R&D employees, followed by the two Alenia labs in Rome (872 R&D employees) and Turin (849 R&D employees). 12 other R&D units had between 251 and 500 employees, another 9 facilities between 101 and 250 R&D employees. Corporate labs with more than 100 employees accounted for 79.2% of total employees in R&D corporate labs (excluding the specialised inter-companies R&D centres).

²⁸⁴ 'Centre for Agro-Industrial Research'.

IRI's companies more involved in R&D belonged to the Alenia Group²⁸⁵, to the Italtel Group and to the semiconductor company SGS-Thomson. They also devoted a significant amount of R&D resources relative to their revenues – between 14.1% and 24.6%. The diversification of R&D activities across sectors appeared also at the company level, despite huge differences in terms of their relative R&D intensity (Table A6.11 lists IRI's largest companies by R&D expenditure, including the specialised inter-companies R&D centres).

Region	Corporate labs	R&D expenditure share	R&D expenditure per inhabitant (Current lire)	R&D employees
Piedmont	7	26.4%	112,148	1,761
Lazio	23	26.0%	92,278	2,399
Lombardy	23	19.8%	40,752	2,452
Campania	15	10.4%	33,699	1,239
Liguria	13	7.6%	82,304	1,020
Friuli	5	2.2%	33,326	401
Sicily	4	1.9%	7,110	377
Abruzzo	2	1.9%	27,475	374
Tuscany	7	1.6%	8,136	192
Veneto	4	1.2%	5,171	193
Puglia	4	0.5%	2,331	75
Emilia Romagna	2	0.3%	1,611	32
Umbria	1	0.0%	579	7
Val D'Aosta	1	0.1%	9,841	4
Trentino	1	0.0%	1,412	4
Calabria	1	0.0%	318	8
Total	113	100%		10,538
Average			28,656	

Table 6.13: IRI's R&D corporate labs by region. Source: Author's elaboration on 'La ricerca scientifica nelle regioni italiane 1991', internal document from the Studies Unit (Archivio Storico IRI, Serie Nera, Busta STU/307).

²⁸⁵ Alenia was established from the 1990 merger between the aircraft manufacturer Aeritalia and the electronics company Selenia.

4.3.3. IRI's research consortia for knowledge transfer

In 1985, jointly with the National Research Council (CNR) and with the Union of the Chambers of Commerce (Unioncamere), IRI promoted the creation of a series of research consortia called '*Città Ricerche*' (Cities Researches). Between 1987 and 1989, nine different consortia were established in cities where local IRI companies, CNR and Unioncamere partnered with local universities, other national research institutes, local private and public enterprises (Figure 6.35).

Conceived as an open research network, *Città Ricerche* aimed at training researchers, developing research initiatives and facilitating technological diffusion between universities and the business sector, especially towards small and medium enterprises. The consortia were financed by associates, but also through research projects commissioned by associates and third parties. Their activities grew progressively each year until 1993, when IRI started to recede, due to its mutated institutional nature²⁸⁶. With the retreat of its main founding member, the consortia were eventually liquidated by the end of the 1990s.

4.4. IRI's research characteristics

This section reports the main results of a seminal 1991 study²⁸⁷ commissioned to Professor Giovanni Dosi on IRI's R&D characteristics at the end of the 1980s. Based on a series of questionnaires submitted to IRI's companies that operated R&D activities, the investigation covered 124 research units of 37 different companies, accounting for over 90% of IRI's workforce. The study represented the most complete overview of IRI's research system at the peak of its development, with a series of important elements that deserve to be highlighted.

First, the relative higher emphasis on basic research compared to the overall enterprise sector. Basic research was among the objectives of 33 R&D units, of which 6 dedicated more than 25% of their total resources to that purpose. As reported in Table 6.14, in 1989 nearly all of the sampled subsidiaries dedicated to basic research

²⁸⁶ As reported in 'Consorti Varie' (Archivio Storico IRI, Serie Nera, Busta DG/842).

²⁸⁷ 'Le unità di ricerca del gruppo Iri' (Archivio Storico IRI, Serie Nera, Busta STU/601), whose results appeared in a reduced but updated version in 'Ricerca, sviluppo e innovazione nel Gruppo IRI' (Archivio Storico IRI, Serie Nera, STU/307).

a higher share compared to the 1.3% national average for the enterprise sector over the same year (Istat, 1992). In fact, the share of total basic research of Italian public enterprises (of which IRI accounted for almost its entirety) had increased from less than 10% in the years before 1985 – being null before 1979 – to an average of 33.9% over the period 1985-1992.

	Basic research	Applied research	Development	Other ¹
Alenia	2.9%	42.8%	54.3%	0%
Ansaldo	0.9%	35.3%	41.1%	22.7%
Other Finmeccanica	1.8%	60.6%	37.7%	0%
CSELT	4.6%	74.4%	21%	0%
Other STET	2.1%	44.2%	46.9%	6.8%
SME	7.4%	11.1%	81.5%	0%
Finsiel	8.7%	66.2%	25.1%	0%
Fincantieri	14.9%	46.1%	25.2%	13.8%

Table 6.14: R&D expenditure by IRI's subsidiaries divided by type of research (year 1989). Source: 'Le unità di ricerca del gruppo Iri' (Archivio Storico IRI, Serie Nera, Busta STU/601). Note: ¹Activities of design, planning, calculation.

Second, IRI's range of research activities was spread across 77 areas, reflecting the multi-sectoral configuration of the group. Table 6.15 reports the list of research areas which were cited by at least two R&D units. The technological core of IRI's R&D research area was: electronics and electric engineering (Alenia, STET, other Finmeccanica); software (Finsiel); mechanical and energy engineering (Ansaldo); mechanical engineering (Fincantieri); materials science (Ilva); food sciences (SME). Each major subsidiary covered a significant number of research areas, displaying a high level of differentiation over total citations.

Area	Alenia	Ansaldo	Other Finmeccanica	STET	SME	Finsiel	Fincantieri	Ilva	Total
Electric engineering	10	2	8	13			1		34
Electronic engineering	6	2	13	13		1			34
Software	3	2	9	5		13	1		33
Mechanical engineering	4	9	4	2		6	1		26
Industrial engineering	3	3	7	5		2	3	1	24
Materials science	3	2	3				3	6	17
Data elaboration			7	2		4			13
Data analysis			5	2		2			9
Real time	1		5	2		1			9
Energy		5	1				2		8
Data transmission			1	4		2			7
Satellites	4		2	1					7
Engineering	1	3					2		6
Metallurgy		1					1	4	6
Informatics			3			2			5
Specification			1			4			5
Hardware			2			2			4
Multiprocessing	1		2			1			4
Office automation						4			4
Programming			3			1			4
Systems analysis			1	1		2			4
Teleinformatics				1		3			4
Matemathics	4								4
Physics	4								4
Aerospace engineering	3							1	4
Food science					3				3
Psychopedagogy						3			3
Storage & Retrieval			2			1			3
Biomedical engineering			3						3
Food					2				2
Chemical engineering		1			1				2
Cryptography			1	1					2
Encoding			1	1					2
Information theory				2					2
Pattern recognition			2						2
Acustics	1		1						2
Environmental protection	1		1						2
Total general citations	50	29	98	55	17	59	25	14	347
Number of areas quoted	16	10	35	15	14	28	14	6	77
Areas over total citations	32%	34%	36%	27%	82%	47%	56%	42%	

Table 6.15: IRI's R&D areas (year 1989). Source: 'Le unità di ricerca del gruppo Iri' (Archivio Storico IRI, Serie Nera, Busta STU/601).

Third, significantly elevated was also the degree of external cooperation between IRI's R&D units and external partners in the context of national, EEC or other international research programmes (Table 6.16). 746 cases were recorded in the period 1988-1990,

of which only 151 (20.2%) among other IRI companies. The largest number of external collaborations were established with foreign companies (especially under international programmes), followed by those with other Italian companies. Far from marginal was also the degree of interaction with universities and with the National Council of Researches.

Entities	Context						Total	Share
		National	EEC programmes	Eureka	Other international	Other		
National Council of Researches (CNR)		66	2	2	3	0	73	9.8%
Atomic and Alternative Energy (ENEA)		16	1	3	10	0	21	2.8%
Industry Experimental Station		1	0	0	1	0	2	0.3%
Universities		77	19	1	10	1	108	14.5%
Other IRI companies		121	22	2	6	0	151	20.2%
Other Italian companies		72	23	5	19	0	119	16.0%
Foreign companies		10	70	20	87	5	192	25.7%
Research consortia		26	6	3	1	0	36	4.8%
Other		21	7	0	12	4	44	5.9%
Total		410	150	36	140	10	746	
Share		55.0%	20.1%	4.8%	18.8%	1.3%		

Table 6.16: IRI's R&D collaborations with external entities (number of projects in the years 1988-1990). Source: 'Le unità di ricerca del gruppo Iri' (Archivio Storico IRI, Serie Nera, Busta STU/601). Note: The table does not take into account intra-companies collaboration among different R&D units.

Furthermore, 43.7% of IRI's external R&D collaborations were activated within the context of international programmes. In particular, other than being an active participant in the Eureka research initiative, IRI was involved in the main EEC research programmes such as:

- RACE, in telecommunications (STET's companies);
- ESPRIT and JESSI in the microelectronic and informatics fields (SGS-Thomson, STET and Finmeccanica's companies)
- BRITE and EURAM in industrial technologies and advanced materials (Ilva, Fincantieri and Finmeccanica's companies);
- ENS, with the aim to establish a European electronic network among the public administrations of the ECC's member states (Finsiel and STET, bringing IRI as the European leader of the project);
- JET, for magnetic confinement fusion (Ansaldo).

Fourth, IRI's R&D units were active in funding perspective graduates from scientific universities. In the 1988-1990 period, 66 R&D units provided scholarships and prizes to master's students, and 46 of them did the same with PhD candidates. 77 R&D units provided scientific assistance for their theses. Ilva, Alenia, STET, SME and Finsiel were particularly keen on maintaining working relationships with their funding recipients.

Finally, out of the 350 main research facilities of IRI – of which only 240 provided an answer to the question – 43 of them were made available to third-party entities. In particular, CSELT, Ansaldo and Fincantieri had a deliberate policy of openness to external laboratories or companies. Over the 37 sampled companies, 18 out of them allowed third-party entities to make use of their research equipment for a share of machine time between 11% and 50% of the total.

4.6. Concluding remarks on IRI's research mission

From the late 1960s until 1992, IRI represented the largest R&D centre in the Italian system of innovation. This followed a deliberate decision to address Italy's chronic weakness in some technologically-advanced sectors, by pursuing a public mission aimed at creating and diffusing knowledge externalities through an open network of territorially distributed research infrastructures.

IRI reorganised and pushed its R&D effort in the late 1960 and early 1970s, while further increasing its investments during the 1980s, without crowding out private R&D expenditure. On the contrary, IRI's R&D activities functioned as a catalyser for technological interactions.

The IRI system of research embraced a public vision of knowledge creation and diffusion, putting more emphasis on R&D expenditure (particularly on basic research from the 1980s) than on the monetary appropriation of its returns via patents. It was open because third-parties could join the system and engage with IRI's R&D units through commissioned research projects, access to IRI's research equipment, partnerships in joint-research centres, participation to research consortia and to research programmes – national and international.

All this was the result of an outward-looking R&D policy adopted during the 1960s, that constituted a defining feature of the Institute in the following decades – for instance, from 1984, figures on R&D expenditure and employees appeared as the first item in IRI's annual reports until 1992.

Until this period, the policy projection of IRI's R&D towards the national innovation system remained a key element of IRI's strategic planning. As stated in the 1988-1991 four-year plan²⁸⁸, IRI's innovation and research programmes were aimed to (p. 149):

Favour the growth and affirmation, in the Country, of an innovation culture, knowing that the contribution to the diffusion of research values is the specific duty of a large industrial Group. To this respect, it has to be underlined that the elevated levels of innovation in sectors where the Group is operating are particularly necessary for the Italian context, where the orienting role offered by large enterprises is a necessary condition for the success of the Country as a whole.

Until the beginning of its privatisation process in 1992, IRI's programmes on R&D were thus conceived as a hinge between the technological competitiveness of its companies and Italy's national capabilities. After that moment, the pursuing of a deliberate R&D policy was abandoned.

5. Concluding remarks on IRI's public missions

This chapter has sought to assess the long-lasting impact of IRI's mission-oriented approach (Mazzucato, 2018; Mazzucato & Dibb, 2019). The three public missions embraced by IRI – training, industrialisation and modernisation of the South, research aimed at knowledge creation and diffusion – constitute a clear example of how a SOSOE can coherently pursue internal strategic objectives with an external policy impact.

IRI's mission-orientation was facilitated by its sheer dimensions and by the sectoral diversification of its activities, allowing the disposal of adequate financial resources and the exploitation of a various range of complementary technical capabilities.

The three IRI missions shared some critical common features. First, they were conceived and centralised by the Institute, which planned and coordinated their effective implementation through its operating subsidiaries. Second, they spanned

²⁸⁸ 'Programma del gruppo 1988/1991' (Archivio storico IRI, Bilanci, Programmi quadriennali del Gruppo Iri). Author's translation from Italian.

across different sectoral activities, creating a diffused sensibility for training, regional development and research objectives in all of IRI's subsidiaries. Third, they were interconnected missions: training was particularly focused on the South and progressively more and more on R&D personnel, while Southern investments in the 1980s were particularly oriented to R&D-intensive activities.

IRI's missions were fundamentally conceived to create long-term positive externalities for Italy's overall economic competitiveness. However, with the privatisation of IRI from 1992, the attempt to further modernise the Southern economy was suddenly abandoned, while IRI's open networks of training and research centres were gradually dismantled. With the end of IRI's propulsive function in those areas, the South started to diverge from the rest of the economy, whereas Italy's training and research capabilities relative to other comparable nations began to recede.

Finally, IRI's missions have to be considered in the context of Italy's political economy in the post-war period. The senior management of IRI and the Christian Democratic ruling class²⁸⁹ shared similar visions of the economy and society, which were forged during the war period while participating to the anti-fascist 'Resistance' movement (1943-1945). The 'Camaldoli Code', a political document drafted in 1943 by catholic intellectuals (among which IRI's senior officials such as Pasquale Saraceno and Sergio Paronetto) and by Christian Democrat political leaders (Ezio Vanoni, future Finance Minister), translated key principles of the 'Social Doctrine of The Church' into practical visions of society and the economy. Among other statements, the Camaldoli Code envisaged "social justice as the directive principle of economic life" and the co-existence of private and public ownership, with the latter having to incorporate public policy functions.

These principles found political convergence with left-wing parties during the drafting of the new republican Constitution between 1946 and 1948, to which all the anti-fascist parties contributed, including the Italian Communist Party and the Italian Socialist

²⁸⁹ The Christian Democracy party (*Democrazia Cristiana*) was the dominant party of government in post-war Italian politics. It governed in coalition with other junior parties (Italian Republican Party, Italian Liberal Party, Italian Social-Democratic Party) and in some periods even with the left-wing Italian Socialist Party, but represented always the largest political force in Italy's Parliament. From 1946 until 1981 and from 1987 until 1992, Italy's governments were led by a Prime Minister from the Christian Democracy party.

Party²⁹⁰. The Italian Constitution of 1948 thus incorporates the recognition of private property, but also of “its limitations so as to ensure its social function” (Article 42). Article 41 explicitly states that “public and private-sector economic activity may be oriented and co-ordinated for social purposes”.

This points to a post-war consensus in the ruling class of Italy and its affiliates or appointees in public technostuctures around a public policy-oriented management of economic institutions. IRI, as the largest of them and most directly involved into the industrial life of the Country, became one of the main loci where this political consensus materialised. IRI’s public policy missions – in particular the Southern development – were concrete manifestations of this phenomenon . This became even clearer as the end of IRI’s public nature and orientation in 1992 coincided with the collapse of the so-called ‘First Republic’ and the demise of its main political parties, the Christian Democracy above all.

²⁹⁰ In the 1946 elections for the Constitutional Assembly, the Christian Democracy obtained the largest share of votes (35.2%), yet lower than the sum of the Sociality Party of Proletarian Unit (20.7%) and the Italian Communist Party (18.9%).

Part II

Chapter 7

The industrial entrepreneurship of IRI

1. The meaning and significance of IRI's industrial entrepreneurship

This chapter suggests an interpretation of IRI's operations, adapting the Schumpeterian understanding of the 'entrepreneurial function' as a fundamental driver of economic change (Chapter 2) to the analysis of IRI's industrial entrepreneurship.

IRI's industrial entrepreneurship is thus qualified along four different dimensions: diversification into new activities; restructuring and development of existing activities; industrial and technological innovation; establishment of international competitive positions. The chapter is divided into four sections (2 to 5), each illustrating these four entrepreneurial characteristics²⁹¹. Far from providing a detailed examination of each relevant case (summarised in Tables 7.1, 7.2, 7.3 and 7.5), this chapter outlines a comprehensive analytical interpretation of IRI's entrepreneurship from a SOSOEs perspective.

2. Diversification into new activities

A first entrepreneurial function concerned IRI's capacity to evolve its holding structure by diversifying into new economic activities. On several occasions, IRI's diversification process was carried out in collaboration with non-IRI entities, either through the acquisition of licences (mostly with foreign companies) or by promoting shareholding partnerships with private domestic companies. Table 7.1 examines the most relevant cases, highlighting the lasting positive legacy of IRI's initiatives for the national economy.

For instance, IRI's 1950s investments in aerospace, electronics, telecommunications and nuclear power laid the foundations for the subsequent competitive success of Aeritalia (currently Leonardo, 5.DI), Selenia (currently Leonardo, 4.DI), SGS-ATES

²⁹¹ For an analytical account of IRI's entrepreneurial initiatives during the 1930s see Gasperin (2022).

(currently STMicroelectronics, 1.DI), Italtel (2.DI), Ansaldo (12.DI). The same happened with IRI's diversification in informatics in 1969, culminating in Finsiel, a global leader in software design by the early 1990s (16.DI).

In other cases, IRI's diversification was the result of vertical integration strategies within the sectoral subsidiaries (see Chapter 4) which later developed autonomously: Cementir (7.DI) and Italmobiliare (11.DI) were created as auxiliary productions of the Finsider group and became leading national players in the cement and plant making sectors; Grandi Motori Trieste (15.DI) was established to reorganise Italy's production of naval engines for Fincantieri's ships and ended up being the building core of Wartsila, the world's second largest producer; FOS (18.DI) started almost as a pilot project, yet by the early 2000s its production site accounted for around 10% of all optical fibre cables manufactured in the world annually.

IRI's specialisation in new fields was also inspired by the opportunity for horizontal diversification (see Chapter 4) – such as in special steels with Terni (8.DI), in mass-produced car vehicles with Alfa Romeo (9.DI), in satellite telecommunications with Telespazio (13.DI), industrial automation with Elsag (17.DI), retail distribution with GS (14.DI) and space exploration with Selenia Spazio (19.DI).

Finally, IRI established new entrepreneurial initiatives in the fields of motorways construction and management with Autostrade (3.DI), in Radio and TV broadcasting with Rai (6.DI) and in air transport with Alitalia (10.DI). In all these cases, IRI was able to deploy financial resources and the available technical expertise to build European-scale national companies.

In all these initiatives, IRI played a 'demiurgic' role, creating and giving shape to new economic activities that otherwise would not have been pursued by private players. The accumulation of technical capabilities in key sectors promoted by IRI's diversification initiatives reached a visible impact by the early 1990s, in some cases constituting a positive legacy to this day, as in the cases of aerospace (Leonardo) and semiconductors (STMicroelectronics).

N.	Name (Years)	Sector [Case]	Description	Impact
1.DI	Marconi Italiana ↓ ATES (1948)	Microelectronics [Early-stage investment]	Founded as a joint venture between IRI's San Giorgio (48%) and Marconi's Wireless Telegraph and Co. (52%), Marconi Italiana established a production plant at L'Aquila specialising in transmitting tubes, which was incorporated by Finmeccanica in 1959.	Marconi Italia's plant at L'Aquila constituted the building block for the electronics company ATES (founded in 1959), which in turn merged with SGS in 1971 to create Italy's leading semiconductor company (today known as STMicroelectronics).
2.DI	Siemens SpA ↓ SIT-Siemens (1950)	Telecommunications engineering [National strategic company]	Because of war requisitions, STET acquired the Italian subsidiary of the German Siemens AG, a leading national supplier of telecommunications equipment for its three telephone concessionaires. STET's acquisition was motivated to avoid national foreign dependence and to develop autonomous technological capabilities in the crucial telecommunications sector. In 1960, the newly denominated 'Società Italiana Telecomunicazioni Siemens' (SIT-Siemens), focused its specialisation on the production of telecommunication equipment under Siemens AG's license.	Over the 1970s, SIT-Siemens established itself as a national champion with autonomous technological capabilities in the production of telecommunications equipment, specialising in electronic public switching systems. Renamed as 'Italtel' in 1980, by the early 1990s it managed to join the restricted club of oligopolistic producers of electronic telecommunications equipment at the global level (10 th position, with a 3% global market share). In 1992, Italtel's domestic market share reached 49% in public switching systems and 38% in transmission systems.
3.DI	Autostrade (1950)	Motorways [National strategic company]	Through the newly established Autostrade company, IRI assumed the responsibility for building and operating the main segments of Italy's motorways network, particularly those connecting the North with the South: ' <i>Autostrada del Sole</i> ' from Milan to Naples (1956-1964) and ' <i>Autostrada Adriatica</i> ' from Bologna to Bari (1963-1973).	In 1991, around half of Italy's 5,300 km motorways network had been built and was operated by Autostrade. During the 1950s and 1960s, the development of a pervasive network of motorways favoured national economic unification and further promoted the development of the car industry.
4.DI	Microlambda ↓ Selenia (1951; 1960)	Electronic systems, radars [Early-stage investment]	Microlambda was established by IRI and Finmeccanica as the first national producer of defence radars, under the licence of the US company Raytheon. It soon moved into civil applications (Air Traffic Control and weather forecast systems) and gained technological autonomy.	Microlambda was the constituting company of Selenia, established in 1960 as the leading national company for civil and military electronic systems. Selenia's radar productions are currently a division of Leonardo, which has delivered its ATC radars to more than 150 countries and accounts for

				20% of all operational weather radars on the planet.
5.DI	IMAM-Aerfer ↓ Aeritalia (1951; 1969)	Aircraft [National strategic company]	Acquisition of the ailing aircraft producer IMAM-AVIS and merger with Aerfer under Finmeccanica to recreate an aircraft production centre at Pomigliano d'Arco (near Naples).	The IMAM-Aerfer production unit constituted one of the two pillars for the consolidation of the national aerospace industry under Aeritalia (in 1969), a Finmeccanica-FIAT equal joint venture with 8,800 employees distributed in the two production units near Turin and Naples. The Pomigliano d'Arco facilities became the national pole for civil aircraft production.
6.DI	RAI (1952)	TV broadcasting [National strategic company]	Transfer of the radio broadcasting company RAI from SIP to IRI and inauguration of its TV broadcasting activities (in 1954).	As the national public broadcasting company, RAI became one of Europe's leading multimedia groups.
7.DI	Cementir (1952)	Cement [Vertical integration strategy]	Established with the cement production unit associated to steel plant of Bagnoli, Cementir was the first company in Europe to produce cement for blast furnaces. With the opening of other production units at Taranto, Arquata, Spoleto, Livorno, it reached a national production share of 12% in 1968.	The creation of Cementir increased competition in the domestic market for cement, previously dominated by the national producer Italcementi, lowering the price of construction works. It also reinforced Italy's specialisation in the sector by entering in the segment of cement production for industrial use.
8.DI	Terni ↓ Acciai Speciali Terni (1952; 1961)	Special steels [Horizontal diversification strategy]	Joint-ventures with the US steelmaking company Armco for the production of silicate magnetic steel (Terni-Armco, in 1952) and with the United State Steel Corporation for the establishment of the first European plant specialising in autonomous production of stainless steel (Terninoss, in 1961).	Terni's acquired leadership in special steel production, one of the only three European steelmaking companies operating the silicate magnetic steel technology (with the key OGH patent for grain-oriented electrical silicon steel), with a 14% share of special steel production in the EEC (in 1991). It was among the world's top five producers of stainless steel.
9.DI	Alfa Romeo (1954; 1962; 1968)	Car making [Horizontal diversification strategy]	Alfa Romeo moved from its traditional high-range production niche towards the mass consumption market, challenging the almost complete national monopoly of FIAT. Firstly, with the Giulietta model (1954), then with the Giulia (1962) model manufactured in the new production unit of Arese, finally with the	Alfa Romeo represented a competitive challenge to the dominant national manufacturer, establishing a modern and complete production site outside the traditional automotive centres. The Pomigliano d'Arco plant, currently owned by Stellantis, is the second largest in the Country.

			Alfasud initiative (1968), a middle-low engine power vehicle produced at the new Pomigliano d'Arco car-making plant.	
10.DI	Alitalia (1957)	Air transport [National strategic company]	Entry of IRI in the air transport sector with the responsibility of developing Italy's flag carrier, from the merger of two smaller airliners (1957).	Creation of a national flag carrier in the context of a non-existing air transport sector. By the early 1990s, Alitalia was ranking among the fourth largest European airliners.
11.DI	Cosider ↓ Italimpianti (1959)	Plant engineering [Vertical integration strategy]	Establishment of a specialised company in steelmaking plant engineering, firstly operating under licencing then evolving into an autonomous general contractor.	Cosider was later transformed into Italimpianti (in 1971), which became the national leader in plant engineering with a strong international projection (71% of its total revenues in 1990 and a global market share in steelmaking plant engineering of more than 4%).
12.DI	SENN ↓ Ansaldo (1959)	Nuclear energy [Early-stage investment]	Establishment of Società Elettronucleare Nazionale (SENN), a Finelettrica's subsidiary tasked with building the nuclear power plant of Garigliano (160 MW), the second in the world with GE's BWR technology.	IRI's company Ansaldo, responsible for building parts of the Garigliano power plant (turbines and alternators), gained GE's licence for building BWR reactors. Terni, another IRI company, manufactured the steel vessel.
13.DI	Telespazio (1961)	Satellite telecommunications [Horizontal diversification strategy]	Establishment of Telespazio (1961), an equal joint-venture between RAI and Italcable for experimentations on satellite telecommunications technologies in the Fucino area. In 1963, STET joined the shareholding arrangements and with the incorporation of Italcable under STET in 1965, Telespazio became a fully-owned IRI subsidiary. In 1967 the new Fucino Space Centre was inaugurated, with a 30-metre antenna capable to cover the Atlantic region. In 1970 a second large antenna, able to cover the Indian Ocean region was installed.	Today, with its 170 antennas and 370,000 square metres Telespazio's Fucino Space – currently owned by Leonardo (67%) and Thales (33%) – is the most important teleport in the world for civilian use. It hosts the Control Centre and the Mission Centre of the COSMO-SkyMed Earth observation satellite constellation and one of the two Control Centres responsible for Galileo, the European satellite positioning and navigation system.
14.DI	GS (1966; 1981)	Retail distribution; fast-food chains [Horizontal diversification strategy]	IRI contributed to the development of a modern retail distribution network with Generale Supermercati (GS), established from the acquisition of a small retailer based mainly in Rome (with only 6 branches). In 1975, GS innovated the distribution sector in	By 1992, the GS group had become Italy's largest retailer by revenues, with 254 stores distributed over the national territory. In 2000, the French distribution giant Carrefour acquired a 64% controlling stake in GS (already privatised in 1995) for a face value of approximately 2.5 billion euros.

			Italy, introducing the discount store formula with the subsidiary SI.CO.	
			GS was also the first in Italy to invest in the fast-food sector, by launching its burger chain called 'Burghy' (first restaurant opened in Milan in 1981), which became particularly fashionable among so-called ' <i>Paninari</i> ', a popular urban subculture among the youngsters in the 1980s.	Burghy was acquired by the Cremonini group in 1985. When this sold its 80 restaurants to McDonald's in 1996, the latter became the dominant player in fast-food service with 100 restaurants at the end of the same year.
15.DI	GMT (1966)	Naval engineers [Vertical integration strategy]	Equal joint-venture between IRI (Ansaldo and CRDA) and FIAT to establish Grandi Motori Trieste (GMT), concentrating the naval engine productions of the two groups under a single national player. In 1971, a new plant was inaugurated at Trieste (Europe's largest at that time). In 1975, FIAT refused to contribute to further capital injections and Fincantieri became GMT's 100% shareholder. In 1982, GMT acquired Sulzer's license for 2- and 4-stroke engines and two years later GMT was incorporated as Fincantieri's Diesel Engines Division.	The GMT initiative created the conditions for Fincantieri's short-lived global dominance in the field of large diesel engines. With the joint-acquisition of a 42% stake in New Sulzer Diesel in 1990 (brought to 100% in 1996), Fincantieri surged to a global leadership in the sector (2 nd in 2-stroke engines). Only one year later (1997), Fincantieri and Matra constituted a new company 'Wartsila NSD Corporation', resulting from a merger between Matra-controlled Wartsila Diesel and Fincantieri's New Sulzer Diesel, Diesel Ricerche and Grandi Motori Trieste. Fincantieri held a minority share of 15.4%, which was sold to Matra in 2000. Matra later merged with Wartsila NSD Corporation to form Warsila Corporation, currently the world's second largest player in the sector (62% global market share in medium-speed engines). To this day, GMT's former plant at Trieste is one of Wartsila's largest with around 1,000 direct employees.
16.DI	Italsiel; Sogei ↓ Finsiel (1969; 1981)	Informatics [Early-stage investments]	IRI's diversification into the field of information systems led to the establishment of Italsiel (1969), Italy's leading software company. This was followed by the foundation of Sogei (1976), providing information systems for the tax registry, and by a series of regional software companies.	By 1991, Finsiel had become the national leading software producer (2 nd in Europe by revenues) with 7,300 employees, specialising in applications for public administrations and banks.

			In 1981, they were all consolidated under IRI's sectoral holding company named Finsiel.	
17.DI	Nuova San Giorgio ↓ Elsag ↓ Elsag Bailey (1969; 1989)	Industrial automation [Horizontal diversification strategy]	Established in 1969 as a spin off from the electronics division of the electrotechnical company Nuova San Giorgio, Elettronica San Giorgio (Elsag) specialised in numerical control machines, postal automation and electronic defence systems. In the following decades, Elsag expanded its activities to become an international leader in industry automation, also through the acquisition of the robot producer DEA (1982) and later of the US leader in continuous process automation – Bailey Controls (1989).	By 1991, with 7,500 employees, Elsag Bailey was a global leader in process control and automation systems, ranking among the top three players by market share in the segments of postal automation, continuous control processes and measurement machines.
18.DI	FOS (1982)	Optical fibres [Vertical integration strategy]	IRI's telecommunications engineering company (Sirti) and Pirelli, Italy's main producer of telecommunications cables, established an equal joint-venture (Fibre Ottiche Sud, FOS) to produce optical fibres for telecommunications at the Battipaglia plant in the South of Italy. In the following decades, FOS expanded its production to a globally competitive scale.	The Battipaglia plant was further expanded in the early 2000s – in 1999, Sirti sold its 50% stake in FOS to Pirelli – reaching an annual production of 7 million km, more than 10% of global production of optical fibres around the mid-2000s. Today, the FOS plant belong to Prysmian, the global manufacturer of telecommunication cables. FOS is Prysmian's second largest optical fibre plant, with annual capacity of 9 million km.
19.DI	Selenia Spazio (1982)	Space [Horizontal diversification strategy]	With Aeritalia and Selenia, IRI diversified also in the space sector. In 1982, its activities were concentrated under Selenia Spazio, and further expanded in 1991 with Alenia Spazio (incorporating Aeritalia's division for space systems).	With Selenia/Alenia Spazio IRI became the leading national player in the space sector, one of the most important contractors of the European Space Agency for satellite systems (especially for telecommunications) and equipment for earth stations. In 2005, Alenia Spazio merged with Alcatel (today Thales Alenia Space) to become the European leader in the sector – from 2009 it has supplied around 50% of the pressurised volume of the International Space Station (ISS).

Table 7.1: IRI's entrepreneurial diversification into new activities. Source: Author's elaboration on annual reports and industrial plans of IRI's subsidiaries (various years).

3. Restructuring and development with a long-term orientation

A second entrepreneurial feature of IRI – sometimes consequential to the diversification one – was the restructuring or reorganisation of existing economic activities and their development in a long-term perspective. Most of these operations concerned IRI's sectoral subsidiaries or its largest operating companies. Table 7.2 illustrates the most relevant examples, which can be reduced to four different analytical categories.

First, in the cases of Finmeccanica (2.RD), Fincantieri (3.RD) and Finmare (10.RD) – although with different time frames – IRI undertook the long-term restructuring of mechanical, shipbuilding and shipping activities that would have otherwise disappeared, as no private investor was willing to sustain prolonged losses while preserving and renovating existing production capacity. In all these cases, the dependence on IRI was gradually reduced and the three subsidiaries gained financial and market sustainability at the end of the process. While Finmeccanica mutated profoundly its sectoral matrix, Fincantieri consolidated its shipbuilding activities through competitive specialisation of productions at the shipyard level. Having operated as a subsidised public transport service for decades, from the mid-1970s Finmare was able to become the only significant national player in the shipping industry.

Second, with the cases of SME (4.RD) and Italstat (7.RD), IRI's consolidated Italy's supply structure, creating two national champions in food processing and civil engineering. With the proceeds obtained from the nationalisation of its electric energy companies in 1962, SME invested in restructuring ailing national companies in the food processing sector, thus avoiding takeovers from foreign multinationals and sought to create a globally competitive group. In the case of Italstat, IRI increased its involvement in the sector through a horizontal diversification of its civil engineering activities, becoming Italy's leading general contractor for public works, domestically and abroad.

Third, by pursuing internal growth and vertical integration, IRI created two internationally competitive players in the steelmaking and telecommunications sectors. In the case of Finsider (1.RD), this happened in two different phases – at the end of the 1940s and in the early 1960s – turning IRI into one of the world's largest and more diversified steel producers. In the case of STET (5.RD), the creation of a national

champion in the telecommunications sector took more than three decades, during which the STET group grew and expanded internationally to reach global leadership positions in fixed and mobile services, while developing competitive capabilities in manufacturing and infrastructural activities.

Fourth, IRI was responsible for the long-term development of strategic manufacturing activities requiring costly research and capital investments with low or deferred returns. This happened as the private sector withdrew or was unwilling to invest. In the cases of SGS-ATES (8.RD) and Aeritalia (9.RD), previous shareholding arrangements with private domestic counterparts were terminated when the profitability of these investments waned, leaving IRI with the sole responsibility for preserving and developing national productive capabilities in the semiconductor and aerospace sectors. In the case of SGS-ATES, a further partnership was put in place in 1987 with the French semiconductor company Thomson Semiconducteurs – a strategic merger that created today's STMicroelectronics. In the case of Ansaldo (6.RD), IRI performed a radical transformation of its previous shipbuilding activities, turning the Ansaldo group into a competitive engineering conglomerate specialising in energy, transport and industrial technologies.

Through these operations, IRI preserved and relaunched strategic activities that would have otherwise disappeared, encouraging their further development. In some cases, IRI's intervention obviated the lack of private initiatives in high value-added productions characterised by significant technological spillovers.

N.	Name	Sector	Typology	Description
1.RD	Finsider	Steelmaking	Creation of an internationally competitive national champion	Creation of a modern steelmaking industry as a policy prerequisite for the development of mechanical engineering productions. The 'Sinigaglia Plan' for steelmaking (1948-1954) more than doubled total crude steel production with the establishment of the Cornigliano integrated steelworks (1951). The construction (1959-1965) and enlargement (1970-1975) of the Taranto steelworks – Europe's largest – made Finsider the largest European steel producer, third globally after Nippon Steel and USX (1985). The Finsider group was characterised by a vertically integrated structure: steel production, specialised cement, refractory materials, plant engineering, shipping, mining and commercial services. It displayed a differentiated production of flat products and was the only mass producer of pig iron, steel tubes and special steels in Italy.
2.RD	Finmeccanica	Mechanical and electronic engineering	Restructuring of activities that would have otherwise disappeared and structural transformation	Finmeccanica was established in 1948 as a sectoral holding company to rationalise, restructure and convert to non-military purposes the mechanical engineering and shipbuilding companies of IRI, representing 10% of the national workforce in the entire mechanical sector. Over the 1948-1954 period, the restructuring process rose productivity three-fold, while Finmeccanica's losses were reduced to 4% of total revenues in 1954 (down from more than 16% in 1950). Over the 1950s, Finmeccanica completed its post-war reorganisation and developed into an engineering conglomerate, specialising in car-making, electro-mechanical equipment, aircraft and rolling stocks, machine tools, electronics, and shipbuilding. In the following decades, Finmeccanica's holding structure evolved in various directions: shipbuilding activities were spun off to the new sectoral holding Fincantieri (in 1959) and Alfa Romeo was sold to FIAT (in 1986). At the same time, Finmeccanica became the national leader in aerospace, electronic systems, energy engineering, transport systems and industrial automation. By the early 1990s, Finmeccanica could claim to be Italy's high-tech industrial pole, accounting for almost 12% of national business R&D.
3.RD	Fincantieri	Shipbuilding	Restructuring of activities that would have otherwise disappeared and product specialisation	Fincantieri was established as a sectoral financial holding for IRI's shipbuilding activities with the aim to restructure the entire sector – almost entirely dominated by IRI, especially after the bailout of the Taranto shipyards (in 1959), followed by the acquisition of the ailing Cantieri Navali del Tirreno e Riuniti (in 1973) and Cantieri Navali Breda (in 1979). Fincantieri's contingent bail outs were accompanied by the restructuring of existing activities. Fincantieri transformed its production structure, moving from the generic shipyard model to a shipyard-based specialisation, seeking economies of scale and obtaining productivity gains. Fincantieri's strategy of competitive

				<p>specialisation and technological upgrade, combined with IRI's financial support, allowed Italian shipyards to overcome a series of global crises that almost entirely wiped out the shipbuilding industry in the rest of Europe, as productions concentrated in East Asia (Japan, South Korea, China). This enabled Fincantieri to reach the status of Europe's largest shipbuilder at the beginning of the 1990s (with an undisputed global leadership in the dominant cruise segment), a position it currently enjoys.</p>
4.RD	SME	Food processing	Restructuring of activities and reorganisation of a dispersed supply structure to create a competitive national player	<p>The sectoral financial holding SME was instructed to reinvest the compensation funds from the nationalisation of its electric energy activities (1962) to support the national food processing industry. The main aims were to repel foreign takeovers and to help ailing companies in their restructuring processes. Between 1965 and 1975, SME perfected the acquisition of some historic brands – Motta (1968), Alemagna (1970), Star (1971), Mellin (1973), Alimont (1974). In the following years, SME sought to rationalise the newly acquired food processing companies, forcing the renovation of some of the most outdated production facilities. Alimont was renamed 'Alivar', incorporating the two companies Motta and Alemagna (1976-1978) as brands under its confectionery unit. Ice cream and frozen food productions were separated and grouped under a new company named Italgel (1977). The motorway's catering units of Motta, Alemagna and Pavesi were reorganised under another a new company named Autogrill (1977), which became Europe's leader in motorway service areas (with significant foreign acquisitions in 1993, right before its privatisation). Cirio was overhauled and its tomatoes processing and canned vegetables activities were incorporated with Bertolli's oil products into a new company named Cirio-Bertolli-De Rica (1987). By 1990, SME had completed the reorganisation and turnaround of a dispersed set of ailing food processing activities, establishing itself as the 6th largest group in the Italian market (32nd globally), with the broader diversification of products and market leaderships in their corresponding segments.</p>
5.RD	STET ↓ Telecom Italia	Telecoms	Creation of an internationally competitive national champion	<p>From 1957, STET assumed a pivotal role in the reorganisation and development of the national telecommunications sector. On that year, it acquired the remaining two telephone concessionaires (Teti and Set) operating on the national territory, merging them with STET's companies (Stipel, Timo, Telve) into SIP, the new national company for intra-urban telephone services. During the 1960s, STET underwent a significant diversification process: it reinforced its user-producer relations with SIT-Siemens and acquired a controlling stake of Sirti (1966), Italy's main telecommunications infrastructure company. With the acquisition of Italcable</p>

				(1965) and the establishment of Telespazio (1961), STET began to operate international telecommunications services via landlines and satellites. STET's monopolistic profit margins in telephone services played a crucial role in financing the development of IRI's electronics companies (i.e. SGS-ATES, Elsag, Selenia), which were transferred from Finmeccanica in 1969 for that purpose. When STET's telephone service companies were merged into a single entity denominated Telecom Italia (1994), this was the fifth largest telecommunications group in the world in terms of revenues (sixth in terms of call volumes), with a significant portfolio of foreign subsidiaries in 40 countries and an undisputed European leadership in the growing sector of mobile telecommunications services (TIM became the global leader in mobile TLC services in late 1990s).
6.RD	Ansaldo	Energy engineering; transport engineering; industrial automation	Restructuring towards high value-added engineering activities and development of technological capabilities	In the early 1960s, shipbuilding activities accounted for approximately 50% of Ansaldo's revenues. In 1966, these were spun off and merged into the new Fincantieri-controlled shipbuilding company Italcantieri. In the same year, Ansaldo was given a new configuration. Its electro-mechanical activities under Ansaldo San Giorgio were consolidated with those of Compagnia Generale di Elettricità (a General Electric subsidiary) to create ASGEN, the national leader for electro-technical equipment. The plant engineering activities were renamed under the company Ansaldo Meccanico Nucleare (1966), which later established NIRA (1973), specialising in the production of nuclear reactors with the BWR technology. The period 1977-1980 saw the constitution of the 'Ansaldo Group', specialising in three different areas: energy, transport and various mechanical engineering (e.g. engines, electronic systems). The energy engineering sector was dominant, with Ansaldo Componenti (renamed Ansaldo Energia in 1990) grouping together the nuclear power activities (with both BWR and PWR technologies, following Sopren's acquisition in 1980) and the electro-technical ones, where it reached a global leadership (6% and 8% global market share for turbines and boilers respectively in 1991). Ansaldo Trasporti was constituted in 1980 and became an international leader in railway engineering (12% global market share in railway signalling in 1991), also through a series of foreign acquisitions in the late 1980s. Ansaldo Sistemi Industriali (founded in 1983, renamed as Ansaldo Industria in 1990) reached a significant specialisation in industrial automation through power electronics, especially in the electrical substation segments (7% of global market share in 1991). In 1991, Ansaldo was Italy's leader in electro-technical engineering, with 20,000 employees and a strong international projection.

7.RD	Italstat	Civil engineering and infrastructure	Restructuring of activities and reorganisation of a dispersed supply structure to create a competitive national player	<p>Italstat was established in 1968 from the reorganisation of IRI's civil engineering companies – Italstrade, Infracrud and Traforo Monte Bianco. With the acquisition of Condotte d'Acqua in 1970, Italstat became the largest and most diversified national group in the civil engineering sector, playing the function of a general contractor and implementing construction works through its operating companies. In the early 1970s, Italstat created new subsidiaries in the fields of public housing and special-purpose buildings (health, postal services). In 1974, it established Aeroporti di Roma (ADR) to operate and renovate Rome's airports of Fiumicino and Ciampino (representing around 42% of national passenger transport and 44% of cargo services). In 1982, IRI transferred to Italstat the control of Autostrade, which accounted for 43% of the national motorways network. With Italstat, IRI had developed the national leading player in the civil engineering sector with the commercial and technical capacity to win large construction works also abroad (dams, ports and maritime bridges). With Italstat, Italy's motorways were maintained and operated by a state-controlled entity whose primary objective was the preservation and renovation of this key public infrastructure.</p>
8.RD	SGS-ATES SGS-Thomson	Semiconductors	Development of technological capabilities with costly research- and capital-intensive investments and international alliances	<p>In the late 1960s, SGS was Italy's largest producer of semiconductors in Italy, followed by IRI's ATES. After Fairchild abandoned the shareholding partnership with Olivetti and FIAT (1968), IRI acquired a 60% controlling stake in SGS through STET, to prevent the foreign takeover by Motorola. In 1972, SGS merged with ATES, to establish SGS-ATES (under a new partnership with Olivetti and FIAT), a new company with a European market share of 4.2%. In 1977 the two private shareholders divested their stakes, leaving to IRI-STET the burden of sustaining the only relevant national player in the semiconductors field. Between 1977 and 1986, STET recapitalised SGS- ATES with more than 900 million euros (in 2018 constant prices). Moreover, in the three years between 1979 and 1981, the Institute extended a subsidised loan to SGS for around 4.8 billion euros (in 2018 constant prices). This helped the semiconductor company to reinforce its technological and competitive edge – from 1979 to 1986 it increased its global market share from 1.08% to 1.27% and gained three positions in the global ranking. This brought SGS-ATES to a stronger negotiating position when in 1987 IRI promoted the merger with the French Thomson Semiconducteurs to establish SGS-Thomson (an equal joint-venture between IRI and the French state-owned company), which became the 13th largest semiconductor group in the world with a global market share of 2.2%. The merger – followed by the 1989 acquisition of the British Inmos – facilitated the exploitation of financial as well as R&D economies of scale and scope within STMicroelectronics (as it was</p>

				renamed after 1994). This enabled the reorganisation of its activities and a significant increase in capital and R&D expenditure, which brought ST to the 5 th global position in 2002, with a market share of 4.1%. At that time, ST had become a key international player with 40,000 employees, 17 production sites and 16 R&D centres distributed over the entire world, specialising in a wide range of consumer, telecom, automotive and PC applications.
9.RD	Aeritalia ↓ Alenia	Aerospace	Development of technological capabilities with costly research- and capital-intensive investments, through international partnership	At its foundation in 1969, Aeritalia suffered from technological and commercial backwardness compared to other European competitors, being mostly confined to manufacturing military airplanes under licence or small subcontracting productions for McDonnell Douglas. In the early 1970s, it embarked on a process of qualitative and quantitative growth, which was hindered by the effects of the 1973 oil shock on the aviation industry. Because of this, FIAT receded from the partnership (in 1976), leaving to IRI and Finmeccanica the responsibility for developing national capabilities in the aerospace sector. Nevertheless, Aeritalia ceased to be a dependent licensee subcontractor and progressively became an integrated project designer and manufacturer. In the same period, Aeritalia inaugurated a new series of international collaborations: Spacelab in 1974 (space exploration); Tornado (Multi Role Combat Aircraft); Boeing 767 in 1978 (partnership on the design project and production of aerostructures in carbon fibre). In the 1980s, Aeritalia's expansion developed further. First, with new international partnerships: in 1981, it joined with Embraer and Aermacchi to design and produce the AMX ground-attack aircraft; in the same year, it launched the ATR-42 project with the French Aérospatiale, to become the world's leading producer of regional turboprop civil aircrafts (50-70 passengers); in 1986 Aeritalia joined the Eurofighter Consortium to produce the Thypoon multirole fighter. Second, by completing a series of acquisitions: Partenavia, OAN and Meteor in 1981; a 25% stake in Italy's second aircraft producer Aermacchi in 1982. In 1990, Aeritalia merged with Selenia, forming a new company named Alenia. By the early 1990s, IRI had almost entirely reduced foreign technology dependence, developing an internationally competitive national champion in the aerospace sector: on a global level Alenia ranked 11 th in the aircraft, 12 th in space, 21 st in defence systems – with an absolute leadership in regional commercial aircraft (25% global market share). In 1991, the Alenia Group had a workforce of over 30,000 headcounts and accounted for 9.2% of national R&D in the business enterprise sector.
10.RD	Finmare	Shipping	Restructuring of activities that would have otherwise	Finmare's structure as a passenger maritime transport group was the result of the 1936 restructuring operated by IRI right after its foundation. Finmare's fleet in 1938 was among the largest in the world (2% of the total, measured

<p>disappeared and structural transformation</p> <p>(1974)</p>	<p>in gross tons), owning all of Italy's 11 ships above 20,000 GT (that put Italy's fleet at the second place after the UK in terms of the largest ships). The war events destroyed Finmare's fleet almost entirely (around 87% of its pre-war total). In the following years until 1954, Finmare rebuilt its fleet and partly regained its pre-war global ranking (0.6% global market share). In 1955, its operating company Italia ranked 1st and 2nd globally by number of passengers transported in the Europe-South America and Europe-North America routes respectively. The orders for new ships needed to rebuild Finmare's fleet were a key factor in preserving and renovating production capacity in IRI's shipyards over that period. However, from the late 1950s the passenger transport business started to lose its prominence in long-distance travelling supplemented by commercial air transport. The restructuring process came late (with Law n. 684, 20 December 1974), accommodating IRI's long-awaited proposal to the public authorities. From 1974, Finmare assumed a radically different configuration, it terminated the transoceanic routes, reorganised the subsidised Mediterranean routes and developed its freight activities. Finmare established a series new shipping companies in partnership with third parties: Almare (1975) for the transport of bauxite; Continentalmare (1976) for the transport of cereals; Carbomare (1981) for the transport of coal. It also acquired the control of Sidermar (1976), which operated as Finsider's fleet for the transport of minerals and finished steel products. Finmare's companies – Lloyd Triestino and Italia – were the first in Italy to enter the container segment (10 years before private ship owners). Between 1974 and 1991, Finmare's fleet more than doubled in GT size, while its national share increased from 7.8% to 19.5% (with Finmare's world share recovering from 0.23% to 0.38%). In 1991, Finmare was Italy's only competitive shipping group on a global scale (0.88% share of world's TEU, around one-fifth of the leading player Evergreen), having also expanded internationally with the acquisition of foreign companies and the stipulation of 18 international partnerships with 43 foreign shipping companies.</p>
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Table 7.2: IRI's entrepreneurial restructuring and development of existing activities. Source: Author's elaboration on annual reports and industrial plans of IRI's subsidiaries (various years).

4. Industrial and technological innovations

The ability of IRI to achieve industrial and technological innovation was a distinctive entrepreneurial feature that can be traced from the 1960s but intensified further over the 1970s and the 1980s. As reported in Table 7.3, IRI's long list of industrial and technological innovations was impressive, not only in the national context but also in a global respect. IRI's innovation achievements spanned across the broad variety of sectors in which the group was involved.

Some of those innovations lie at the foundation of Italy's current technological competitiveness in areas such as radar (3.IN and 5.IN) and space (8.IN, 9.IN and 30.IN) technologies, steelmaking processes (14.IN), railway signalling (17.IN), dynamic tolling (18.IN), shipbuilding (21.IN, 28.IN and 31.IN), ultrasound medical devices (24.IN). In other cases – such as in telecommunications and digital technologies (11.IN, 13.IN and 23.IN), solar energy technologies (12.IN), continuous automation processes (15.IN), hybrid electric vehicles (19.IN and 22.IN), air transport (6.IN) and large civil engineering projects (7.IN, 27.IN, 29.IN) – technological leadership was lost in the course of the 1990s and 2000s, sometimes in coincidence with the privatisation and demise of key IRI companies incorporating those technological capabilities.

The pervasiveness of IRI's product and process innovations provides conflicting evidence to the theoretical claim that SOEs are structurally unable to innovate and be technologically competitive. Furthermore, the intensification of IRI's achievements from the 1970s debunks the prevailing narrative that identified this period with the 'degeneration' of IRI's role. While the overall economic results were negative – mostly due to the global steelmaking crisis of the years 1975-1985, as explained in Chapter 5 – this did not impede IRI's companies to achieve major technological outcomes.

N.	Name (Year)	Subsector	Description
1.IN	F1 Championship (1950; 1951)	Car making	Alfa Romeo 158, designed in 1938 to compete in auto racing, won the first edition of the F1 World Championship in 1950, with three pilots – Farina, Fangio, Fagioli – in the first three positions. Its successor model (Alfa Romeo 159) won the second edition (1951) of the F1 World Championship with Juan Manuel Fangio. In 1952 Alfa Romeo withdrew from the F1 competition. The project for a new Grand Prix car (Alfa 1960) was interrupted as the engineers who were working on it had to be deployed to designing the family car Alfa Romeo Giulietta (1954), the first to be produced by Alfa Romeo on a mass scale.
2.IN	Supersonic airplane (1956)	Aircraft	The fighter aircraft 'Sagittario 2' – designed and manufactured by IMAM-Aerfer at Pomigliano d'Arco – became the first airplane manufactured in Italy to break the sound barrier in controlled flight, when it reached Mach 1.1 during a dive from 13,725 metres, on 4 December 1956.
3.IN	Meteor 200 (1961)	Meteorological radars	Selenia realised its first weather surveillance radar (WSR), named Meteor 200. This was the first of a series which made Selenia a leading player in the field. The evolutions of Selenia's Meteor radars are currently produced by Leonardo Germany GmbH, a subsidiary of Leonardo, which accounts for around 20% of all weather radars in the world.
4.IN	Nuclear vessel (1962)	Special steel	Terni manufactured the vessel for Garigliano's nuclear power plant. Terni became the only Italian producer of nuclear vessels.
5.IN	ATC radars (1963)	Radars for air traffic controls	Selenia produced the ATCR-2 radar for air traffic control. This was the first civil radar system designed by Italian companies, building on experience gained under NATO contracts. Selenia rapidly became a leading player in this sector, producing a series of air traffic control radars based on the development of the ATCR-2 model (ATCR-22 L-band, ATCR-33 S-band and ATCR-44 L-band). These were supplied to several international airports (in Sweden, USSR, Nigeria, Mexico, Peru, Bulgaria, Hungary, Spain), making Selenia the second largest provider of air traffic control radars in the world (outside the US) by the end of the 1970s.
6.IN	Jet airplanes (1969)	Air travel	Alitalia became the first European airline to have its entire fleet composed by jet airplanes.
7.IN	Motorways (1973; 1993)	Motorways	With the Autostrade company, IRI became Europe's biggest motorways operator. As it accounted for 45% of the national motorways built, Autostrade was the main responsible for Italy gaining the second place in Europe in terms of the total length of its motorways network in 1973. In 1993, Autostrade became also the first European company to be involved in the construction of a US highway (Dulles Greenway).
8.IN	Sirio (1974)	Space satellites	In 1974 Telespazio began to work on Sirio, the first satellite to be entirely designed and built in Italy. On 25 August 1977, Sirio lifted off from the NASA launchpad at Cape Canaveral in the US. Sirio was

			designed with an operative life of two years, but it ended up being used for experimental transmissions on telecommunications until 1985.
9.IN	Spacelab (1974)	Space exploration	Participation in the Spacelab project, placing Aeritalia as the leading Italian space company. With Aeritalia's contribution to Spacelab amounting to 18% of its production value, Italy was the second largest Spacelab participant after Germany. Aeritalia manufactured the Spacelab pressurised module, all the racks that fit inside, and the thermal control system. The first launch of the STS-9 Columbia took place on 28 November 1983.
10.IN	Port of Bandar Abbas (1975)	Civil engineering	In 1975, Condotte d'Acqua (Italstat) secured the order to build the Iranian port of Bandar Abbas. It was the largest foreign commission for a construction work ever obtained by an Italian civil engineering company – valued around one billion dollars. The Iranian Revolution of 1978-1979 halted the construction when 40% of the project had been completed.
11.IN	Proteo/UT (1975, 1980s-)	Electronic public switching equipment	In 1965 SIT-Siemens rejected the preference of its licensee and former parent company (Siemens AG) to produce semi-electronic public switching centres, deciding to seek technological autonomy with the pure electronic switching technique. This resulted in the design of the Proteo system (1974), the precursor of the more advanced UT system (in its UT10/3 1983 version and in a more advanced UT100/6 1989 version), designed in collaboration with the R&D centre CSELT, which certified Italtel's technological capabilities and commercial success. More than 15 million UT systems were installed worldwide (in Russia, Argentina, Spain, etc.) by 1994, up from only 5 million in 1991 (mostly in Italy).
12.IN	Eurelios (1976)	Solar energy	Ansaldo Società Generale Elettromeccanica led the project Eurelios, a consortium with the electric energy state monopolist ENEL and foreign partners (Cethel and MBB) aimed at building a solar thermoelectric power plant (with solar thermic concentration) to produce electric energy. Located in Adrano (Sicily), the plant became operative in 1981, one year before SolarOne in the Mojave Desert. Eurelios was the world's first solar thermal energy power plant to produce electric energy to service the national grid. The same engineers from Ansaldo who worked on the Eurelios project were also involved in the construction of the Ivanpah Solar Electric Generating Station (ISEGS) in 2013, the largest power-tower solar thermal system in the world.
13.IN	COS2 (1977)	Optical fibres	A consortium composed by the companies SIP, Sirti, Pirelli and Corning, led by STET's R&D centre (CSELT) realised the world's first installation of an operational 4 kilometres optical fibre cable (named COS2) in a urban settlement (Turin). Experimental tests conducted on the installed optical cable gave better results than any other previously achieved by either US or Japanese players.
14.IN	Multistand Pipe Mill (1978)	Seamless steel tubes	The steel tube producer Dalmine was the world's first to introduce the Multistand Pipe Mill (MPM) technology – elaborated in partnership with IRI's INNSE – for the industrial production of medium-sized seamless tubes (355.6 mm). This state-of-the-art technology and its evolution are currently the international reference for steel tube mills.
15.IN	Elsag (1979)	Postal automation	Introduction of the SARI system for postal automation, based on the multiprocessor EMMA for pattern recognition, which automatically recognised postal codes and sorted correspondence correspondingly. The EMMA technology was firstly introduced in the Italian postal system, but from 1981 it was also adopted by the US Postal Service (226 models operating by 1993).

16.IN	New food products (1970s-1980s)	Food processing	During their IRI period, SME's food processing companies overhauled their productions and commercial structures but also launched new iconic products, especially in the sweet confectionery and ice creams segments. Pavesi introduced the biscuits <i>Maltolatte</i> (1976), <i>Scricchioli</i> (1979), <i>Goccirole</i> (1987, currently the most sold brand in the Italian market), <i>Frollis</i> (1988). The Motta brand was enriched with the snacks <i>Girella</i> (1973), <i>Yo-Yo</i> (1986) and the cake <i>Tartufone</i> (1983). In the ice cream segment, Italgel diversified the Motta brand with the ice cream tube <i>La Cremeria</i> (1983), the cone <i>Maxicono</i> (1985) and the sandwich <i>Maxibon</i> (1989). In the early 1980s, Italgel also diversified in the high-range frozen dessert segment, establishing the brand <i>Antica Gelateria del Corso</i> , which in 1982 launched the <i>Tartufo</i> ice cream on a commercial scale. Furthermore, SME's food processing companies introduced modern marketing techniques based on catchy slogans voiced by popular actors or singers. They also sought commercial visibility by sponsoring sporting clubs which were able to achieve unrivalled results at the international level – for instance, the volleyball team 'Maxicono Parma' won the so-called 'Big Slam' in 1989-1990 (all the national titles plus the European Super Cup and the Men's Club World Championship), while the Motta-sponsored AC Milan football club won the national title and the 1993-1994 UEFA Champions League.
17.IN	Consorzio Saturno (1986-)	Railway signalling systems	In 1986, Ansaldo Trasporti and Sirti, together with other private operators (Sasib and Sae-Westinghouse), promoted the creation for the 'Consorzio Saturno'. The Consortium was responsible for installing telecommunications and signalling systems on the Italian high-speed railway network under planned construction.
18.IN	Telepass (1986)	Dynamic motorway tolling	When it was introduced on the Italian motorways in 1990, the Telepass system was the first large-scale system of dynamic motorway tolling in the world. It was conceived in 1986 by IRI's Autostrade (in partnership with Olivetti) as a solution to the foreseen congestions at the motorways toll gates induced by the 1990 FIFA World Cup. Its functioning was simple and innovative: few metres before accessing the lane at the toll gate, an electronic signal from a small box installed inside the car would be transmitted via satellites to a remote computer. This would automatically open the gate, debiting the cost of the toll to the driver's bank account. The Telepass system was later installed on several US motorways and it is currently the most diffused toll payment system in Europe, with over 8 million customers. Telepass was transformed into a joint-stock company for mobility technologies in 2008. While the initial investment amounted to 16 million dollars (of which 8 million on R&D), at the end of 2020 the controlling shareholder (Atlantia) sold a 49% stake to Partners Group AG for 1,056 million euros.
19.IN	Alfa Romeo 33 (1986)	Hybrid electric vehicle	Alfa Romeo tested the prototype of a hybrid electric vehicle – an electric-powered version of the Alfa 33 model. The 'Alfa 33 Ibrida' was equipped with Alfa Romeo's newly introduced (1983) electronic engine control and with an electric battery provided by Ansaldo that allowed a maximum fully electric speed of 60 km/h for 5 km. Alfa 33 Ibrida was among the most advanced – and the most mass production-oriented – hybrid prototypes at that time, almost 10 years before the appearance of the Toyota Prius model. Following Alfa Romeo's acquisition in 1986, FIAT decided to abandon the project due to its high development costs.

20.IN	New Technology Telescope ↓ Very Large Telescope (1987; 1991)	Astrophysical telescopes	INSSE (Finsider) won the contract for building the 'New Technology Telescope' (NTT), to be installed at the Las Silla Observatory in the Chilean Andes. The NTT was the 7 th largest and most technologically advanced telescope in the world – the first in the world to have a computer-controlled main mirror. NTT served as a base for the Very Large Telescope (VLT), promoted by the European Southern Observatory and built between 1991 and 1998 by a consortium of Italian companies led by Ansaldo. The VLT, installed at Cerro Paranal's observatory is made of four giant 8.2-metre unit telescopes, which makes it the largest and most advanced optical telescope in the world.
21.IN	Micoperi 7000 (1988)	Shipbuilding	Fincantieri produced the world's biggest semi-submersible crane vessel 'Micoperi 7000' for the Italian oil offshore engineering company Micoperi. Having been bought by the energy engineering company Saipem, the redenominated 'Saipem 7000' is a key instrument for the installation of offshore wind farms in the North Sea. The ship is 176 metres long, 87 metres wide and 43.5 metres tall. It is fitted with two cranes that can lift 14,000 tons at one time. In order to combine the mobility needed by a ship with the stability required by a floating construction unit, the ship was conceived with a semi-submersible structure which can change its level in the water according to the conditions of the sea. Moreover, the whole operational cycle was controlled through a computerised system that could guarantee stability in very rough seas.
22.IN	Vaporetto E1; Vaporetto LIUTO (1988; 1996)	Electric-powered steamboat	In partnership with other Italian companies, Ansaldo Sistemi Industriali realised the prototype of an electric powered ' <i>vaporetto</i> ', the municipal steamboat-buses that shuttle people around the canals of Venice. The <i>vaporetto</i> , with an aluminium hull, was supposed to cover the city's main water-bus routes. The prototype (called E1) was the first electric powered vessel in the world to be deployed as a public transport vehicle (with capacity of 210 passengers). E1 was later turned into a model with a hybrid diesel electric power generation system called 'LIUTO', developed by Ansaldo between 1996 and 1999.
23.IN	MPEG and MP3 Standard (1988)	Digital coding standard for video and audio signals	CSELT promoted the foundation of the Moving Picture Expert Group (MPEG) to develop a digital coding standard for video and audio signals in order to provide interactive video and audio on a Compact Disk (CD). Leonardo Chiariglione, a researcher at CSELT, became its first Chairman. In 1991, the Group released the first compression standard (MPEG-1). The MPEG-1 Audio Layer III was the first version of the audio format that would be renamed as 'MP3'.
24.IN	SIM 5000 (1990)	Ultrasound medical devices	The ultrasound echocardiograph SIM 5000 designed and produced by Esaote – a spin-off from Ansaldo's biomedical division – was selected by NASA to be deployed on the Space Shuttle in 1991 to monitor cardio-vascular physiology of its astronauts. This certified Esaote's affirmation as a global leader in the field of ultrasound medical devices.
25.IN	Turbotronic (1990)	Car diesel engines	VM Motori, until 1989 a Finmeccanica company specialising in middle-range engines, launched the Turbotronic diesel engine, featuring world's class technical performances and one of the most advanced electronically controlled injection systems with exhaust gas recirculation (EGR). Turbotronic was defined as 'the world's cleanest diesel engine' and it was subsequently adopted by leading global car manufactures such as Chrysler, Toyota, Ford, GM, Alfa Romeo and Rover.

26.IN	HD satellite digital transmission (1990)	TV broadcasting	The national TV broadcaster RAI realised the world's first experiment of point-to-point digital transmission of a TV signal, through the Olympus satellite and optical fibres connections. This allowed the high-definition broadcasting of the 1990 FIFA World Cup's games.
27.IN	Iricav 1; Iricav 2 (1991-)	High-speed railway engineering	Under its plan for a national high-speed railway network, the State Railways assigned to two IRI-led consortia the construction of the segments Rome-Naples (Iricav 1) and Venice-Verona (Iricav 2). The Rome-Naples segment was inaugurated in 2005, while works for the section Padua-Verona (where Iricav 2 was restricted to operate) have only begun in 2020 and will be completed by 2026.
28.IN	Destriero (1991)	Blue Riband Yacht	Fincantieri's shipyards of Muggiano delivered the fastest motor yacht in the world, named ' <i>Destriero</i> '. On 9 August 1992, <i>Destriero</i> crossed the Atlantic – from Ambrose Light near New York to Bishop Rock lightship on the Scilly Isles in England (3,106 nautical miles) – in 58 hours straight without refuelling (at an average speed of 53 knots), beating the previous 1990 record of 79 hours and 54 minutes set by Britain's catamaran 'Hoverspeed Great Britain'. <i>Destriero</i> 's record is yet unbeaten (2022). At that time, <i>Destriero</i> was the largest and most powerful unit in light alloy ever built: 67 meters long, with a beam of 13 meters and 60,000 HP.
29.IN	Storebaelt (1991-1998)	Suspension bridge	Iritecna's CMF Sud (renamed COINFRA in 1995), won the order to build the eastern part (East Bridge) of a 6,790 metres long bridge, connecting Sjelland (where Copenhagen is located) and Fiona on the Storebaelt sea. The metal sustaining components were made of a special steel produced by Taranto's Ilva steelworks. To this day, the East Bridge can claim to be Europe's longest suspension bridge span (1,624 metres – at that time, the second longest in the world). The vertical clearance for ships is 65 metres (213 ft), this allows even the world's largest cruise ships to glide under the bridge with its smokestack folded. The bridge was completed in 1998 and its tolled motorway opened to traffic. In 2021, the bridge was crossed by more than 12 million vehicles.
30.IN	Italsat (1991;1996)	Space satellites	Between 1991 and 1996, under a programme managed by the Italian Space Agency, two experimental satellites (Italsat F1 and Italsat F2) were launched into space for experimental testing on the digital telecommunication systems of Telecom Italia. The two satellites were realised by Alenia Spazio and Telespazio was responsible for their in-orbit control.
31.IN	Carnival Destiny (1992-1996)	Cruise shipbuilding	Following previous orders and deliveries of large cruise ships to the Carnival Cruise group, in the early 1990s Fincantieri signed an agreement with the US cruise liner for the construction of the biggest cruise ship ever built. 'Carnival Destiny' was assembled in the Monfalcone shipyards and delivered in 1996. At that time, it was the world's first passenger ship weighting more than 100,000 GT. It could host 4,400 passengers.
32.IN	Sulzer RTA96C (1994)	Naval engines	New Sulzer Diesel, a subsidiary of Fincantieri (jointly controlled with Bremer Vulkan Verbund AG since 1990), finalised the design of the two-stroke diesel engine Sulzer RTA96C, developed from the Sulzer RTA84C (1988). Sulzer RTA96C entered service in 1997 as the most powerful diesel engine in the world.

Table 7.3: IRI's industrial and technological innovations. Source: Author's elaboration on annual reports and industrial plans of IRI's subsidiaries (various years).

5. International competitiveness

For most of its existence, IRI's focus was on the domestic economy, where its companies operated in competition with other players or in regulated monopolies (see Chapter 4 and Chapter 5). With the progressive opening of global markets during the 1980s, IRI was underplayed as an outdated organisation, unfit for international competition. Nevertheless, during that decade IRI was increasingly becoming one of the most internationally oriented industrial groups in Italy. The Institute further promoted the internationalisation effort of its companies by opening new representation offices in the most relevant markets. By 1991, the Institute's headquarters in Rome and its local Naples office were paired by foreign branches in Brussels, Washington, Moscow, Tokyo and Beijing (which was inaugurated as early as in 1981²⁹²).

As reported in Chapter 5, from 1975 IRI's foreign revenues in real terms soared exponentially (they amounted to 10.8 billion USD in 1991), while IRI's national export share was higher in the years 1981-1992 than in any previous period. Moreover, during the 1980s, IRI's export specialisation was particularly strong in high-tech products (based on SITC classification). IRI's high-tech exports accounted for an average of 20% of Italy's high-tech exports²⁹³, while IRI's average share of national exports over the same period was around 6%. The quality of IRI's export matrix was further improved towards high-quality complex systems and products. As a result, the geographical destination of IRI's exports evolved in favour of advanced economies – the share of IRI's exports increased from a 40% value in 1981 to 65% in 1988.

However, IRI's internationalisation approach at the end of the 1980s moved away from its previous export-oriented focus towards a 'global industry' strategy aimed at joining the international oligopoly of leading global companies and gaining global market shares through foreign acquisitions, mergers and alliances with international competitors.

²⁹² Interview with Romano Prodi, Alessandro Ovi, Luigi Parlato (19 November 2018).

²⁹³ P. 56 from 'Ricerca, sviluppo e innovazione nel Gruppo IRI' (Archivio Storico IRI, Serie Nera, STU/307).

International acquisitions were prevalently operated by Finmeccanica's subsidiaries in the period 1988-1991 (Table 7.4): railway engineering companies in the US and France (Wabco Westinghouse, Union Switch & Signal, Transcontrol, CSEE); the US aircraft manufacturer The Dee Howard; industrial automation companies in the US and France (Bailey Controls, Ross Hill Controls and the control division of Schlumberger), the biomedical company Biosound in the US, the semiconductor company Inmos in the UK and the electromechanical engineering company Ganz in Hungary. Among other sectoral subsidiaries, in 1989 Italtel (STET) established a shareholding partnership with the European branch of AT&T and in 1990 Fincantieri acquired a control stake in New Sulzer Diesel. Those strategic acquisitions consolidated the international leadership and increased the global market share of IRI's subsidiaries in their relative sectoral segments.

Acquisition	Share	Year	Country	Buyer	Sector
Wabco Westinghouse	100%	1988	US	Ansaldo Trasporti	Railway systems
Union Switch & Signal	100%	1988	US	Ansaldo Trasporti	Railway systems
Transcontrol	74.8%	1988	US	Ansaldo Trasporti	Railway systems
CSEE	49%	1989	France	Ansaldo Trasporti	Railway systems
The Dee Howard	100%	1988	US	Aeritalia	Aerospace
Bailey Controls	100%	1989	US	Elsag	Industrial automation
Schlumberger (Control)	60%	1990	France	Elsag	Industrial automation
Ross Hill Controls	100%	1980	US	Ansaldo Industria	Electric actuators
Biosound	100%	1989	US	Esaote Biomedica	Medical devices
Inmos	100%	1989	UK	SGS-Thomson	Microprocessors
Ganz Ansaldo	51%	1991	Hungary	Ansaldo Energia	Electromechanical
New Sulzer Diesel	42%	1990	Switz.	Fincantieri	Naval engines
AT&T/NSI	20%	1989	US	Italtel	Telecom equipment

Table 7.4: IRI's foreign acquisitions between 1988 and 1991. Source: Author's elaboration.

IRI's international investments had reached a significant extent by 1991. The IRI Group held majority holdings in 172 foreign companies operating in industrial, commercial, financial and banking sectors. It had substantial minority holdings in other 72 companies – of which only 23 below the 10% share. IRI-controlled foreign companies spanned across 43 countries (19 in Europe, 11 in the Americas and 13 in the rest of the world). The value of IRI's capital employed in these foreign holdings was worth more than 2.6 billion USD²⁹⁴, while the total number of IRI's foreign employees was around 31,000²⁹⁵ (8.5% of IRI's workforce in the industrial section).

²⁹⁴ 'IRI Group profiles' (Archivio Storico IRI, Bilanci).

²⁹⁵ P. 49 from 'Rapporto sull'IRI' (Archivio Storico IRI, Bilanci, Ufficio Studi). The figure includes SGS-Thomson's employees.

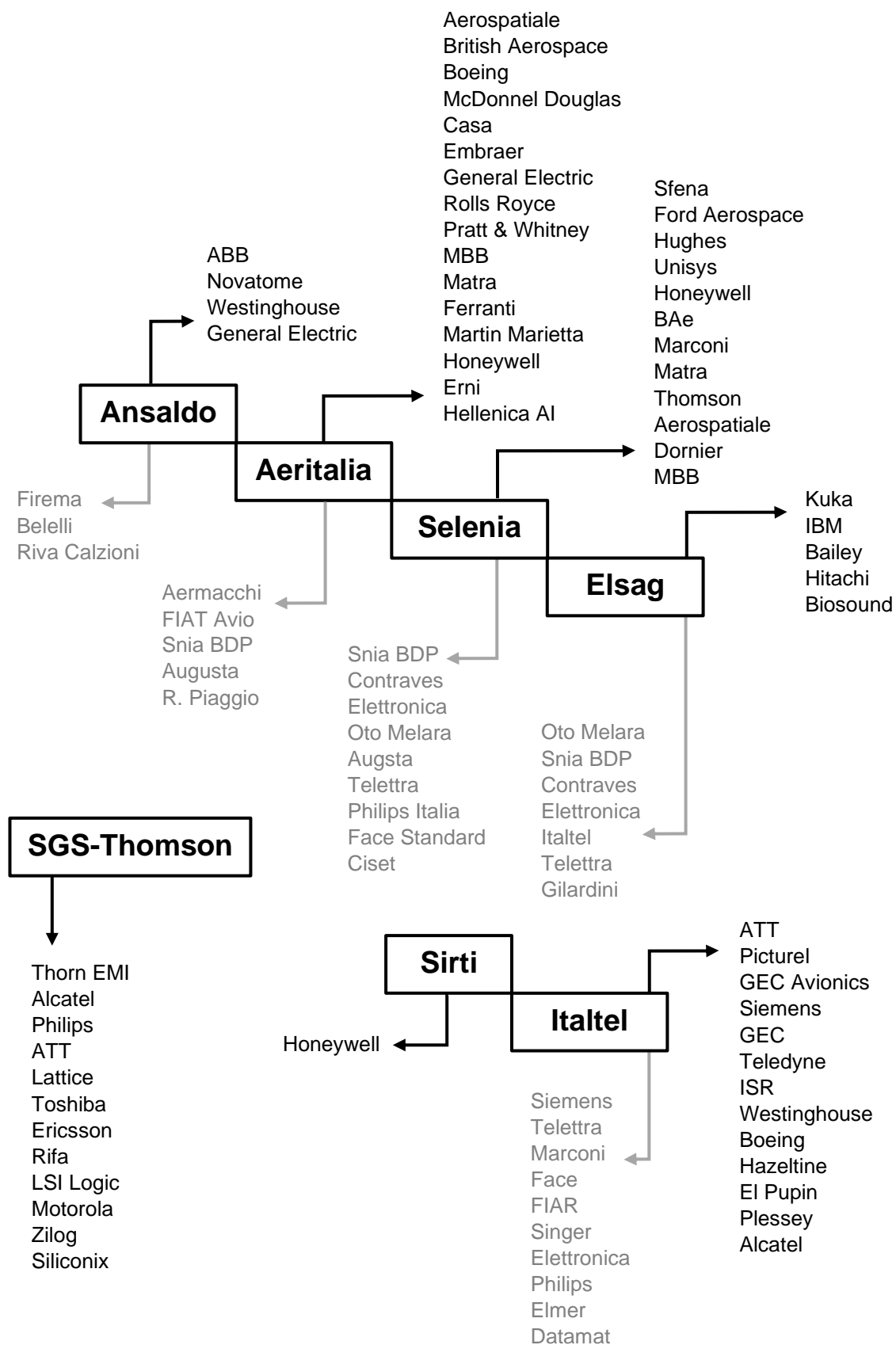
Aside from some minor international joint-ventures inaugurated throughout the 1980s – especially in the aerospace sector – in 1987 IRI promoted²⁹⁶ a strategic merger between SGS and Thomson Semiconducteurs, the most significant operation in the European semiconductor industry to this day. The equal joint-venture, named SGS-Thomson, had all the necessary elements for an industrial success. The two founding companies were both controlled by state entities, had a similar global market share (around 1.2%) and their specialisations were complementary both in terms of application technologies (SGS was stronger in the automotive and industrial segments, Thomson in those associated with consumer electronics and PC) and of geographical markets (SGS was well positioned in North America, Thomson in Asia). In the 15 years since its foundation, SGS-Thomson – later renamed STMicroelectronics (ST) – was able to exploit its industrial synergies and the larger financial and R&D economies of scale to grow and gain competitive market shares through capital and research investments, with support from the Italian and French state, as well as from the EU JESSI programme. From 1987 to 2002, ST went up from the 13th position in the semiconductor industry (with a global market share of 2.2%), to the 5th position (with a global market share of 4.1%). From 1990 to 2002, ST's global workforce doubled from around 20,000 to 40,000 employees, its gross sales went from 1.35 to 6.32 billion USD, while its production sites increased from 14 to 17 and its R&D centres doubled from 8 to 16 (Steve, 2004). IRI's support of the national semiconductor industry with SGS-ATES (in the years 1972-1986) and its merger operation with Thomson was instrumental in creating Europe's leading semiconductor company, with one of the most diversified portfolios of end-market applications²⁹⁷.

Finally, IRI's penetration of global markets was pursued also through strategic partnerships with international competitors in the form of technological agreements and commercial alliances. Figure 7.1 represents the main agreements, alliances and consortia of the IRI Group by 1988.

²⁹⁶ The proposal for a merger with Thomson was elaborated at all the IRI levels – SGS, its controlling holding group STET, the Institute – with the Institute's Board of Executives eventually approving the decision (Interview with Romano Prodi, 11 September 2019).

²⁹⁷ Telecommunications (31%), PC (22%), automotive (13%), industrial (13%), consumer (21%). Percentages in brackets represent ST's internal shares of semiconductor production by type of application in 2002 (Steve, 2004).

The outcome of IRI's international projection through acquisitions, joint-ventures and partnerships was the achievement of strong leadership positions in the competitive oligopoly of leading global companies. By the early 1990s, IRI's companies enjoyed leading market positions and shares at the European (EEC) and international levels in their relative industry segments. As reported in Table 7.5, IRI ranked among the top five European players in steelmaking, space, software, shipbuilding, air transport, shipping and telecommunications services. At the global level, its companies obtained leading market positions – among the top three – in various segments: commuter aircraft, large aircraft components, radars, railway signalling, automation of continuous processes, naval engines, passenger cruises, and seamless steel tubes.



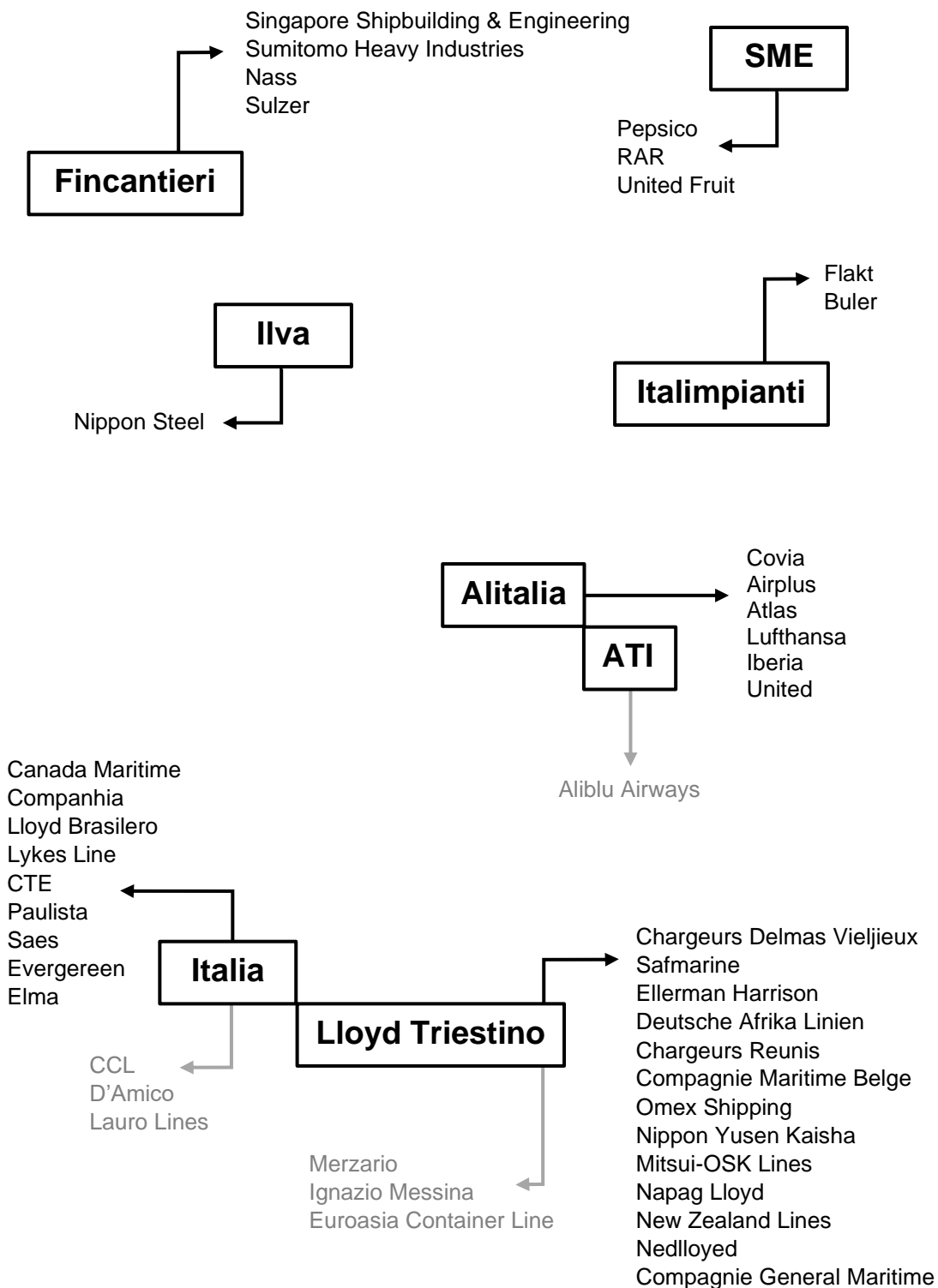


Figure 7.1: Main agreements, alliances and consortia of the IRI Group in 1988. Source: Author's elaboration from 'Programma del gruppo 1989 – 1992' (Archivio Storico IRI, Bilanci, Programmi quadriennali del Gruppo Iri). Notes: Grey-coloured names represent partnerships with domestic companies.

Sector	Segment	IRI's subsidiary	Year	Europe		Global	
				Ranking	Share	Ranking	Share
Steelmaking	Crude steel	Ilva	1991	3°	8%	6°	1.6%
	Pig iron	Ilva	1991		11%		1.9%
	Special steel	Ilva	1991		14%		
	Seamless tubes	Dalmine	1991	1°	20%	3°	3.4%
Aeronautics	Commuters (40-80 seats)	Alenia	1991			1°	25%
	Airplane components	Alenia	1991			2° - 3°	15-20%
	Overall	Alenia	1990			11°	
Electronics	Medium tactical missiles ¹	Alenia	1991			2° - 3°	20%
	Electronic defence systems	Alenia	1990			21°	
	Air Traffic Control ¹	Alenia	1991			2° - 3°	25-30%
	Semiconductors	SGS-Thomson	1992	2°	15%	13°	2.6%
Energy engineering	Large components	Ansaldo	1991			5° - 6°	7%
	Power plants	Ansaldo	1991		10%		
	Overall	Ansaldo	1990			10°	
Transport engineering	Systems	Ansaldo	1991			4°	8-10%
	Signalling	Ansaldo	1991			1° - 2°	12%
	Electrical vehicles	Ansaldo	1991		12%		3.5%
Industrial automation	Postal automation	Elsag Bailey	1991			2° - 3°	10%
	Continuous processes	Elsag Bailey	1991			2° - 3°	10%
	Measurement machines	Elsag Bailey	1991			2°	15%
	Discontinuous processes	Elsag Bailey	1992				4%
Space	Space systems	Alenia Spazio	1992			2°	32%
	Overall	Alenia Spazio	1990	2°		10°	

Sector	Segment	IRI's subsidiary	Year	Europe		Global	
				Ranking	Share	Ranking	Share
Shipbuilding	Passenger's ships	Fincantieri	1991			1°	27.7%
	Productive capacity	Fincantieri	1991	1°	10%		
	Ship orders	Fincantieri	1991	1°		10°	
	Two stroke naval engines	Fincantieri	1991			2°	36%
	Four stroke naval engines	Fincantieri	1991			3°	18%
	LNG carriers	Fincantieri	1994			7°	4%
Telecommunications	Overall	STET	1992			6°	
	Mobile telephone services	TIM	1994	1°			
	Electronic switching systems	Italtel	1992			10° - 11°	3%
Informatics	Software	Finsiel	1991	2°	1.7%	9°	0.5%
Food	Volume of affairs	SME	1990	12°	0.9%	32°	0.03%
	Olive oil exports	Bertolli	1990	1°			
Cement	Production	Cementir	1990		2%		
Maritime transport	Overall (fleet size)	Finmare	1990		3%		
	Shipping (fleet size)	Finmare	1991			>10°	0.9%
Motorways	Mileage operated	Autostrade	1990		10%		
Civil and plant engineering	General contracting	Iritecna	1991	6°		20°	0.5%
	Steelmaking plants	Italimpianti	1990				4.3%
	Constructions	Italstat	1990		0.23%		
	Consulting services	Iritecna	1991				12.2%
	Logistic systems	Iritecna	1991				3.6%
Air transport	Volume of affairs	Alitalia	1992	4°			
	European routes	Alitalia	1991			6°	7.8%
	Europe-North Atlantic routes	Alitalia	1991			5°	3.2%
	Europe-Far East routes	Alitalia	1991			6°	3.6%
	International cargo services	Alitalia	1991	5°	6.8%		

Table 7.5: IRI's market positions and shares at the European (EEC) and global level in the early 1990s. Source: Author's elaboration on annual reports and industrial plans of IRI's subsidiaries (various years). Notes: ¹US market excluded.

6. Concluding remarks on IRI’s industrial entrepreneurship

The evidence provided in this chapter highlights a clear and diffused industrial entrepreneurship of the IRI SOSOEs, summarised in Table 7.6 along its four dimensions.

Typology	Objective	Partnership	Period
Diversification	Market creation	Joint ventures with private players (domestic and foreign)	Until the early 1980s, but stronger in the 1950s and 1960s
Restructuring and Development	Market fixing	Mostly IRI	Until the mid-1970s, stronger in the 1950s and 1960s
Industrial and Technical Innovations	Innovation push	Foreign licences followed by technological emancipation	From the early 1960s, but stronger in the 1970s, 1980s and early 1990s
International Competitiveness	Creation of globally-competitive national champions	International acquisitions, alliances and agreements	From the mid-1980s

Table 7.6: Summary of IRI’s entrepreneurship typology. Source: Author’s elaboration.

IRI’s typologies of entrepreneurship covered a diverse spectrum of policy objectives: from creating new markets and sectoral activities, to fixing market failures; from pushing innovation at Italy’s technological frontier to creating globally-competitive national champions in key sectors and industrial segments.

These operations – especially the diversification into new initiatives – were often promoted together with other private industrial players. In some cases, this implied crowding-in domestic partners, which nonetheless abandoned the joint venture when the economic returns were late to materialise. In other cases, the partnership with third parties involved international companies, at first in the form of foreign licences and technical assistance, then with equal commercial and investment agreements. IRI operated without the financial and commercial commitment of private players when the returns from the restructuring programmes were too low or uncertain in the long term. In all these cases, IRI provided an entrepreneurial additionality, promoting initiatives with long-term positive consequences for Italy’s competitiveness that would not have happened otherwise.

IRI was thus able to perform the function of ‘entrepreneur of first resort’ for the Italian economy. The combination of IRI’s size with its sectoral diversification enabled the adoption of initiatives that few other players in the national context could match. IRI

could deploy its technical and managerial capabilities for new entrepreneurial initiatives, while its multi-sectoral conglomerate structure implied the possibility of balancing the financing requirements of activities under restructuring or development with surpluses accruing from established profitable sectors (Chapter 6).

IRI's operations were sometimes driven by specific policy aims that the Institute was responsible to carry out, in accordance with the public authorities. Among them can be listed: the preservation of production capabilities, the national presence in a specific sectoral activity (e.g. air transport, nuclear power energy, aerospace, semiconductors, naval engines), import substitution, technological independence, consolidation of the national supply and introduction of competition in a collusive market segment. Given the large size of IRI's companies, its industrial operations effectively translated into national industrial policies.

Finally, IRI's acclaimed entrepreneurship represents a profound challenge to conventional economic theories (see Chapter 2). These upheld the structural inability of state ownership – due to its non-profit motivated incentives – to be entrepreneurial and foster innovation. On the opposite, as underlined by neo-Schumpeterian evolutionary theories, the IRI case confirms that innovation and structural change require confronting the uncertainty of future initiatives, but also accumulating productive capabilities by committing to patient long-term investments (Mazzucato, 2013; Lazonick & Mazzucato, 2013).

Part II

Chapter 8

The current system of state-owned enterprises in Italy

1. A study of Italy's current system of SOEs

This chapter investigates Italy's current system of SOEs, providing the opportunity for a theoretical comparison²⁹⁸ with IRI's system of SOEs. The chapter is organised as follows. Section 2 presents an overview of Italy's SOSOEs, focusing on its most important companies. It reports on the quantitative dimensions of the system, analysing its main economic and financial variables, also in relation to the rest of the national economy. Section 3 outlines a qualitative investigation of the system's governance, elaborating from the interviews with top executives of Italy's leading SOEs. Some concluding analytical reflections are provided in section 4.

2. The distinguishing features of Italy's current system of SOEs

The current Italian system of SOEs is the outcome of the privatisation process that took place from the year 1992, when Law Decree no. 333 (11 July 1992) transformed Italy's largest public corporations – including the state holding companies IRI and ENI – into joint-stock companies (100% owned by the Treasury). ENI and ENEL were later listed on the stock exchange – in 1995 and 1999 respectively – and partly privatised, with the state retaining a controlling stake. IRI was instead put into liquidation in 2002 after most of its controlled companies had been sold or transferred to the Treasury²⁹⁹.

Other large autonomous state bodies – operating postal services, railway transport, national highways, air traffic control, and others – were also transformed into joint-stock companies and listed on the stock market³⁰⁰. As reported in Chapter 1, Italy was

²⁹⁸ Chapter 9 outlines a theoretical taxonomy based on the two models.

²⁹⁹ At that moment, net receipts for the Italian state amounted to approximately 20 billion euros (Mucchetti, 2013).

³⁰⁰ Poste Italiane (postal services) was listed in 2015, while ENAV (air traffic control) was listed in 2016. ANAS (roads management) was incorporated in Ferrovie dello Stato Italiane (state railways) as a 100% subsidiary in 2018.

among the countries that privatised most on a global scale. Despite the intensity and scope of this privatisation process, the presence of SOEs in Italy remains quite significant, also in comparison with other advanced economies.

	Enterprises		Employees		
	N.	%	N.	%	
B - Mining and quarrying	10	0.2	13,429	1.5	
C - Manufacturing	345	5.7	70,452	7.9	
D - Electricity, gas, steam and air conditioning supply	653	10.7	57,077	6.4	
E - Water supply; sewerage, waste management and remediation activities	753	12.4	97,132	10.9	
F - Construction	237	3.9	11,265	1.3	
G - Wholesale and retail trade; repair of motor vehicles and motorcycles	464	7.6	16,777	1.9	
H - Transportation and storage	638	10.5	279,991	31.6	
I - Accommodation and food service activities	92	1.5	5,415	0.6	
J - Information and communication	299	4.9	65,527	7.4	
K - Financial and insurance activities	241	4.0	192,505	21.7	
L - Real estate activities	282	4.6	3,285	0.4	
M - Professional, scientific and technical activities	874	14.4	21,940	2.5	
N - Administrative and support service activities	596	9.8	22,925	2.6	
P - Education	132	2.2	2,865	0.3	
Q - Human health and social work activities	146	2.4	16,342	1.8	
R, S - Arts, entertainment and recreation; Other service activities	323	5.3	10,132	1.1	
Total	6,085	100	887,059	100	
Share of Italy's enterprises	Number	Employees	Revenues	Value Added	Ebitda
	0.4%	5.4%	9.7%	8.9%	10.7%

Table 8.1: Italy's state-controlled enterprises by industry in 2018. Source: Author's adaptation from Istat (2020).

In 2018 (Istat, 2020), the number of Italy's state-owned commercial enterprises³⁰¹ – at both the central and local level – amounted to 6,085, employing 887,059 people, an average of 146 employees per company (Table 8.1). Despite representing only 0.4% of the total number of Italian enterprises, SOEs employed 5.4% of the total workforce and accounted for 8.9% of the overall value added in Italy's enterprise sector. Their presence is widely distributed across sectors, but prominent in transport, financial and insurance and utilities.

³⁰¹ Companies operating in the industry and service sectors, excluding the agricultural sector, non-profit institutions and other public agencies.

2.1. The top 20 SOEs as the core of Italy's SOSOEs

The Italian SOSOEs is characterised by the presence of few large companies, accounting for a dominant share of total revenues and employees. The 20 largest centrally-controlled SOEs by revenues listed in Table 8.2 – with a turnover of more than 400 million euros³⁰² and a total workforce of more than 1,000 employees³⁰³ – essentially correspond to the core of Italy's SOSOEs.

This group of SOEs excludes a long list of infrastructure³⁰⁴ and multi-utilities³⁰⁵ companies controlled by local authorities, companies in which the state owns a minority stake without an effective control over their governance³⁰⁶ and other companies that have moved under state control since 2019³⁰⁷. The list also considers only commercial undertakings in industry and services, thus excluding state

³⁰² With the exception of the nuclear decommissioning company Sogin.

³⁰³ With the exception of the aerospace company Avio.

³⁰⁴ Among which the companies responsible for the management of the Milan Airports of Linate and Malpensa (SEA), the A22 Modena-Brenner Pass motorway and the railway services of the Lombardy Region (Trenord).

³⁰⁵ Including four large companies – A2A, Hera, Iren, Acea – involved in multi-utilities services (electric energy, water distribution, waste management) listed on the Milan stock exchange and ranking among the 100 largest Italian companies by revenues. In 2018, A2A (18th) had 6.3 billion euros revenues and over 12,000 employees; Hera (20th) had 6.1 billion euros revenues and around 8,600 employees, Iren (38th) had 3.8 billion euros revenues and around 7,000 employees, Acea (58th) had 2.8 billion euros revenues and 6,500 employees.

³⁰⁶ In 2018, the state-controlled bank CDP had a 4.9% stake in Telecom Italia – Italy's largest telecommunication company, the 5th largest industrial company in the country by revenues – later increased to 9.8%, which makes CDP its second largest shareholder. Through a controlled vehicle (CDP Equity), CDP controls 16.7% of Webuild, Italy's largest civil engineering company. CDP Equity and its subsidiaries have minority stakes in a broad range of medium-large companies: Trevi (underground engineering), Euronext (stock exchange platform), Kedrion (biopharmaceutical), BF (farming), Valvitalia (industrial components).

³⁰⁷ Between 2020 and 2021, the ailing former flag carrier Alitalia has been brought under public ownership and renamed 'ITA Airways' (as of June 2022). Over the same period, the control of Autostrade per l'Italia – the largest motorways operator in Italy (with 2,855 km of roads managed) – has been acquired by Holding Reti Autostradali, a financial holding owned by a consortium of investors of which CDP represents the largest shareholder with a 51% stake. In December 2021, CDP acquired a further 10% stake in the optical fibre infrastructure company Open Fiber (an equal joint-venture between CDP and Enel), which ceased to be a consolidated subsidiary of Enel and became an autonomous company, 60% controlled by CDP (the remaining 40% has been acquired by the investment firm Macquarie). At the beginning of 2019, the state development agency Invitalia recapitalised Industria Italiana Autobus (Italy's second largest producers of buses) to become its largest shareholder (42.8% as of June 2022) together with Leonardo (28.7% as of June 2022). In 2021, Invitalia also acquired a 50% stake (which will increase to 60% by 2024) of Acciaierie d'Italia, Italy's largest producer of steel, the owner of Taranto's steelworks, the largest in Europe.

participation in banks³⁰⁸, financial holdings³⁰⁹, insurance companies³¹⁰ and investment funds³¹¹.

What immediately emerges from the list of the top 20 Italian³¹² SOEs is their relatively large dimensions. They occupy top positions in the ranking of Italy's largest companies: when measured by revenues, 6 out of the 10 largest Italian companies are SOEs. Eni and Enel are the first and the second largest national companies by revenues and by market capitalisation (in reversed order). Poste Italiane and Ferrovie dello Stato Italiane are the first and the second largest industrial employers respectively. Ferrovie dello Stato Italiane is responsible for the largest amount of fixed investments made by Italian companies³¹³, Terna ranks fourth. Leonardo is the first national company in terms of R&D expenditure.

Furthermore, as illustrated in Figure 1.3, Italy's system of SOEs presents a variegated shareholding configuration. Although these SOEs are ultimately controlled by a central government authority – the Ministry of the Economy and Finance (MEF) – there is no single entity that has a direct shareholding relation with most or all of them³¹⁴. Their direct public shareholder is either the MEF (in the case of Enel, GSE, Leonardo, Ferrovie dello Stato Italiane, Rai, STMicroelectronics, ENAV, Sogei, Istituto Poligrafico e Zecca dello Stato, Sogin), or the state-controlled investment bank Cassa Depositi e Prestiti (CDP) and its subsidiaries (in the case of Fincantieri, Snam, Terna, Ansaldo Energia, SIA) or one of the very same SOEs (as with Avio) or a combination of the previous options (in the case of Eni, Poste Italiane, Saipem, Italgas).

³⁰⁸ In 2017, Monte dei Paschi di Siena, Italy's fourth largest bank by assets, was recapitalised by the Ministry of the Economy and Finance, which currently holds 64.2% of its capital (as of June 2022). In the same year, the state development agency Invitalia acquired Mediocredito Centrale, one of the largest banks in the South of Italy, specialising in credit for SMEs.

³⁰⁹ The list excludes the development agency Invitalia and CDP's financial holdings such as Fintecna, CDP Reti, CDP Equity and CDP Immobiliare, which are intermediary shareholders of some operating SOEs or real estate assets.

³¹⁰ CDP owns the export credit and insurance company SACE.

³¹¹ Asset management funds such as AMCO (incorporated in 2019, specialising in NPE management) or CDP's investment funds (CDP Investimenti Sgr, Fondo Italiano d'Investimento SGR, and others).

³¹² These companies are considered to be 'Italian' as they are legal entities taking the form of joint-stock companies incorporated under Italian civil law, with the exception of STMicroelectronics, whose parent company is incorporated in The Netherlands.

³¹³ Followed by TIM (where CDP is the second largest shareholder) and by Autostrade per l'Italia (51% controlled by CDP since 2021).

³¹⁴ As in the French, Chinese, Swedish or South African cases.

Italy's top 20 SOEs have the juridical form of joint-stock companies. Twelve of them are listed on the Milan stock exchange³¹⁵, with a range of share ownership that spans from the 13.75% of STMicroelectronics³¹⁶ to the 71.6% of Fincantieri. Given the dispersed ownership of third-party shareholders, a 25-30% stake in a listed company is sufficient for the state to dominate the annual general meetings of shareholders and to appoint most board members. The other eight companies are unlisted, of which six are 100% state-owned and only two³¹⁷ are majority state-owned with third-party shareholders.

The various shareholding configurations of Italy's SOEs do not seem to correspond to a specific market environment in which they operate (Figure 8.1). Some of the listed SOEs have the larger – sometimes almost complete – source of revenues from regulated monopolistic activities. This concerns most of the energy infrastructure companies (Enel, Snam, Terna, Italgas), but also air traffic control activities (ENAV). Also listed are the large manufacturing and engineering SOEs – prevalently former IRI companies – that constitute national champions competing in the international oligopoly within their respective sectors (Leonardo, Fincantieri, STMicroelectronics, Saipem). 100% state-owned companies are prevalently focused on domestic monopolistic segments (Ferrovie dello Stato, Sogei, Poligrafico e Zecca dello Stato Italiano, GSE, Sogin), as they fulfil specific public duties of national relevance. Avio, Eni and Poste Italiane, are all listed global players in their fields, but part of their business is protected by exclusivity (i.e. postal services and national imports of gas) or by public contracting (Avio). There are no examples of 100% state-owned global competitive players³¹⁸ or cases of unlisted majority SOEs operating in regulated monopolistic segments.

The great bulk of Italy's SOEs are active in the energy sector. Eni and Enel are truly global players, ranking in the top 100 positions of the Fortune 500 Global list (at the

³¹⁵ STMicroelectronics is also listed on the Paris, New York and Euronext stock exchanges. Eni is also listed on the New York stock exchange.

³¹⁶ The parent company of STMicroelectronics is a joint-stock company incorporated in The Netherlands, which is 50% owned by the MEF. ST's Italian activities are operated by a limited liability subsidiary (STMicroelectronics srl) incorporated in the Italian jurisdiction.

³¹⁷ Since 2018, only Ansaldo Energia retained this shareholding configuration as in 2020 SIA merged with the card payment company Nexi, which was already listed on the stock market.

³¹⁸ Fincantieri fell under this category until 2014, when it was listed on the stock market.

83rd and 89th place respectively in 2018). Snam, Terna and Italgas are energy network companies operating mostly in the domestic market.

Eni was until 1992 a public law corporation with a vertically integrated structure – including oil and gas exploration; transport and retail; management of energy infrastructures; mechanical and civil engineering for the oil and gas sectors; chemical transformations; mining and others. At the end of the 1980s, it ranked among the top 5 global oil giants³¹⁹. Despite falling behind other competitors in relative dimensions over the past three decades, Eni remains a global player in the fields of oil and gas exploration, transport and production. Eni is particularly strategic for the Italian economy, as it dominates domestic hydrocarbons exploration and owns the transport rights on the large European and North African networks for transporting natural gas in Europe (it is responsible for 52.3% of total imported and for 76.2% of domestically produced gas in 2018). Eni also owns 100% of Versalis, Italy's largest chemical company.

Enel is the former state monopolist in the electric energy sector. Its transformation into a joint-stock company in 1992, the liberalisation of the electric energy retail market and the unbundling of the transmission grid have greatly reduced its dominant role in Italy. However, as of 2018, Enel is still the largest domestic producer and retailer of electric energy – with shares of 19.4% and 26.9%³²⁰ respectively (Arera, 2019). More importantly, it controls 85% of the electric energy distribution network, a semi-monopolistic segment whose tariffs are regulated by the national authority Arera. In Italy, Enel is also Italy's third largest player in the natural gas market (11% share). Enel is a multinational electric energy utility, with a significant presence in South America and Spain. It claims to be the largest renewable energy operator in the world (with 47 GW capacity in 2018) and the largest electricity distribution company (with 73 million end users).

Previously operating as a subsidiary of Eni, **Snam** is the infrastructure company that owns 32,642 km of domestic gas pipelines (93.2% of the total) and the great majority of national gas storage facilities (with 16.9 billion metre cubes capacity over the

³¹⁹ Ranking 18th in the overall Fortune 500 International list of 1990.

³²⁰ In the 'free market' segment.

national total of 17.8). Snam is particularly strategic for the national energy system, as it operates the 8 entry points³²¹ for imported gas – amounting to 93.1% of total domestic consumption of natural gas, which in turn represents 34.8% of Italy's internal gross consumption of energy³²². All its monopolistic activities of gas transport, regasification and storage are regulated with a fixed remuneration by the national energy authority. Snam is also the EU's leading company by length of gas pipelines owned. In the past years, Snam has expanded internationally, investing in infrastructural assets in Austria, France, Greece and in the UK. It has also diversified in the fields of residential energy efficiency and in green hydrogen technologies, becoming the leading national player in this field.

Italgas is the leading natural gas distribution company in Italy (with a 34% market share) and the third largest operator in Europe, with a network of around 70,000 km and a customer base of 7.5 million users. Until 2016, it was a subsidiary of Snam (which has maintained a minority stake of 13.5%). Italgas also operates in a regulated business, with revenues defined by the national energy authority Arera.

Created as a spin off from Enel (following the unbundling of the once vertically integrated state monopolist), **Terna** is the owner and operator of Italy's electric transmission grid, with 72,856 km of cables, representing 99.7% of the national grid. This is managed under monopoly concession, so that Terna's remuneration is regulated by the national energy authority Arera. Terna is the leading European grid operator and the seventh largest in the world. Its role for the Italian energy system is extremely strategic, not only for the efficiency of the domestic electric energy sector, but also as Terna is responsible for the foreign interconnections (with France, Switzerland, Austria, Slovenia, Montenegro, Tunisia) on which Italy is dependent as a net importer of electric energy – 43,898 GWh in 2018, representing 14.5% of total domestic electric energy consumption.

The other significant – although still heterogeneous – group of SOEs is represented by the large manufacturing and engineering players: Leonardo (and Avio), Fincantieri,

³²¹ Of which 5 interconnected gas pipelines (Tarvisio, Gorizia, Passo Gries, Mazara del Vallo e Gela) and 3 LNG regasification terminals (Panigaglia, Cavarzere e Livorno). In 2020, a new gas pipeline connection (TAP) was inaugurated at Melendugno.

³²² Figures based on the year 2018.

Saipem, STMicroelectronics and Ansaldo Energia. These are truly global leaders in their respective sectors.

Leonardo, formerly known as Finmeccanica until 2016, is the leading Italian company in the aerospace and defence sector – the 11th largest by revenues and the 4th largest by R&D in the world (in 2018). With its AugustaWestland models, it is the world leader in civil helicopters (accounting for more than 40% of the global market). Its civil radars for air traffic control are in use in 200 airports over 110 countries, while its air defence and surveillance radars (about 1,000) have been adopted in 58 countries. Leonardo is the joint producer of the ATR model, a world leader in regional civil aircrafts, and it is the prime contractor of components for the Boeing 787. Leonardo's subsidiaries are also responsible for providing over 50% of the living volume of the International Space Station (Alenia Thales Spazio) and for operating the 170 antennas at Fucino Space Centre (Telespazio), the world's most important teleport for civilian use. Leonardo is a leading member of key international military programmes such as the Eurofighter (multi-role fighter), the Tempest (defence systems), the Eurodrone (unmanned aircraft), the NH90 (helicopter), Fremm (naval systems) and others. In Italy³²³, Leonardo represents a key pillar for a network of 4,000 domestic suppliers (86% of them SMEs), with an order value of 4 billion euros. Leonardo's ecosystem in Italy employs over 124,000 people and its related industries generate 10.5 billion euros in added value (0.6% of Italy's GDP). Leonardo is also the main shareholder of **Avio**, a leading European designer of space launchers (Vega and Ariane for the European Space Agency), a developer of fuel propulsion systems and payload adapters, also involved in R&D programmes for the space sector.

Fincantieri is the largest shipbuilding company in the world outside East Asia, with 20 active shipyards (8 in Italy) distributed over four continents. It is diversified in most shipbuilding segments – cruise ships, naval, ferries, large luxury yachts, offshore vessels, equipment systems – enjoying the world's leadership in the cruise ships production (with a global market share of 45.7% of all cruise ships ordered between 2004-2018). Fincantieri has supplied the US Navy and the US Coast Guard with mod-

³²³ Figures from Leonardo's company profile 'Leonardo 2020 Accelerating technology evolution', referring to the year 2020.

sized vessels for more than 30 years. Only 15% of its revenues are domestic, but 45% of its workforce is located in Italy and 80% of its considerable supply-chain orders are directed to domestic companies (around 5,000 enterprises, for a total order value of 3.3 billion euros in 2018). This translates into a significant economic impact of Fincantieri for Italy's industrial system. It has been estimated³²⁴ that each cruise ship built by Fincantieri, valued between 600 and 800 million euros, generates an additional multiplier value of induced supply activities of 2.1-2.8 billion euros. The overall contribution of Fincantieri to Italy's GDP amounts to an annual average of 1%. On top of its 8,600 direct employees in Italy, Fincantieri's production activate further 42,000 jobs with its supply chain.

Saipem is a global leading company specialising in engineering, drilling and construction of major projects in the energy and infrastructure sectors. In 2020, it ranked 14th among the world's largest international contractors in terms of international revenues³²⁵. Saipem has been formally independent from Eni only since 2015, when the latter reduced its stake to 30.4% and de-consolidated its participation as a financial investment. Due to the nature of its business, Saipem is the most internationalised among Italy's SOEs: only 18% of its total workforce has Italian nationality and less than 10% of Saipem's backlog concerns Italian projects. Traditionally focused on fossil-fuel related engineering and construction (it is the world's leader in offshore E&C), in recent years Saipem has started to transform its core business, moving towards offshore wind (where it has a projected global market share of 3.8% in the years 2022-2025), carbon capture technologies, subsea robotics, green hydrogen generation and transportation.

STMicroelectronics is Europe's largest semiconductor integrated device manufacturer (IDM), ranking among the ten largest producers in the world with a global market share of 1.9% (year 2018). The company – formally registered in The Netherlands – is a French-Italian joint venture³²⁶ with 13 manufacturing sites distributed globally. It designs and manufactures a broad range of semiconductor products: automotive integrated circuits; analog, industrial and power conversion

³²⁴ Figures from Fincantieri's Sustainability Report 2018.

³²⁵ From ENR's 2021 list 'The Top 250 International Contractors'.

³²⁶ The controlling shareholder of STMicroelectronics NV, with a 27.51% share, is STMicroelectronics Holding NV – a financial vehicle owned by the Italian Ministry of the Economy and Finance (50%) and by the French state investment bank Bpifrance (50%).

integrated circuits; general purpose microcontrollers; discrete and power transistors; MEMS and optical sensing solutions; etc. STMicroelectronics is the most advanced native European IDM, with the production of 28nm nodes in the French site of Crolles³²⁷. In Italy, STMicroelectronics employs around one-quarter of its total workforce and more than one-third of its R&D personnel, mostly in the two front-end facilities of Catania and Agrate – the latter in the process of activating a 300mm wafer fab (by the end of 2022).

Ansaldo Energia, based in Genoa, where its two production sites are located, is a leading international player in the power generation sector. It design and build turnkey power plants, gas and steam turbines and generators. It also provides technical consultancy for nuclear activities. In particular, Ansaldo Energia is one of the world's only four producers³²⁸ of large gas turbines (50Hz and over 50MW), with a global market share varying between 8% and 15% in the years 2017-2021.

The Italian system of SOEs is also characterised by the presence of service companies specialised in distribution (Poste Italiane), digital payments (SIA) and TV broadcasting (Rai).

Poste Italiane³²⁹ – the former mail service, now a listed company – is the national mail delivery operator (89% market share) with around 12,800 post offices (one in every Italian municipality) and 35 million clients. In recent decades, Poste Italiane has diversified its activities into four main areas: mail and parcel (with a 37% national market share in the business-to-consumer segment); financial services (with a market share of 13% and 569 billion euros of assets under management); insurance products (it is the largest national player in the life insurance segment with a market share of 14.7%); digital payments and mobile services (it is the largest national player by cards issued, digital wallets and e-commerce transactions, with a market share of 25%). Relative to the year 2019, Poste Italiane estimated an overall impact on the national economy of 12.5 billion euros (0.7% of Italy's GDP) and a total activation of 189,000

³²⁷ As of 2021.

³²⁸ The other three manufacturers being General Electric, Siemens and Mitsubishi, with similar market shares.

³²⁹ Figures for Poste Italiane refer to the year 2020 and are taken from 'Poste Italiane 2024 Sustain & Innovate' (Capital Markets Day, 19 March 2021).

jobs (of which 127,000, Poste Italiane's employees). In the same year, Poste Italiane purchased around 2.4 billion euros in goods and services from Italian suppliers, of which 2,300 SMEs (representing 48% of total purchases).

SIA was a leading European company in the design, creation and management of technology infrastructures in digital payments, cards, network services and capital markets, with presence in more than 50 countries. Financial intermediaries, central banks, corporations and public administrations were among its 2,300 clients. SIA was the largest card processor in Italy (second in Europe), and the leader in cross-border transactions in Europe. Between 2020 and 2021, it merged with the digital payments companies Nexi (Italy) and Nets (Denmark and Norway) to become continental Europe's leading payment systems company by transaction volumes, cross-border payments, number of merchants and number of cards³³⁰. Following this merger, the Italian state has currently³³¹ diluted its participation in the new Nexi group³³², becoming the second largest shareholder with CDP's 13.6% and with Poste Italiane's 3.6% stakes.

Rai is the national public broadcasting company. Rai is subject to legal provisions assigning special supervisory controls to the Italian Parliament in designating its directors. Rai is primarily involved in TV broadcasting, with 14 channels that make it the largest operator in the country (with a 36.25% share in 2018). At the same time, it operates 13 radio national stations. Rai is a cinema producer and runs one of the world's largest free digital platforms (RaiPlay) with streaming channels, TV shows, series and films. It is also the owner of the leading operator (Rai Way) in the Italian radio-television infrastructure and transmission market (revenues share of 16.2% in 2018), with 2,300 broadcasting towers covering the entire national territory.

Another group of SOEs represents companies that, as autonomous state bodies, used to be the operational arms of the Ministry of Transport and the Ministry of Public Works in railways (Ferrovie dello Stato Italiane), in the aviation sector (ENAV) and in national roads management (ANAS).

³³⁰ From the Nexi corporate presentation 'Creating a Fully Integrated European PayTech Leader: Strategic Combination Between Nexi and Sia' (5 October 2020).

³³¹ As of June 2022.

³³² Following Nexi's IPO in 2019, the Nexi-Sia group is listed on the Milan stock exchange.

Ferrovie dello Stato Italiane (FS) is Europe's largest integrated rail and roads operator³³³ with respect to the number of people serviced and to the total amount of fixed investments, managing around 16,800 km of railway network (of which 1,500 km high-speed tracks), 26,000 km of roads and 1,300 km of highways. FS also operates transport services: 9,000 regional and high-speed trains with around 600 million passengers daily (it is Europe's 3rd largest train operator in passenger-kilometres), as well as cargo and logistics services (with 50 million tons of goods transported yearly). Since January 2018, FS is also the owner of the national road and highways operator ANAS, previously an autonomous company owned by the MEF. FS's 2019-2023 industrial plan estimated that its 58 billion euros of planned investments would activate a supply chain of 100,000-120,000 jobs and 25-35 billion euros of annual gross production. The annual contribution of FS's supply chain is valued around 0.7-0.9% of national GDP.

ENAV is the sole national provider of air traffic control and navigation services, entrusted by national law without time limit (around 95% of its total revenues comes from regulated tariffs). ENAV is the fifth largest air navigation service provider in Europe: it manages around 2 million flights annually, controlling over 732,000 km² of air space, through 45 airport control towers and 4 area control centres.

Finally, the remaining group of SOEs are companies that provide services and goods to the public administration. **GSE** assists the Ministry of Economic Development in developing its energy policy, managing the system of fiscal incentives for the installation of renewables and for other energy efficiency measures. **Sogin** is the company responsible for decommissioning former nuclear plants and for managing their radioactive waste. **Sogei** is an IT company that provides in-house services for the digitalisation of the public administration, specialising in digital solutions for the tax authorities. **Istituto Poligrafico e Zecca dello Stato** (State Mint and Polygraphic Institute) is the national company responsible for producing coins, passports and other official documents, postage stamps, car plates, various publishing products, and others.

³³³ Figures from 'FS Italiane Group: Investor Presentation' (October 2019), with reference to the year 2018.

Number	Commercial companies	Sector	Revenues	Net results	Dividends	Dividends to the state shareholder	Payout ratio	Dividend yield	Fixed investments	R&D expenditure	Employees	Employees in Italy	Market Capitalisation	Ranking among Italian companies	State-controlled shareholders
1	Eni	Energy, oil and gas	76,938	4,126	2,954	889	72%	5.9%	9,119	197	31,701	20,576	49,695	1°	25.76% CDP; 4.34% MEF
2	Enel	Electric energy	75,672	4,060	2,847	672	70%	5.7%	8,152	135	69,272	28,134	50,254	2°	23.59% MEF
3	GSE	Renewable energy	32,280	9	5	5	52%	-	130	0	1,275	1,275	Unlisted	3°	100% MEF
4	Leonardo	Aerospace, defence and electronics	12,240	509	81	24	16%	1.8%	508	1,440	46,462	29,244	4,413	7°	30.2% MEF
5	Ferrovie dello Stato Italiane	Railway transport	12,078	559	150	150	27%	-	7,500	27	82,944	75,944	Unlisted	8°	100% MEF
6	Poste Italiane	Postal services	10,864	1,399	574	369	41%	6.3%	538	12	134,360	134,360	9,120	9°	35% CDP; 29.26% MEF
7	Saipem	Industrial engineering	8,538	-410	0	0	0%	0%	485	32	31,693	5,703	3,286	15°	30.54% ENI; 12.55% CDP Equity
8	Fincantieri	Shipbuilding	5,474	69	17	12	24%	1.1%	161	122	19,274	8,662	1,500	25°	71.64% CDP
9	Snam	Gas pipelines	2,586	960	731	222	76%	5.9%	882	77	3,016	3,016	12,606	66°	30.37% CDP Reti; 1.4% Bank of Italy
10	Rai	TV broadcasting	2,578	0	0	0	0%	-	104	14	12,805	12,805	Unlisted	67°	99.56% MEF

Number	Commercial companies	Sector	Revenues	Net results	Dividends	Dividends to the state shareholder	Pay-out ratio	Dividend yield	Fixed investments	R&D expenditure	Employees	Employees in Italy	Market capitalisation	Ranking among Italian companies	State-controlled shareholders
11	Terna	Electric grid	2,319	772	451	135	71%	4.7%	1,035	56	4,252	4,252	9,507	77°	29.85% CDP Reti
12	STMicroelectronics	Semiconductors	8,417 [1,760]	1,124 [24]	188 -	27 -	17% -	2.0% -	1102 [280]	1221 [400]	45,953	[10,266]	10,873 -	[109°]	13.75% MEF 100% STM
13	Italgas	Gas pipelines	1,176	314	168	67	54%	4.2%	523	0	3,619	3,619	4,036	186°	26.05% CDP Reti; 3.5% Snam
14	Ansaldo Energia	Energy engineering	1,172	-232	0	0	0%	-	127	109	4,086	4,086	Unlisted	187°	59.9% CDP Equity
15	ENAV	Air traffic control	890	114	101	54	88%	4.4%	110	7	4,114	4,114	2,300	241°	53.28% MEF
16	SIA	Electronic payment systems	615	80	60	50	75%	-	18	34	3,465	1,791	Unlisted	337°	49.5% FSIA Investimenti
17	Sogei	Information systems	539	28	28	28	100%	-	32	14	2,164	2,164	Unlisted	388°	100% MEF
18	Istituto Poligrafico e Zecca dello Stato	Publishing	460	57	54	54	95%	-	95	61	1,736	1,736	Unlisted	441°	100% MEF
19	Avio	Aerospace	440	26	10	3	39%	3.4%	23	196	850	850	291	466°	25.88% Leonardo
20	Sogin	Nuclear decommissioning	212	4	2	2	63%	-	34	-2	1,173	1,173	Unlisted	802°	100% MEF

Table 8.2: Italy's 20 largest SOEs by revenues (year 2018). Source: Author's elaboration on the companies' annual reports. Notes: 1) Figures on revenues, net results, dividends, investments, R&D and market capitalisation are all expressed in millions of euros; 2) STMicroelectronics's figures refer to the consolidated group (upper values in euros, converted from USD values) and to the Italian subsidiary (lower value in squared brackets), whose capex and R&D expenditures are estimated from the annual average over the period 2016-2020; 3) Pay-out ratios are calculated as the share of dividends distributed over net profits in the same year (2018), rather than over net profits of the previous year.

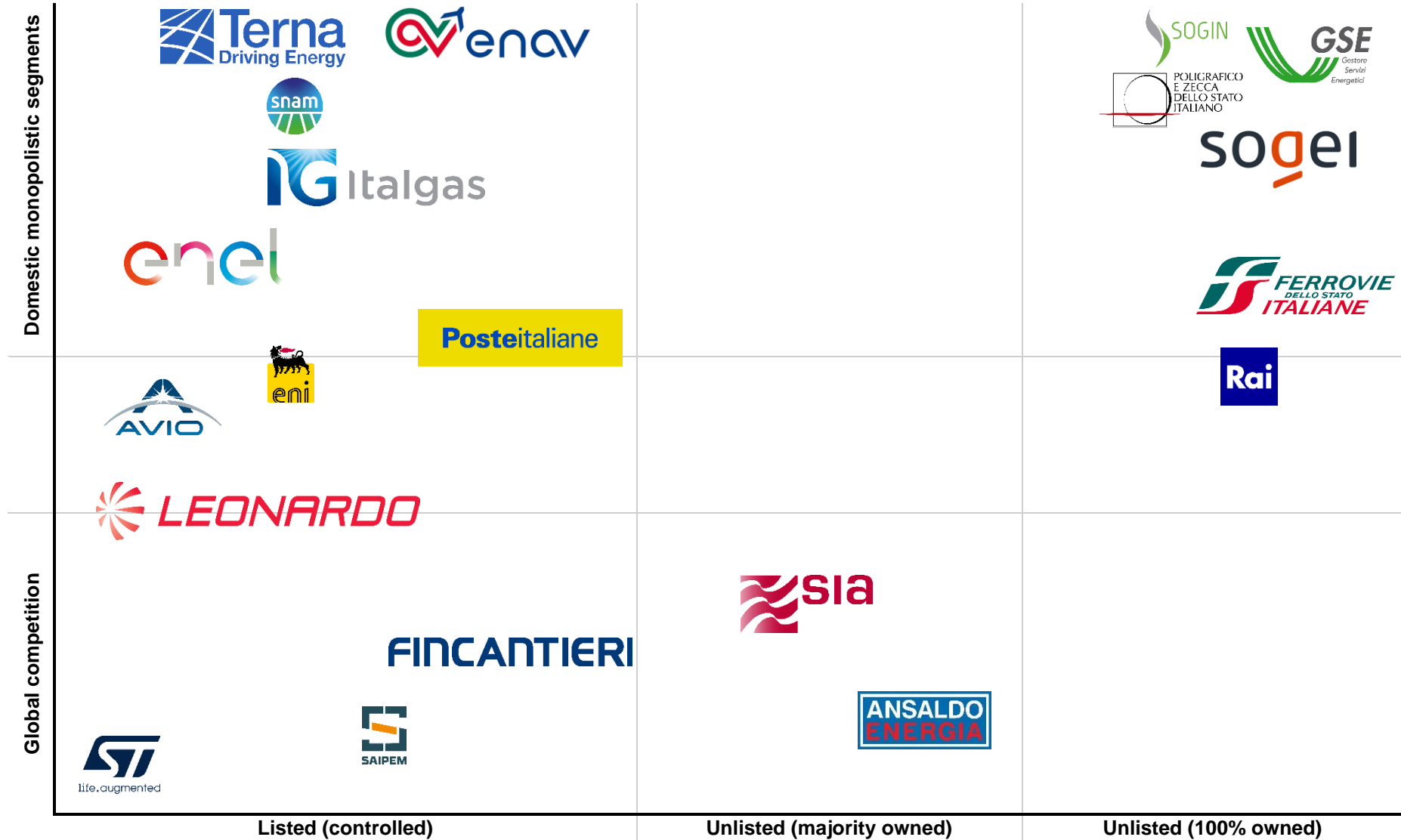


Figure 8.1: Italy's system of SOEs illustrated according to the shareholding arrangement of the single companies and to the market environments in which they mainly operate. Source: Author's elaboration.

2.2. The quantitative relevance of Italy's SOSOEs

Given the considerable magnitude of each individual SOE, it is worth investigating the dimensions of the Italian SOSOEs, in absolute terms but also relative to the national economy. As reported in Table 8.3, Italy's SOSOEs consists of more than 500,000 employees, of which more than 350,000 operating in Italy. This points to a significant internationalisation of the system – more than 30% of its workforce operates abroad. If consolidated under a single entity³³⁴, total revenues³³⁵ would amount to 255.5 billion euros.

With respect to the national business enterprise sector³³⁶, these top 20 SOEs account for 2.9% of its total workforce, for 8.1% of its total revenues, for 17% of its total fixed investments and for 18.4% of its overall R&D expenditure. These figures confirm that Italian SOEs operate in highly capital- and research-intensive sectors.

	Number	Revenues	Investments	R&D	Employees
Total	20	255.5 bn	-	-	504,214
(In Italy)			(17.4 bn)	(2.9 bn)	(353,770)
National share	-	-	5.5%	11.6%	1.4%
Enterprises share	0.0005%	8.1%	17.0%	18.4%	2.9%
Enterprises share (>250 emp.)	0.51%	22.5%	39.8%	35.4%	9.2%

Table 8.3. Aggregate economic figures for the 20 largest Italian SOEs. *Source:* Author's elaboration based on companies' financial reports and Istat data. *Notes:* Revenues, investments and R&D expenditures are reported in euros.

As for their financial performance (Table 8.4), only two companies³³⁷ were recording net losses in 2018. The aggregate sum of net profits amounted to 14.3 billion³³⁸ euros, resulting in a profit rate of 5.6% overall. 58.9% of total net profits was distributed in dividends (representing a 3.5% dividend yield relative to the listed companies), resulting in 2.8 billion euros dividends accruing to the state shareholder for its part. This corresponds to 0.6% of total budget receipts of the central government.

At the same time, third-party shareholders gained 5.7 billion euros in dividends, equivalent to 39.6% of aggregate net profits. Finally, Italian SOEs dominate the Milan

³³⁴ This consolidated entity would hypothetically rank at the sixth position in the Fortune Global 500 list relative to the year 2018 (with \$301.4 bn converted with average dollar/euro exchange rate in 2018, from BIS Statistics).

³³⁵ Revenues include the group STMicroelectronics NV.

³³⁶ The following figures refer to fixed investments, R&D expenditures and employees in Italy.

³³⁷ Saipem and Ansaldo Energia, with net losses of 410 and 232 million euros respectively.

³³⁸ Net profits include the group STMicroelectronics NV.

stock exchange, with an overall value of 147 billion euros at the end of 2018, representing 27.1% of the total stock market capitalisation.

	Total	Ratios	
Cumulated net profits	14.3 bn	5.6% over total revenues	
Dividends	8.4 bn	58.9% dividend payout ¹	3.5% dividend yield
Dividends to the state	2.8 bn	0.6% over total receipts of the central government	
Dividends to third parties	5.7 bn	39.6% share of net profits distributed to third parties	
Market capitalisation	147 bn	27.1% over total market capitalisation	

Table 8.4: Aggregate financial figures for the 20 largest Italian SOEs. Source: Author’s elaboration based on companies’ financial reports and Istat data. Notes: ¹The pay-out ratio is here calculated as the ratio between cumulated net profits and total dividends over the same year (2018).

Two key elements emerge from the presentation of Italy’s system of SOEs. First, Italian SOEs often qualify as internationally competitive players in their respective sectors, with considerable global market shares and technological capabilities. Second, given their large dimensions, these companies represent fundamental actors in the national economy: business plans of SOEs tend to coincide with national policies in the sectors where they operate.

Therefore, the governance of Italy’s SOSOEs assumes an implicit but direct impact on the country’s economic development. The way in which it is organised and oriented matters, creating space for significant policy opportunities (see Chapter 10 for a policy proposal).

3. The governance of Italy’s SOSOEs

The interviews with top executives of Italy’s leading SOEs have been instrumental in defining the governance of the current Italian SOSOEs³³⁹. Eight broad analytical issues have been identified, divided into those referring to the internal organisation of each SOE, and others reflecting their external interactions.

Among the first group of issues, the interviews have dealt with:

1. The missions of Italy’s SOEs.
2. The philosophy of SOEs’ management.

³³⁹ All quotes reported below in this section are author’s translation from Italian.

3. The role of SOEs' executives.

The second group has investigated:

4. The relationships of SOEs with the controlling state shareholder.
5. The role of minority third-party shareholders.
6. The interactions with other SOEs.
7. The connection with the national productive system.
8. The alignment with national industrial policies.

3.1. The missions of Italy's SOEs

The missions of Italy's SOEs are largely internal and focused on their specific business activities. They can be summarised with the expression "to be the best in our sector". Missions can also be very general statements such as this one reported by a manager:

The sense of our mission is to do business, producing with strong attention to efficiency and to the creation of value.

Apart from few exceptional and not formally stated cases, there is little or no mention to any external socio-economic objective in the main mission statements of Italy's SOEs. The recognition of their *objective* national systemic relevance is left to the *subjective* sensibility and evaluation of the management teams.

Missions are also mainly self-attributed. Their definition is based on historical factors, as suggested by one manager:

The definition of [company name]'s mission and role comes from history.

In other cases, it is the result of the subjective interpretation of the company's management in the context of changing socio-technological conditions, as reported by another manager:

Q: Who assigns the mission?

A: For sure not the state, but rather the society.

Q: Based on which criteria?

A: Objective criteria that one faces looking at the evolution of the world.

As ascertained also by the OECD (2021a), Italy's state shareholder does not assign any formal public mission to its SOEs. This is further confirmed by the lack of any explicit policy rationale for state ownership.

3.2. The philosophy of SOEs' management

Italy's SOEs do not present a fundamentally distinct managerial approach compared to similar privately-owned companies, as one manager admitted:

Q: What distinguishes your company from a hypothetical privately-owned counterpart operating in the same sector?

A: Absolutely nothing. [...] Those working in this sector operate in a certain way because society needs it, not because the state is a shareholder.

Others were more cautious, but admitted that the 'state-owned' nature of the companies had little or no influence over their managerial conduct:

I am inclined to believe that our conduct, even if we were entirely privately-owned, would not differ much from what we are now.

Despite displaying reservations towards the obsession for short-term profit maximisation, managers of Italy's SOEs do not refute a management-by-number philosophy for their companies, based on financial performance indicators – as appearing from their industrial plans and investors presentations. The generous dividends policy and buybacks programmes that some SOEs adopt are willingly accepted, although few managers expressed some reservations. One of them argued:

To be state-owned does not mean that we are not a business enterprise. On the contrary, I believe that being profitable is the first condition to avoid becoming another entity. But public ends should regulate investment returns.

Within a shared profit-oriented managerial approach and considering structural differences deriving from the various sectoral activities, the defining variable that seems to determine the managerial philosophy of Italy's SOEs appears to be whether they are listed or not. As remarked by two different managers:

[1] The sole perception of the existence of a top-down command and control element is a contradiction for a listed company. [...] Because the company is either state-owned or it is not. There is no intermediated model.

[2] 'State-controlled' is a controversial expression. Listed companies are controlled by two organs: the shareholding meetings and the board of executives. There is

no single shareholder that controls them, where it be the case, things would be complicated.

Leaving aside the personal – and partially ideological – views of single managers, listed state-controlled companies are subject to a different legal discipline compared to non-listed SOEs. The presence of third-party investors – often of institutional and foreign nature – creates pressures for the maximisation of their shareholder value and for a generous distribution of dividends, at the expense of the internal reinvestment of free cash flows.

When one of the listed SOEs has a systemic national importance (for instance those in the energy sector), their public institutional role does not vanish entirely. At the same time, the capacity to reinvest their surpluses for technical improvements (or lower tariffs) is partly compromised. As admitted by a manager of a listed SOE with respect to a company's ability to fulfil broader national economic objectives:

For SOEs with systemic responsibilities, the listing on the stock market could be lethal.

3.3. The role of SOEs' executives and board members

As reported by the OECD (2021a), the appointment of SOEs board members is a matter of political influence, formalised by the MEF. Contrary to other systems of SOEs (e.g. in France, Austria, Canada, etc.). There are no state appointees on Italy's SOEs boards, only observers with no voting rights.

During the interviews, several managers have lamented that the appointment process is mostly focused on the key figures of the CEO and of the Chairperson. Too little attention is devoted to the technical and sectoral competences of other members of the boards. One manager suggested:

There needs to be an enhancement in the competences of the board's members, so that the board could also discuss about technologies and investments, not mere procedural rules.

This would replicate the competences of the management team also within the board of executives, facilitating the elaboration of coherent strategies.

The second issue concerns the autonomy of the boards of executives from the various stakeholders (including the shareholders), which the managers would like to be as

higher as possible. One manager restated the provision of the Italian Civil Code, arguing:

When the members of the board are nominated, they operate in the exclusive interest of the company, not the [state] shareholder.

A few managers (of listed companies) would also separate the board from its shareholders at the very moment of its renewal. They delineate a kind of 'self-governed' board of executives, where the latter suggests the list of new potential CEOs and board members to the shareholders assembly. This would increase further the already significant separation between control and ownership within the SOEs, making even more difficult for the state shareholder to implement any policy mandate through its SOEs.

The separation and complete autonomy of the executives from the state shareholder, particularly strong in the case of listed SOEs, is coherent with their dichotomous vision on state ownership. According to most executives, organisations involved in economic activities can either be *formally* public agencies or *substantially* private enterprises, any intermediate formula would be considered incoherent and distortive.

3.4. The relationship of SOEs with the controlling state shareholder

The ultimate shareholder of the system of SOEs is the Ministry of the Economy and Finance (MEF). Nevertheless, the interactions between the SOEs and the controlling Ministry over strategic industrial decisions are limited and subject to voluntary informal initiatives by the managers.

As reported in section 3.1., the Ministry refrains from assigning strategic mandates to its controlled enterprises. This is formally justified by the legal provisions of the Italian Civil Code on joint-stock companies³⁴⁰, attributing to the board of executives a significant degree of decision-making autonomy and protection (Cossu, 2018). In practice though, shareholders could exert a significant pressure on the management, based on their ultimate appointment and revocation powers.

³⁴⁰ Article 2380-bis of the Italian Civil Code states "the management of the company is exclusively entitled to directors, who carry out the necessary actions for the implementation of the corporate purpose".

In the Italian case, the state shareholder is largely indifferent to the managerial conduct of its SOEs. The two most intense interactions in the MEF-SOEs relationship happen with the appointment of the boards' members and with the approval of the annual financial statements.

Furthermore, contrary to most OECD countries, the Italian state shareholder does not produce annual aggregate reporting on either the entire SOE sector or on a portfolio of SOEs (OECD, 2021a). Reporting on SOEs is performed on an *ad hoc* basis and the coverage is mostly about 'financial performance and value'. The reporting entity is the State Court of Auditors, rather than the shareholding Ministry (OECD, 2022b).

The following quote from an SOE manager is very descriptive of the relationship between the state shareholder and its controlled companies:

As far as the engagement [on strategic industrial decisions] with the board is concerned, there is no interaction with the controlling shareholder. One could defend herself behind the claim of being 'market-oriented'. But we should not be like that, otherwise one should explain why the state holds an equity stake in my company. The political sphere thinks it can control what happens in the companies with the 'who', not with the 'what', so that everything is reduced to the issue of appointments. The 'what' has disappeared [...] I think that when the state is a significant shareholder, it should indicate what the company should do and with which criteria.

Other managers reported a similar detachment from the public shareholder – here some examples are reported:

[1] The [state] shareholder has nothing to say when it sees that the company works for the society, delivers dividends, does not destroy value.

[2] When we ask the MEF if we can make a new acquisition in an 'x' country, they react by saying that it is up to us to take a decision in one way or another.

[3] Today the MEF is a non-operative and silent shareholder.

[4] I would say that today the state does not behave as a classic private holding group.

Part of the explanation for the lack of any strategic orientation by the state shareholder derives from its delegation of the technical supervisory aspects to the sectoral ministries. SOEs entertain constant interactions with the public authorities, but they do it through their sectoral ministry, rather than with their shareholder entity. As one manager put it:

I meet frequently with officials from the MEF, but I do it on a voluntary basis, to update them. For our necessities, we have more frequent interactions with the MISE [Ministry of Economic Development], with the Ministry of the Environment, and with the Ministry for Culture.

Nevertheless, the interactions between SOEs and their sectoral ministries are not aimed at defining national industrial strategies together. The SOEs seek to establish a privileged access to the ministry in order to remove bureaucratic obstacles and to make sure the relevant legislation is approved on time and accordingly. The ministry, on the other side, have the responsibility to supervise SOEs' activities, most of them in regulated sectors. These are exchanges that would take place notwithstanding the ownership nature of the companies. Due to their sectoral specificity and systemic impact, these companies would entertain recurring institutional relations with the transport, energy, defence ministries even if they were entirely privately owned.

A further distinctive factor must be highlighted separately: the engagement with the public shareholder on strategic objectives is stronger when SOEs are directly controlled by CDP or by one of its financial subsidiaries. In that case, CDP's holding nature has enabled a clearer rationalisation of the SOEs according to their sectoral specificities. One manager observed:

As a good majority shareholder, [CDP] seeks to promote a certain coherence among its participations. This is very helpful because its observation point from above enables the exploration of synergies and common projects that those who operated daily in their own field cannot see.

For instance, CDP Reti has been created in 2012 as a financial vehicle that groups together the three energy infrastructure SOEs – Terna, Snam and Italgas. In 2014, CDP Reti's capital was opened to a subsidiary of State Grid Corporation of China (35%) and to Italian institutional investors (5.9%). Similarly, CDP Equity was established in 2011 to acquire mostly minority (but also controlling) stakes in companies of major national interest with a stable economic and financial position. Finally, in 2019 the Fincantieri and Saipem participations were grouped under CDP Industria, a new holding for strategic equity investments by the CDP group in the industrial sector.

By virtue of it being a business-like organisation, CDP is more naturally inclined to consider its direct shareholdings as operating subsidiaries of a unitary – although not

integrated – industrial group³⁴¹. Given CDP's higher degree of managerial autonomy, the relationship between the public shareholder and the SOEs is more dynamic and open to within-group joint initiatives.

The potential for a different management of the CDP-controlled SOEs emerged in CDP's 2019-2021 Industrial Plan, which declared the intention of managing the "strategic equity investments portfolio with an industrial long-term vision". In particular, the plan sought to reorganise the corporate structure of its participations according to the main sectors of activity, to develop specific industrial competences and sector-related knowledge within the CDP group, to promote specific initiatives of common interest among CDP-controlled companies and to increase collaborations among them.

Most managers of CDP-controlled SOEs recognised the strategic importance of this evolution in their relation with the shareholder, despite being aware that this would imply a change in CDP's internal organisation and competences. As remarked by one manager:

If CDP wants to become an industrial group it has to integrate elements with knowledge of industry, sectors and technologies.

This more 'industrial' approach towards SOEs, confirmed by the CDP managers at that time (2020), appears to have been side-lined with the latest 2022-2024 plan, which limits CDP's role to a 'stable shareholder', leaving out any reorganisation of its shareholdings along the logic of an industrial holding group.

3.5. The role of minority third-party shareholders

Among the 20 largest Italian SOEs, 14 are not 100% owned by public entities, thus allowing for the existence of minority third-party shareholders. In two cases (Ansaldo Energia and SIA) the minority shareholders are industrial partners that operate in similar sectors. As for the 12 listed SOEs, the third-party shareholders are prevalently retail or institutional investors, with the exceptions of the three SOEs controlled by

³⁴¹ Within its structure CDP distinguishes among four different shareholding configurations: control, *de facto* control, significant influence, joint control.

CDP's subsidiary CDP Reti – where State Grid Corporation of China's 35% stake allows the appointment of a representative in the boards of Snam, Terna and Italgas.

The role of minority third-party shareholders is not neutral. Once again, in listed SOEs shareholders are typically financial institutions or households whose main interest is to maximise the return of their investments. They are not involved in the direct management of the SOEs, as long as the latter is able to satisfy their main objective. As one manager reported:

Every year, our second largest shareholder sends us a letter suggesting that we operate in a way that reflects what we do already.

This nonetheless presents a potential downside: it creates pressure for the short-term maximisation of the stock market value and for a generous distribution of annual dividends. A managerial approach that seeks to retain and reinvest the company's profits could be seen as less favourable by this category of shareholders, which might pull out of their investments.

Third-party shareholders in non-listed companies are instead industrial partners that can share technological know-how, access to markets and co-invest in new initiatives. In Italy's system of SOEs there are only two instances of this (Ansaldo Energia, SIA³⁴²), plus the hybrid formula of CDP Reti, as previously mentioned. In this case, a manager from one of the three energy infrastructure companies controlled by CDP Reti reported that due to State Grid's presence as a minority shareholder they were able to enter the Chinese market as partners and consultants. In the case of Ansaldo Energia, the shareholding partnership with Shanghai Electric – a subsidiary of the state-owned State Power Investment Corporation, one of the largest electricity generation companies in China – was formalised in 2017 with an agreement³⁴³ that enabled Ansaldo Energia to penetrate the Chinese market with the realisation of two power generation plants near Shanghai, endowed with Ansaldo's GT36 maxi gas turbines. It must be noted that this shareholding arrangement happened only within CDP, thus

³⁴² Not anymore with respect to SIA, having merged with the listed Nexi in 2020.

³⁴³ From Ansaldo Energia's press release 'A stronger partnership between Ansaldo Energia and Shanghai Electric' (16 July 2017).

confirming the more proactive nature of the latter – relative to the MEF – in promoting industrial initiatives with their controlled SOEs.

Table 8.5 summarises the shareholding structure of non-100% owned SOEs by type of investors and geographical origins, reporting also their top shareholders. It emerges that institutional investors dominate the shareholding structure of most SOEs – in the cases of Eni, Enel, Leonardo, Terna and Snam, they account for more than half of their share capital. Retail investors, mostly domestic, play a marginal role.

More relevantly perhaps is the geographical distribution of SOEs' non-controlling shareholders: in the cases of Eni, Enel, Leonardo, Snam, Terna, Italgas and STMicroelectronics, more than 40% of shareholders are foreign, of which more than half are non-European. These SOEs accounts for around 88% of total distributed dividends in 2018, implying that more than one-third of the total dividends generated by Italian SOEs are distributed to non-Italian investors. Thus, foreign investors considered together receive a higher amount of dividends than the Italian state does from its SOEs.

Investors						
	By type	%	By origin	%	Top shareholders	%
Eni Jan 2020	Italian state	30.3	Italy	55.3	1. CDP	26.1
	Institutional	50.4	Non-Italy	43.6	2. MEF	3.93
	Retail	18.1	<i>of which:</i>		3. Unicredit	1.96
	Self-owned	1.1	UK and Ireland	6.1	4. Norges Bank	1.55
			Other EU	14.1	5. PBOC	1.01
			USA and Canada	11.9		
			Rest of the world	11.5		
Enel Dec 2020	Italian state	23.6	[Institutional]		1. MEF	23.58
	Institutional	62.3	Italy	6.7	2. BlackRock	5.08
	Retail	14.1	Non-Italy	93.3	3. Capital Group	4.96
			<i>of which:</i>		4. FIL International	3.60
			France	5.5	5. Norges Bank	2.57
			UK	13.3		
			Germany	6.4		
			Rest of Europe	15.3		
			North America	46.4		
			Rest of the world	6.4		
Leonardo Feb 2022	Italian state	30.2	[Institutional]		1. MEF	30.20
	Institutional	51.8	Italy	6.7	2. BlackRock	4.98
	Retail	17.5	Non-Italy	93.3	3. Deutsche Bank	3.60
	Self-owned	0.5	<i>of which:</i>		4. GMO	2.05
			France	7.1	5. Norges Bank	1.52
			UK	26.4		
			Rest of Europe	8.5		
			North America	46.4		
			Rest of the world	4.9		
Poste Italiane Apr 2022	Italian state	64.3	[Institutional]		1. CDP	35.00
	Institutional	23.6	Italy	21.4	2. MEF	29.3
	Retail	11.8	Non-Italy	79.6	3. Discovery	0.49
	Self-owned	0.4	<i>of which:</i>		4. Engadine Partners	0.48
			Scandinavia	7.4		
			UK	9.3		
			Rest of Europe	20.8		
			North America	28.3		
			Asia and Oceania	2.6		
			Rest of the world	10.1		
Saipem Dec 2021	Italian state	43.1	Italy	73.2	1. Eni	30.54
	Unknown	54.8	Non-Italy	26.8	2. CDP	12.55
	Self-owned	2.1	<i>of which:</i>		3. Dodge & Cox	5.69
			UK and Ireland	4.1	4. Marathon	5.10
			Rest of Europe	7.0	5. Capital Group	4.94
			Americas	15.1		
		Rest of the world	0.7			
Fincantieri Dec 2021	Italian state	71.3	Unknown	-	1. CDP	71.32
	Unknown	28.7			2. Marshall Wace	0.69
					3. Fosse Capital	0.67
Snam Apr 2022	Italian state	32.8	Italy	52.6	1. CDP Reti	31.4
	Institutional	50.1	Non-Italy	47.1	2. Romano Minozzi	7.5
	Retail	16.8	<i>of which:</i>		3. Lazard	5.4
	Self-owned	0.3	Continental Europe	13.0	4. BlackRock	3.6
			UK and Ireland	13.7		
			USA and Canada	16.3		
		Rest of the world	4.1			

Investors						
	By type	%	By origin	%	Top shareholders	%
Terna May 2020	Italian state	29.9	Italy	51	1. CDP Reti	29.85
	Institutional	53.8	Non-Italy	49	2. Lazard	5.1
	Retail	16.3	<i>of which:</i>		3. Norges Bank	1.6
			UK and Ireland	12.3	4. Inarcasa	1.1
			Rest of Europe	17.5		
		USA and Canada	14.9			
		Rest of the world	4.3			
ST June 2022	Italian state	13.8	Unknown	-	1. ST Holding NV	27.5
	French state	13.8			2. BlackRock	6.2
	Other	72.5			3. Capital Group	5.1
					4. Société Générale	5.0
Italgas Dec 2021	Italian state	40.9	Italy	57.0	1. CDP Reti	26.0
	Institutional	45.8	Non-Italy	43.0	2. Snam	13.5
	Retail	9.0	<i>of which:</i>		3. Lazard	9.2
			Continental Europe	10.1	4. Romano Minozzi	4.3
			UK and Ireland	10.2	5. BlackRock	4.8
			USA and Canada	20.1	6. Crédit Agricole	3.4
		Rest of the world	2.5	7. Bank of Italy	1.4	
Ansaldo Energia Dec 2018	Italian state	60	Italy	60	1. CDP Equity	60
	Chinese SOE	40	Non-Italy	40	2. Shanghai Electric	40
Enav Oct 2018	Italian state	53.4	Unknown	-	1. MEF	53.4
	Institutional	41.0				
	Retail	5.6				
Avio June 2022	Italian state	29.6	Unknown	-	1. Leonardo	29.6
	Other	67.2			2. Space Holding	4.1
	Self-owned	4.2			3. In orbit	4.1
SIA Dec 2022	Italian state	49.5	Italy	~95	1. FSIA Investimenti	49.5
	Institutional	43.9	Non-Italy	~5	2. F21 Reti Logiche	17.1
	Other	6.6			3. Orizzonte	8.6
					4. Banco BPM	4.8
					5. Intesa Sanpaolo	4.0
					6. Unicredit	4.0
					7. Banca Mediolanum	2.9
					8. Deutsche Bank	2.6

Table 8.5: Ownership structure of Italy's SOEs with minority third-party shareholders. *Source:* Author's elaboration from companies' corporate governance reports and annual reports. With the exception of Snam, Terna and Italgas, figures on the companies' current major shareholders are taken from Amadeus Database (accessed on June 2022). *Notes:* bold represents state shareholding entities and shareholders of Italian origins.

3.6. The interactions with other SOEs

Intra-SOEs interactions are mostly based on commercial relations concerning the supply of products or the access to a particular service provided by the company. Joint partnerships on new business or technological ventures are instead episodic and left to the initiative of the single executives. Once again, these have been more frequent among CDP-controlled SOEs, as the interviewed executives confirmed.

The concept of ‘interactions’ here has to be conceived as compatible with EU competition rules – particularly those concerning anti-competitive agreements (Article 101 TFEU) and mergers (EC Merger Regulation 139/2004). In fact, Italy’s SOEs business activities are almost never overlapping – with the only exclusion of the electricity and gas retail activities of Eni and Enel. Intra-SOEs interactions here are not meant as operations to fix prices in a given market, but rather as the joint development of new technologies or the establishment of new entrepreneurial initiatives.

Given the lack of a unitary impulse for entrepreneurial interactions from its controlling shareholder, the systemic economic impact of Italy’s SOEs appears underutilised. Several executives of the SOEs actively oppose a more intense and policy-oriented coordination of their activities. This is exemplified by the following exchange:

A: There is a global competitive environment where the interaction between two companies is mutually beneficiary, but it is essentially market driven.

[...]

Q: If the state shareholder were to push for more joint initiatives among SOEs, how would you react?

A: By answering ‘yes’ every time we could, meaning that the market eventually decides.

As another manager reported, some SOEs deliberately avoid collaborations even when it comes to accessing international markets. Since SOEs compete on the same domestic market only on rare occasions, a strategic coordination among them could not be accused of being collusive. Instead, the non-collaborative behaviour of SOEs creates frictions that hamper the development of promising initiatives.

Nevertheless, a considerable number of the interviewees welcomed the possibility of a more formalised coordination of SOEs around joint industrial initiatives:

[1] We need more systemic sensibility among [SOEs'] managers. [...] The willingness to adopt a systematic approach simply is not there.

[2] One of the greatest problems is the lack of collegiality and discussion [...] Osmosis and contamination must be at the foundation of our relationship. Isolation brings a disadvantage to the 'Country-system'.

[3] I can assure you that there is a great desire from my technical collaborators to have a dialogue with other counterparts. If you can bring together different experiences, you obtain an immense value added.

3.7. The connection with the national productive system

The impact of Italian SOEs on the national productive system is self-evident through the quantitative weight that those companies have in terms of direct employment, investments, R&D activities and purchasing of intermediate goods and services. However, each SOE has its own sectoral specificity. SOEs involved in the management of energy, physical infrastructures and digital networks underpin the competitiveness of the entire national economy. SOEs and their managers are aware of their systemic and strategic nature, but they refrain from proclaiming it openly, as this could constrain their managerial autonomy.

The other way in which Italian SOEs have a systemic impact on the productive system is through the activation of backward linkages with their suppliers (often local SMEs). Italy's SOEs mobilise a substantial amount of direct and indirect purchases – in some respects they represent large procurement centres for a significant supply-chain structure. Even the most internationalised SOEs rely extensively on domestic suppliers, which in turn depend on the orders of the SOEs for a substantial amount of their turnover. As one manager of an engineering SOE admits:

Our [greatest contribution] is to pull all our domestic supply chain. We operate all around the world, but we bring with us our Italian suppliers, many companies that have been created because of our existence.

In several cases, SOEs are able to establish a fiducial and long-term relationship with their suppliers, privileging quality over cost factors and sometimes helping domestic SMEs to compete in tender processes. This is particularly valid for the large system-integrators engineering SOEs, relying on suppliers for specific components.

The promoting role of SOEs is instead relatively weaker with respect to the supply of large and complex equipment (especially in the energy sector). Here, the lack of specialised domestic engineering companies forces Italian SOEs to rely on foreign suppliers. At the same time, by the same admission of the managers, the possibility of targeting the procurement of SOEs towards the creation of competitive national champions could be hampered by the strict adherence to competitive open tenders, which SOEs have to comply with (as they would otherwise infringe Article 101 of the TFEU).

In conclusion, there are no common supply-chain policies or guidelines for the system of SOEs. In the current scenario, it is therefore impossible to discretionally mobilise their procurement power in order to force comparative advantages in the domestic economy and to build a more competitive supply structure around them. Some managers defended the autonomy of their company also in this respect, arguing:

The relation with SMEs is not cross-cutting, each large sectoral company has a specific relationship with them.

3.8. The alignment with national industrial policies

Following from the latter point, the interviewed executives have confirmed the lack of coordinated industrial policies for the Italian system of SOEs. The legal code for ‘participated companies’³⁴⁴, approved in 2016, does not mention the possibility of a policy coordination or orientation of Italy’s SOEs outside the statutory objectives of special-purpose SOEs.

It follows that any new diversification, investment or partnership initiative is taken autonomously by the SOE with little or no indication from the public shareholder. Far from invoking a top-down approach that would reconfigure the corporate governance of the very same companies, several managers have welcomed the possibility for the public shareholder to provide industrial policy guidelines and coordination. One argued that the state ownership nature of the companies should compel a more active role in national policymaking:

³⁴⁴ ‘Testo Unico sulle società partecipate’ (Legislative Decree n. 175, 19 August 2016).

I believe that SOEs should do a bit of industrial policy [...] there are areas in which we surely have a business involvement, but also an external or institutional role.

One manager emphasised the advantage for the state to dispose of a potential influence over a diversified range of companies. Another one even suggested that the existence of a broad but ‘clear orientation’ would facilitate their operations:

If we had a clear orientation, we could be more determined in confronting our issues. The strength [of the lack of policy coordination from the shareholder] is that we are not subject to strong interferences, but it is also its weakness because we could venture in a direction with more security.

Finally, all SOEs have incorporated in their governance some of the UN SDGs principles, among which the pursuing of socio-economic, industrial and technological objectives. Listed companies also are obliged to compile annual sustainability reports, where they outline if and how they have achieved the self-attributed targets. In fact, the evaluation of their SDGs contribution is left to the companies themselves, with no role for the public shareholder to monitor, assess and sanction their eventual lack of compliance with stated objectives.

4. Concluding reflections on Italy’s current SOSOEs

Italy’s SOEs are leading international players and fundamental components of the domestic economic structure. This is partly due to their large dimensions, but also to the advanced technological and engineering capabilities they incorporate, together with their role as operators of strategic national networks in energy, mobility and distribution.

At the same time, the state shareholder largely abstains from assigning policy mandates to its SOEs and refrains from promoting strategic industrial operations that could be jointly established. Consequently, Italy’s leading SOEs resemble a dispersed portfolio of financial assets, rather than to a coordinated group of companies pursuing internal industrial synergies and external policy objectives. The governance of the system is to a considerable extent left to the autonomous management of the individual companies, in relation to the nature of the sectors and markets in which they operate.

Within the system, fundamental is the distinction between listed and unlisted companies, even more than the degree of shareholding control. Separate legal

provisions and the significant presence of financial institutional investors reduce listed SOEs to operating almost as private listed company, while 100% unlisted SOEs seem more respondent to public policy functions.

Another distinguishing element regards the direct shareholding control, divided between the public investment bank CDP and the Ministry of the Economy and Finance, which remains the ultimate shareholder of the system. The activation of shareholding rationalisations and of inter-group initiatives among the CDP-controlled SOEs has been more frequent than within the SOEs directly controlled by the Ministry, confirming the more proactive role of autonomous state holding organisations.

Finally, in the current situation, a further level of heterogeneity in the governance of the SOEs is added by the subjective visions (or ideologies) and competences of the single appointed executives, which nonetheless does not necessarily translate into alternative managerial philosophies.

In conclusion, Italy's current SOSOEs presents a 'passive shareholder' governance approach, where the main shareholding purpose for the state is to secure solid economic performance and to obtain safe financial returns. Under these arrangements, the policy instrumentality of a diversified system of large SOEs remains considerably underplayed. A summary of Italy's SOSOEs governance rules – adapted from OECD (2021a) – concerning the rationale for state ownership, taxes and financing provisions, rules on reporting, nominations of the boards is illustrated in Table 8.6.

Rationale						
Not explicit (SOEs-specific measures)						
Institution responsible for the ownership function						
Ministry of the Economy and Finance						
Ownership model						
Centralised ownership entity						
Taxes						
Subject to the same tax treatment as private enterprises						
Financing						
	State guarantee on commercial debt	Preferential terms on commercial debt likely	Mechanism in place to avoid preferential treatment	Rate-of-return targets	Dividends guidelines or targets	
	No	Yes	No	No	No	
Reporting						
Nature	Ad hoc reports on SOEs or regular reporting to the Parliament on SOEs activities.					
Coverage	Implementation of state ownership policy	Financial performance and value	Total employment on SOEs	Public policy objectives	Board compensation and remuneration	Reporting on individual SOEs
	No	Yes	No	No	No	No
Board nomination						
The MEF appoints the Boards of Directors for the totality or a part of it, on the basis of political decisions.						
State appointees on the Boards	No (observers but with no voting rights)					

Table 8.6: Summary of Italy's SOSOEs governance. Source: Author's adaptation from OECD (2021a).

Part III

Chapter 9

Conceptualising systems of state-owned enterprises: the public entrepreneurship and state shareholding models

1. A theoretical framework for SOSOEs

This chapter seeks to provide a theoretical framework for the SOSOEs concept, yet unexplored in the academic and policy literature. Building from the empirical investigation presented in previous chapters, a dichotomous taxonomy delineates how SOSOEs can assume opposite configurations between the model of ‘public entrepreneurship’ and the one of ‘state shareholding’. The two ‘ideal types’ are exposed in section 2, making reference to the Italian case study analysed in previous chapters. A graphical representation of the SOSOEs taxonomy is illustrated in Figure 8.1 at the end of the chapter.

2. Two opposite ideal types for SOSOEs

As defined in Chapter 1, a SOSOEs can be described as a portfolio of relevant national companies controlled by the central government under a common governance framework. Outlining a theoretical conceptualisation of SOSOEs implies analysing how the system can assume different configurations and what its resulting implications are.

The configuration of a SOSOEs can be understood by combining two theoretical coordinates, defined as the ‘essence’ and the ‘function’ of the system. The **essence** of the system refers to the rationale of state ownership, which can be oriented to external public policy objectives, or limited to a state guardianship role over the controlled SOEs. The **function** of the system indicates how the SOSOEs operates, whether it displays dynamic elements of industrial entrepreneurship (in a Schumpeterian sense) or if it tends to follow the passive financial shareholding logic of asset management.

When the essence of a SOSOEs is to pursue public policy objectives while displaying systemic entrepreneurial features, the system is associated to the ideal type of public

entrepreneurship. Conversely, when the state is a mere guardian of the system, which is then passively managed as a portfolio of financial assets, then the state shareholding formula expresses the opposite ideal type.

SOSOE's can be further qualified through six different dimensions. These too take opposite configurations – with the possibility for intermediate results.

Among the six dimensions, three are *internal* to the system:

- **Focus** refers to the economic or financial variables that the system mainly addresses.
- **Investments** relates to a broad notion of how investments decisions are made within the system and to the system's approach to risk and uncertainty about future states of the economy.
- **Interactions** indicates the internal relations and the degree of integration among SOEs within the system.

Other three dimensions refer to relation of the system with *external* factors:

- **Shareholder** denotes the role that the state shareholder assumes in relation to the system of SOEs.
- **Knowledge** captures how processes of knowledge creation and diffusion are organised within the system of SOEs and in relation to the broader national system of innovation.
- **Market** pertains to the relationship that the system of SOEs establishes with external economic and market conditions.

2.1. The public entrepreneurship model

The public entrepreneurship model is defined through a combination of the public policy and industrial entrepreneurship coordinates. The IRI system of SOEs, analysed in Chapters 4 to 7, has inspired the public entrepreneurship configuration.

With respect to the first defining coordinate, the essence of a public entrepreneurship system of SOEs is to embrace cross-sectoral public policy missions with an external projection. A public entrepreneurship system entails the possibility to embrace multiple public policy missions. In the case of IRI (Chapter 6), its three main public missions were delineated as comprehensive strategies, despite being performed by the single SOEs in coherence with their business activities. IRI's public missions were meant to increase the competitiveness of its own companies, but their ultimate function was to disseminate positive economic externalities within the national productive system, via the promotion of technical and managerial capabilities, the creation of industrial ecosystems in depressed areas, the creation and diffusion of technological and scientific knowledge.

As for the second defining coordinate, a public entrepreneurship system displays an industrial entrepreneurship function when it promotes initiatives that would not otherwise have been pursued, given existing market incentives. The system becomes an indirect instrument for industrial development and technological innovation through the business strategies of the composing SOEs. In the case of IRI (Chapter 7), the entrepreneurial function materialised through the diversification into new activities, the restructuring and development of existing sectors and companies, the achievement of industrial and technological innovations and the ability to gain internationally competitive positions and market shares.

The actual behaviour of a public entrepreneurship system is further qualified along the six dimensions listed above.

The *focus* is on real economic variables – value added, investments, employment, R&D expenditure, etc. – meaning that the system attributes a preferred value to the economic context in which it operates. As reported in Chapter 5, IRI put a great

emphasis on measuring those economic variables and presenting them in its annual reports and planning documents, among its first items.

Investments in the public entrepreneurship model are conceived in a long-term perspective. The system acts as an investor of first resort, confronting uncertainty and the possibility of failure. Returns on some of the system's investments can be deferred and low or they may not even materialise, not necessarily due to lower technical or organisational efficiency, but because of difficult or unforeseen external conditions. IRI's initiatives in sectors such as aerospace, semiconductors, informatics, specialised engineering and others were of that nature. Their pay-off was mostly industrial-technological for the economy as a whole rather than monetary for the public shareholder (Chapter 7). IRI also introduced a four-year planning method for its sectoral investments and undertook decade-long initiatives such as the 'electronics plan' at the end of the 1960s to develop the electronic sector (Chapter 4). Finally, most of its investments in new industrial plants in the South were characterised by an external context of higher transportation costs and lower market expectations (Chapter 6) that had discouraged private investments, before IRI and other state holding company intervened to reverse the process.

SOEs in a public entrepreneurship system display a considerable degree of internal *interactions* (or even integration). Despite remaining separate entities with managerial autonomy, SOEs are encouraged to seek industrial synergies and to establish joint initiatives. This is facilitated by the existence of a state holding company that orchestrates the interactions of its controlled companies, as it was with IRI (Chapter 4). Within its structure, IRI favoured intra-group cross-shareholding arrangements, processes of vertical integration and horizontal diversification, the establishment of new companies and the participation of its SOEs to technical and commercial partnerships (Chapter 4 and Chapter 7).

The role of the public *shareholder* in this model is one of active involvement in defining the long-term strategies of the system, despite leaving managerial autonomy to the single SOEs. The public shareholder oversees not only the financial performance of the system and its components, but also their industrial strategies and investment programmes. In the case of IRI, the involvement of the state holding parent entity – the

Institute, a public law body – was crucial, representing the ultimate decision-making level of the entire system (Chapter 4). Multi-annual business plans of IRI's SOEs were defined together with the Institute, which then monitored their executions – also by appointing its officials to the boards of directors or to other supervisory bodies of the controlled subsidiaries. Even at the highest levels of public shareholding represented by the political institutions – i.e. the Ministry of State Holdings, the Council of Ministers, Parliament, the national Court of Auditors – the shareholder's involvement in the long-term strategies of IRI was active and occurred through informal discussions and formal proceedings (i.e. parliamentary audits and presentations of multi-annual programmes).

In a public entrepreneurship model, a system of SOEs embraces an open approach to *knowledge* generation and diffusion to the rest of the economy as one of its main objectives. Consequently, the system of SOEs assumes a key function in the national system of innovation, often operating as a bridging institution between the enterprise sector and public policies (especially around R&D programmes). The way in which IRI pursued this approach was through an open network of R&D centres (Chapter 6) and via technological partnerships or industrial joint-ventures with non-IRI companies (Chapter 7).

With respect to the *market* dimension, a public entrepreneurship system is dynamically involved in fixing market (or sector) failures and creating new markets (or industrial activities). It embraces a transformational approach towards the existing productive structure, fostering endogenous structural change, also against existing comparative advantages. The IRI system of SOEs comprised both functions. It fixed the failures of the private sector by restructuring mechanical, shipbuilding and food productions, but also supported strategic activities in the electro-mechanical, aerospace and electronics sectors that were abandoned by private actors (Chapter 7). At the same time, IRI played a demiurgic market-creating function by diversifying in sectoral activities that did not exist before (Chapter 7), or by creating industrial ecosystems and building infrastructures in underdeveloped areas of the Country (Chapter 6). In certain cases – for instance in car making and cement productions (Chapter 7) – it introduced a competitive stimulus against dominant incumbents. In other cases – such as with aerospace, naval engines, semiconductors, steelmaking (Chapter 7) – IRI's companies operated in symbiotic collaborative relations with the private sector.

2.2. The state shareholding model

The state shareholding model is defined through a combination of the state guardianship and financial shareholding coordinates. In what follows, this ideal type is associated to the way in which Italy's systems of SOEs is currently configured (Chapter 8).

The first coordinate that defines the state shareholding ideal type appears when the *essence* of a SOSOEs is merely to be a guardian of the system, with the only aim of maintaining national (public) ownership on certain domestic activities. Since the state does not attribute any public policy mission to the system, SOEs are left with pursuing the sole – privately-oriented – objective of maximising their profits and stock market values. Consequently, in a state shareholding system, there is a substantial *ex-ante* separation between official public policies and business strategies of the SOEs, which are independently adopted.

The second coordinate follows from the first: state shareholding systems are not organised to play an explicit instrumental *function* in the industrial development of their countries. In line with a passive shareholding philosophy of asset management, the system's function is to generate the highest financial returns in the form of distributed profits and growing shareholders' value (with the perspective of maximising the proceeds from a hypothetical divestiture of the public shareholder's stake). In the current Italian case, this configuration derives from the privatisation process that begun in 1992, when the ownership and control of IRI and of the other big public corporations were transferred from the Ministry of State Holdings and other sectoral ministries to the Treasury, with the aim of raising the highest amount of financial resources from the selling of public industrial assets.

As with the public entrepreneurship model, the functioning of state shareholdings SOSOEs is also qualified along six dimensions.

The *focus* of state shareholding SOSOEs is primarily on financial variables – annual profits, dividends, stock market value – which are considered to be the benchmark of managerial efficiency. Given the significant influence of institutional investors (as in the Italian case), the maximisation of profits and shareholders' value can become the overarching focus of the system. SOEs in the current Italian SOSOEs are prevalently

focused on their profitability, with internal differences on how it is conceived – sometimes as a means to be financially sustainable, in other cases as the ultimate end that satisfies their private shareholders.

Investments in the state shareholding model do not assume a speculative dimension, which would otherwise go against the guardianship function of preserving the value of national industrial assets. However, there is a significant pressure for a safe and relative short-term remuneration of the invested capital. This is particularly evident in the current Italian case with respect to SOEs that operate in the relatively risk-adverse regulated monopolistic segments, as they implement generous annual dividends policies or when they decide to deploy free cash flows to launch share buy-back programmes aimed at propping up their stock market value.

In a state shareholding SOSOEs, *interactions* among constituent companies are sporadic and informal. SOEs effectively operate as separate independent entities, without any horizontal coordination motivated by their shared state ownership nature, even when they would not incur in collusive behaviours, as operating in different sectors. When joint-initiatives occur, this is the incidental outcome of the companies' management, rather than a process facilitated by the controlling shareholder. When SOEs in the system have different direct state shareholders, strategic synergies are even less frequent, whereas the existence of a state holding entity with delegated autonomy can increase the likelihood of such interactions³⁴⁵.

The state *shareholder* is largely absent in the general orientation of the system of SOEs. It passively records managerial decisions that single SOEs adopt, without contributing to the definition of their long-term business plans. The state exercises its ultimate prerogative of controlling shareholder by appointing executive members of the boards of directors, but in the extreme case – as it happens with the Italian SOSOEs – the appointed figures do not behave as the direct emanation of the state shareholder, but rather as external representatives, free from any imperative public mandate.

In the state shareholding model, the management of *knowledge* is reserved to the individual SOE, that treats knowledge as a private competitive asset. Knowledge

³⁴⁵ See Chapter 8 with respect to the role of CDP in Italy's SOSOEs and Chapter 10 for a more detailed discussion on this issue.

spillovers are limited both within the system – among SOEs – and with respect to the rest of the economy. This might result from a combination of factors, such as the stringency of industrial secrets, the private appropriation of R&D research efforts, or the lack of common research infrastructures. Systems of SOEs could still be relevant elements of the national system of innovation when the constituting companies represent a significant share of national R&D activities and have control over advanced technologies (as in the case of the Italian SOSOEs). However, in state shareholding systems, knowledge generation and diffusion processes remain relatively uncoordinated and close to the outside world.

Finally, with regards to the *market* dimension, the state shareholding model embraces a market-neutral behaviour, as intervening against market signals and forcing relative prices would be considered economically unviable and distortive. The system only accommodates or follow external exogenous change in given market and technological conditions, rather than fostering and orienting them along different trajectories. A case of this is the market-neutral approach – i.e. focused on predetermined cost structures and patterns – that Italian energy SOEs embrace with respect to the green transition. Another example is the non-targeted approach with the supply-chain of SMEs, mediated by public tenders and dominated by the procurement power of the large SOEs, with little strategic orientation towards developing specific industrial capabilities.

<i>Internal dimensions</i>			
Large	Economic variables (value added, investments, employment, R&D)	Focus	Financial variables (profits, stock market value)
	Long-term investments of first resort confronting uncertainty	Investments	Safe and short-term remuneration of risk adverse investments
	Integration of SOEs seeking industrial synergies	Interactions	SOEs operating as separate entities
Size	Public policy missions	Essence of the system	State guardianship
	Public Entrepreneurship		State Shareholding
	Industrial entrepreneurship	Function of the system	Financial shareholding
Small	Active involvement in defining long-term strategies	Shareholder	Absent and passive, with no state representatives in the boards
	Open system of knowledge generation and diffusion	Knowledge	Limited access to internal knowledge (private asset)
	Market-fixing and creating role fostering endogenous change	Market	Market-neutral role accommodating exogenous change
	<i>External dimensions</i>		
			Low
			High

Figure 9.1: A conceptual taxonomy for SOSOEs: the public entrepreneurship and state shareholding models. Source: Author's elaboration.

3. Concluding remarks on the conceptual framework for SOSOEs

This chapter has outlined a theoretical framework with a taxonomy for SOSOEs, by conceptualising the analytical distinctions between the two cases presented in previous chapters – IRI and the current Italian SOSOEs

Two pure and opposite ideal types for systems of SOEs have been identified: the public entrepreneurship and the state shareholding models. These have been defined from a combination of theoretical coordinates and dimensions, themselves divided between antithetical poles, extrapolated from the recurring characteristics analysed in the comparative study of the two Italian systems.

The public entrepreneurship and state shareholding ideal types are two dichotomous theoretical models, but a range of intermediate configurations is naturally conceivable. A SOSOEs could embrace a state guardianship approach but at the same time be sensitive to certain public policy necessities. Conversely, a system could be structured as having a financial shareholding function but still embark on entrepreneurial initiatives, as defined by the industrial entrepreneurship coordinate – although in this case entrepreneurial initiatives might be independently initiated by the management of the single SOEs. Similarly, mixed combinations of the two opposites for each dimension are conceivable and they would generate intermediate configurations between the two extreme models.

In practice however, even if there might be a continuous between the antithetic poles, the configuration of SOSOE tends to resemble either one model or the opposite. This is confirmed by how adequately the theoretical framework fits the two Italian systems. The framework also reflects a historical transformation of state ownership in most Western economies, where previous public corporations (that would be likely matches for the public entrepreneurship model) have been transformed into joint-stock state-owned companies. In the process, the corresponding national systems of SOEs have moved closer to the state shareholding model.

This might lead to the suggestion that joint-stock SOEs are inherently likely to be organised under a state shareholding model, but the IRI case proves that a public entrepreneurship system of joint-stock SOEs is practically and theoretically feasible.

Part III

Chapter 10

Contributions, further research opportunities and policy suggestions

1. Final remarks on the thesis

The central purpose of this thesis was to elaborate a different analytical perspective on state-owned enterprises (SOEs), capturing one of the most relevant transformations of state ownership over recent years.

This research introduces and discusses – for the first time in the academic and policy literature – the concept of systems of state-owned enterprises (SOSOE). It has provided a definition of SOSOEs, investigating how these are configured by empirically assessing two distinct but comparable systems (IRI and the current Italian one), belonging to the same national context but operating in different time periods. It has also proposed a theoretical framework for SOSOEs, aiming at comprehending how the distinguishing elements of a SOSOE impact on its actual functioning within a given economic context.

This final chapter summarises the main theoretical and empirical contributions of the thesis. It introduces potential further research opportunities and discusses policy implications deriving from its main results. The chapter concludes by outlining a policy proposal on how to reform the current Italian SOSOEs under a coordinating state holding company.

2. Empirical and theoretical contributions

Previous chapters have addressed the two research questions presented in Chapter 1. They have provided empirical evidence and developed theoretical insights that can better define and conceptualise SOSOEs (RQ1). At the same time, the comparison between two Italian cases (and the particular focus on the IRI model) has highlighted the conditions that enable a SOSOEs to display a dynamic entrepreneurial function

and a transformative public policy orientation, corresponding to the public entrepreneurship model (RQ2).

In addressing the two research questions, this thesis has accomplished its stated objectives, developing a set of original contributions. Four major ones can be clearly identified, matching the stated aims in Chapter 1.

First and foremost, with the support of original empirical evidence, this thesis has indicated a new analytical perspective on SOEs, through the yet unexplored concept of systems of SOEs. It has also suggested a preliminary but comprehensive theoretical framework for interpreting their different configurations, based on the two ideal types of public entrepreneurship and state shareholding.

Second, the theoretical implications of this thesis challenge but also enrich existing economic theories on state ownership. Through the SOSOEs concept, state ownership can be analysed as a more complex phenomenon compared to the simplistic dichotomy ‘private versus public’ portrayed by conventional economic theories. SOSOEs demonstrate the heterogeneity of SOEs, differing significantly according to their national and sectoral specificities, to the degrees of state control and to their governance frameworks. Furthermore, the study of SOEs in their national contexts enables the conceptualisation of state ownership under an innovation perspective, largely ignored by the neo-Schumpeterian evolutionary approach to economics of innovation. SOSOEs – and the composing SOEs – could be appraised as distinctive elements of national systems of innovation, due to their hybrid nature of business organisations owned or controlled by the public sector.

Third, as a by-product of assessing the SOSOEs concept and its public entrepreneurship implications, this thesis has confronted the main misconceptions about IRI – Italy’s former and most relevant state holding company – revisiting its economic role in the context of the Italian economic development over the post-war period, with the support of new original empirical evidence. This evidence points to an evolving, yet permanent, entrepreneurial and policy-oriented role of IRI in promoting technological innovation and structural change – even at a later stage, superficially regarded as degraded and corrupted. IRI can instead be appraised as an innovative policy model for a state holding company: highly diversified (especially in

manufacturing sectors) but centrally integrated, pursuing public policy objectives and the upgrade of the country's industrial structure.

Fourth, based on the IRI example this thesis has defined the public entrepreneurship configuration for SOSOEs, highlighting its policy merits in contrast with the state shareholding model, which appears to characterise most modern systems (including the current Italian one). It has also pointed to the opportunities that a state holding company offers in coordinating the national portfolio of SOEs.

3. Further research opportunities

The theoretical arguments developed in this thesis are only preliminary and could be refined with the contribution of other analytical approaches and further empirical studies. For instance, the theoretical taxonomy outlining the public entrepreneurship and state shareholding ideal-types, although tailored to describe the configuration of SOEs within a given economic context, could be adapted and extended to other forms of state organisations involved in economically relevant activities – notably, state investment banks, state agencies, public research institutes, etc.

Introducing the system of SOEs concept as a dedicated field of study could also open significant opportunities for further empirical research in three different directions.

First, it could motivate the elaboration of recurrent national cases studies, matching the methodology adopted in the OECD's recent series of 'Country reviews' (OECD, 2015d; 2015e; 2015f; 2018b; 2019; 2020b; 2021b; 2021c; 2022c) with the case study approach illustrated in Chapter 8, analysing the financial reports and other corporate document of SOEs, as well as conducting structured interviews with leading executives. The national context that would certainly deserve a deeper examination of its system (or sub-systems) of SOEs is China, on which research has been relatively embryonic, despite the recent growing interest (Leutert, 2020; Huang et al., 2022).

A second promising research avenue would be the periodic collection of key facts and figures on the most relevant SOEs at the global level (e.g. the 10 largest by revenues in major countries). This would enable a better international comparison among leading SOEs within their respective industries.

Third, systems of SOEs call for a better understanding of the critical ownership entities that supervise the national portfolios of SOEs. There is a substantial lack of empirical studies on how these entities are structured and operate. Relatedly, very little theoretical investigation has been undertaken to analyse the organisational structure and economic function of state holding companies. In particular, comparative case studies could be performed by examining state holding entities in different national contexts – e.g. the French *Agence des participations de l'État* (APE), or the Chinese SASAC, that controls 98 among the largest central non-financial SOEs³⁴⁶.

Lastly, and specifically on the study of IRI: the creation of the IRI Database – the most comprehensive collection of time series on IRI's main variables ever realised – enables the possibility of further statistical investigations over the impact of IRI on Italy's economic development in the second half of the 20th century.

4. Policy implications and proposals

This thesis revamps the policy perspective on state ownership, championing a modern reinstatement of the policy instrumentality of SOEs. While reducing the overall direct deployment of SOEs in implementing sectoral industrial policies, in recent decades, countries with a significant state ownership presence have organised their SOEs under a portfolio structure. Following these recent developments, the SOSOEs perspective can supplement the traditional policy approach to state ownership with suggestions for how to exploit the policy potential of modern SOEs.

SOEs are territorially-based productive organisations, nested within industrial ecosystems, usually disposing of massive financial resources and significant technological capabilities. As such, they can become very direct and effective policy instruments, especially in industries with natural monopoly characteristics. For instance, when it comes to decarbonising our economies, SOEs are among the most relevant players on the planet³⁴⁷. It would be practically impossible to achieve a global green transition without fundamentally transforming SOEs in the energy sector.

³⁴⁶ As of September 2022. The list of SASAC controlled companies can be retrieved from SASAC's website.

³⁴⁷ SOEs accounted for 62% of total electricity generation capacity installed or under construction globally in 2016 (Prag et al., 2018). Furthermore, it has been estimated that SOEs have been responsible for 59% of the total GHG emissions from the 100 largest fossil fuel companies between

This thesis champions the public entrepreneurship configuration as a role model for SOSOEs. In a public entrepreneurship SOSOEs, the state is involved in setting long-term public policy objectives that address main economic challenges. SOEs are organised as focusing primarily on real economic variables (i.e. value added, investments, employment, R&D), confronting uncertainty in a long-term perspective, being investors of first resort in new areas, and seeking inter-companies synergies in order to promote new industrial initiatives or restructure and develop existing ones. The generation of productive knowledge and capabilities and their diffusion to the rest of the economy are central to the functioning of a public entrepreneurship SOSOEs. Finally, a public entrepreneurship SOSOEs is expected to address existing market failures, but also to operate as a demiurge, creating new industrial activities through its evolution and diversification. This approach underpinned IRI's action during the post-war period, contributing to the remarkable development and transformation of the Italian economy until the early 1990s, when it was deprived of this function, before being eventually dismantled.

On the contrary, the lack of any planning involvement from the shareholding state, the exclusive focus on financial variables, the separation of the single SOEs and the (industrial) policy neutrality of most modern SOSOEs represent a waste of the state ownership policy potential.

In addition to the conceptual elements that characterise the configuration of systems of SOEs, this thesis advances policy reflections on the organisational structure of state holding entities. Previous chapters, especially those focusing on the IRI case, have exposed the advantages of structuring the SOEs portfolio under state holding companies endowed with managerial and financial autonomy.

The state holding company can be a very effective tool for a government to organise its SOSOEs. First of all, it introduces a level of separation between policymakers and the operating companies, thereby increasing the isolation of the latter from direct political intrusions³⁴⁸. At the same time, it preserves the overall public mandate in the

1988 and 2015, themselves accounting for 71% of global industrial GHG emissions over that period (CDP, 2017)

³⁴⁸ Excessive political intrusiveness in the operational management of individual SOEs, especially when subject to international competition, can stifle their ability to deliver economic and industrial objectives.

hands of a politically accountable managerial board, supported by a specialised technocracy. A significant share of the appointed members in the SOEs boards could be represented by senior officials from the state holding company (as it was with IRI), which would represent the interests of the company but also of the public shareholder.

Second, especially in smaller and emerging economies, a state holding company with delegated roles from its controlled SOEs could be best placed to exploit economies of scale in terms of finance, R&D, commercial and export strategies. It would also entail an independent financing capacity for the apex of the state holding structure, which could be oriented towards its controlling companies. However, even in a less integrated configuration, a state holding company could be mandated to enforce cross-sectoral public policy missions, to promote new initiatives (for instance, the establishment of new SOEs or joint-ventures between existing SOEs and private counterparts) and to elaborate long-term sectoral planning strategies with the controlled SOEs.

4.1. The compatibility of a public entrepreneurship model with the evolution of EU competition law

A major challenge for modern SOEs (but also for systems of SOEs) is their relation to competition law (Lin et al. 1998; Sappington and Sidak, 2003), since the principles incorporated by the latter could fundamentally hamper any public policy orientation of SOEs and their systems.

This is particularly relevant in the context of the European Union (Lallemand-Kirche et al., 2017), where most of its members states (including Italy) had and still have a significant portfolio of SOEs. The European Union was born from the European Coal and Steel Community in 1951, with the aim to integrate the coal and steel industries of the six founding members³⁴⁹ into a single market with common rules. In most of these countries, the coal and steel industries were partially or totally under public ownership. In an ironic turn of events, it was precisely SOEs in former nationalised industries that were among the most affected by the legal changes taking place from the mid-1980s.

³⁴⁹ The 1951 'Treaty of Paris', establishing the European Coal and Steel Community (ECSC), was signed by France, West Germany, Italy, Belgium, The Netherlands and Luxembourg.

In this respect, a major turning point was represented by the introduction of the Single European Act of 1986, which entailed the completion of the internal market by 1 January 1993. As stated in a 1985 White Paper³⁵⁰ from the Commission of the European Community, this implied a more stringent enforcement of competition policy and state aid oversight.

In the case of Italy, a new competition law was passed in 1990³⁵¹ to harmonise the national system with the evolution of the European competition regime. This regulation came into place only two years before the beginning of the privatisation phase³⁵², which instead was never explicitly imposed by the EU treaties (such as the new Maastricht Treaty of 1992). The combination of privatisations, banking reforms³⁵³ and liberalisations – consequent to the new competition regime – profoundly re-shaped the Italian economy and established what has been defined as a ‘new economic constitution’ (Cassese, 1995).

Specifically on competition policy, the new competition regime³⁵⁴ imposed stricter rules on two main areas. First, anti-competitive behaviours by undertakings such as agreements to fix prices, limit production, apply dissimilar conditions to equivalent transactions (Article 101 TFEU, Article 2 of Law n. 287 10 October 1990) or abuse of dominant positions (Article 102 TFEU, Article 3 of Law n. 287 10 October 1990). Second, the distortionary application of state aid if deployed to discriminate certain undertakings or the production of certain goods (Article 107 TFEU). The new legislation meant the end of national state monopolies of public utilities and the drastic reduction of indiscriminate sectoral- or firm-specific state subsidies.

With reference to the IRI case presented before, it has to be noted that only a few activities were regulated by *de facto* state monopolies: telephone services, air and maritime transport. All these sectors were liberalised in the 1990s and opened to competition, although for a long time the incumbent – Telecom Italia in the

³⁵⁰ “Completing the Internal Market”, a policy document elaborated by the Commission of the European Communities on 14 June 1985 (for the European Council of Milan, 28-29 June 1985).

³⁵¹ Law n. 287 (10 October 1990).

³⁵² Inaugurated by the legislative decree n. 333 (11 July 1992).

³⁵³ Legislative decree n. 385 (1st September 1993).

³⁵⁴ The legislative basis of competition law in the EU still rests in the Treaty on the Functioning of the European Union. Articles cited in the text refer to the most recent 2016 consolidated version.

telecommunications sector and Alitalia in the air transport sector – enjoyed a significant market dominance. Nevertheless, it would be an exaggeration to suggest that the entire IRI model would be theoretically incompatible with current anti-competitive laws. If anything, the steelmaking producer Finsider was a major negotiator of the first European single market for steel products (introduced with the ECSC), while IRI's entry and expansion in cement (Cementir), car making (Alfa Romeo) and food processing (SME's subsidiaries) activities could be conceived as fostering a higher degree of domestic competition against the dominance of Italcementi, FIAT and foreign multinational food companies respectively.

On the opposite, IRI's method of recapitalisation through increases in its endowment fund deliberated by Parliament (see Chapter 4 and 5) would be formally banned by current state aid rules, as it would not fall under the few specific exceptions allowed in the EU Treaty (e.g. aid to provide relief following natural disasters or to promote underdeveloped areas, projects of common European interest and cultural heritage, etc.). Given the need to fulfil the completion of the single market by 1993, the then Minister for State Shareholdings Giuseppe Guarino (a distinguished law scholar and expert on public law) realised that public law entities such as IRI, ENI and ENEL were going to be at disadvantage compared to other large private groups in the new legal environment, as state aid restrictions would not have allowed SOEs the possibility of recapitalisation by their public shareholder. Minister Guarino then drafted the relevant articles of the legislative degree n. 333 (11 July 1992) which transformed the public law entities into joint-stock companies³⁵⁵.

A critical policy question for today should thus be whether a system of SOSOEs with public entrepreneurship characteristics – particularly in the EU context – could be formally compatible with current competition rules. The answer is far from definitive and depends on a series of contingent considerations, including the most recent proposed changes³⁵⁶ in state aid rules in the EU, allowing more policy discretion to address the energy crisis and the transition towards a net zero economy. Nevertheless,

³⁵⁵ Although Guarino's plan was to only partly privatise them by selling minority stakes of the new joint-stock parent holdings to consortia of Italian banks and corporations. This information comes from a copy of the ministerial documents that Giuseppe Guarino made available to the author.

³⁵⁶ The Temporary Crisis and Transition Framework adopted by the European Commission in March 2023 has introduced a significant temporary loosening in EU state aid rules.

competition rules apply to individual SOEs (such as in the case of concessionary regimes in energy and railway transport), rather than to the system of SOSOEs and its governance configuration – once indiscriminate state aid from the ultimate ownership entity (such as a state holding company) is ruled out. If the individual SOE in the system refrains from uncompetitive pricing policy or abuses of its market position, nothing compels it from re-investing the available generated income in new industrial initiatives or seeking intra-system technological synergies and pursuing joint research projects with other SOEs. At the same time, discretionary recapitalisations of SOEs by a state holding agency – ruling out the possibility that the state could provide indiscriminate subsidies to the holding entity – could be compatible if the ultimate objective of that subsidy were to achieve one of the socio-economic objectives that are already allowed by the EU Treaty (and that the above-mentioned change in legislation is further encouraging).

4.2. A proposal for reforming the Italian SOSOEs with a state holding company

The relevance of the Italian case – and of its transformation from the pre-1992 state ownership model to the current one – has been already underlined throughout the thesis. An inherent implication of this research is the suggestion that the current Italian SOSOEs could re-introduce some of the constituting elements of the IRI model, starting from its public policy orientation and entrepreneurial function.

The Italian SOSOEs displays an underutilised transformative potential, as discussed in Chapter 8. While re-establishing IRI in its original form would be anachronistic and unfeasible, a reform of the existing system inspired by IRI's lessons could nonetheless represent a promising policy perspective. This final section of the thesis outlines a tentative proposal for reforming the Italian SOSOEs, concentrating on the creation of a dedicated state holding company (see a graphical representation of its proposed structure in Figure 10.1).

An institutional reform of the system towards a more public entrepreneurship configuration is first and foremost hindered by the uncoherent organisation of the portfolio of SOEs. The Italian system presents a dispersed shareholding structure across different holding organisations: CDP, Invitalia and the Ministry of the Economy and Finance, with the latter exercising the legal prerogatives of the shareholder.

A more functional arrangement of the system would imply the concentration of the commercial SOEs³⁵⁷ – i.e. the shareholdings of all the controlled companies and of those where the state retains a significant influence through minority stakes – under a newly established state holding entity, as recommended also by the OECD Guidelines on Corporate Governance of SOEs (OECD, 2015a; 2021a). The initial mandate of this ‘State Shareholding Agency’³⁵⁸, a public law body, would be to rationalise the portfolio of SOEs and to create the conditions for their long-term policy orientation along nationally-defined ‘public missions’.

The Agency could be governed by a two-tier system composed by a management board (‘Executive Board’) and by a supervisory council (‘Stakeholders Council’). The ultimate managerial responsibility of the Agency would be delegated to the Executive Board, composed by a chairing President, a vice President and other executives with expertise and delegated responsibilities in the main thematic areas of the Agency. The President and the executives would be appointed for a 5-year renewable period by a dedicated parliamentary Committee with a qualified majority (see below), thus favouring a longer-term orientation of the Agency’s management and reducing the partisan political nature of a governmental appointment. The Agency’s Executive Board would interact directly with the management of the controlled SOEs on issues concerning their long-term financial and industrial strategies. In this role, it would operate as the executive body of the state shareholder.

The Stakeholders Council would have an active supervisory role, with the powers to veto the Executive Board on certain matters (such as the approval of the public policy missions), as well as to defer the dismissal of its members to the parliamentary Committee. It would also be able to propose new issues to the attention of the Executive Board. The Stakeholders Council would be composed by SOEs executives, academic and other industry experts, representatives from labour organisations, civil society associations and senior officials from relevant ministries (Economy and Finance, Industry, Labour, University and Research, Energy). These would be selected

³⁵⁷ Excluding banks and financial holdings.

³⁵⁸ In Italian, the state holding company would take the denomination *Ente per le Partecipazioni dello Stato* (EPS).

by their respective organisations – except for the academic and industry experts, appointed by the parliamentary Committee – for a rotating period of 3 years.

The Agency's operational affairs should be carried out by a public technocracy, organised as a corporate entity with functional divisions – e.g. administration, finance, planning and control, study and strategies, external relations, human resources, etc. Its employees should be hired with contracts assimilated to the private sector, according to their technical competences, with a particular emphasis on the knowledge of industries, markets and technologies. The Agency should also be responsible for publishing annual aggregate reports on its controlling SOEs – including individual reporting on its most relevant SOEs – as suggested by the OECD Guidelines on Corporate Governance of SOEs (OECD, 2015a).

Shareholdings under the Agency could be organised into 'thematic areas' – e.g. Energy, Mobility, Digital, Strategic Manufacturing, Public Works – without the need for creating intermediate shareholding structures. Within each of these areas, supervised by a representative from the Executive Committee, would fall SOEs and state-participated companies operating in different sectors but sharing a commonality of interests. Each of these areas would constitute an institutional platform for SOEs and the Agency to discuss potential joint initiatives and set targeted public policy missions within their respective remits. Public policy missions would not be top-down overarching obligations imposed by the Agency on the controlled companies, but rather theme-specific goals with clear and transparent targets resulting from a dialectical policy-making process between the public shareholder (i.e. the State Shareholding Agency with its political and social representatives) and the single SOEs within the thematic area.

A further step would be to delegate a certain degree of financial autonomy to the state holding company, enabling it to dispose of its share of dividends accruing from the participated SOEs³⁵⁹. At that point, the Agency could also finance itself through state-backed bond issuing (as it was in the case of IRI, but also today with the German state

³⁵⁹ As reported in Chapter 8, with respect to the year 2018, net profits of the Italian SOSOEs accruing to the public shareholder would have amounted to 2.8 billion euros. Although this figure varies across years, it remains a significant amount of resources that could be retained and reinvested within the SOSOEs.

development bank KfW). If the state holding company had autonomous financial capacity, it could use that power to shape the internal dynamics of the system, providing extra financing resources for developing new activities or transforming existing ones.

In terms of external controls and supervisions, there could be a separation of responsibilities for the two different shareholding levels. Single SOEs would continue to be supervised by the line ministries for sector-specific legal requirements. The Agency would instead be supervised, for its financial conducts, by the National Court of Auditors, and for its general policy orientation by Parliament, through a special bicameral Committee on State Shareholding. The latter would also be responsible for the appointment of the members of the Executive Board and of the experts in the Stakeholders Council through a qualified majority of two-thirds, which would normally imply an agreement with parties outside the perimeter of the government majority. The Agency would also be obliged to present its annual reports to the parliamentary Committee, together with regular updates on the pluriannual plans containing objectives and targets of the Agency's public missions.

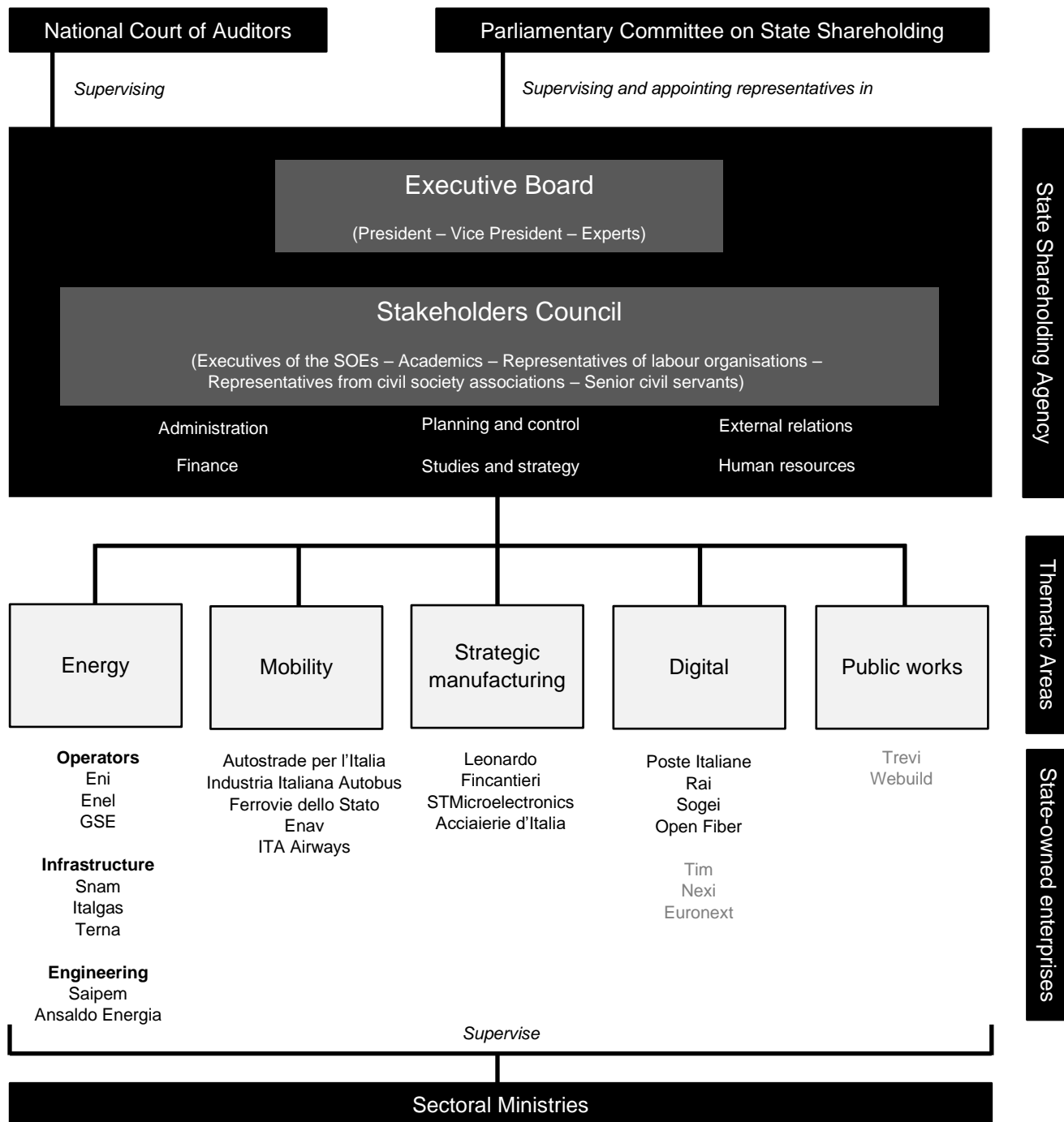


Figure 10.1: Graphical representation of the proposal for reforming the Italian SOSOEs with the establishment of a state holding company. Source: Author's elaboration. Notes: Companies in grey colour have a significant but non-controlling stake from the state (as of October 2022).

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Appendix

This Appendix is conceived as a repository of empirical material and sources for the chapters of the thesis. It is organised in different sections corresponding to the specific chapter they refer to.

Chapter 1. Motivation, aims and structure

Aerospace	Aluminium	Automobiles	Biotechnology	Chemicals	Electronics	Engineering	Mining	Petro
Aeritalia – IRI (Italy)	Arda og Sunndal Verk (Norway)	Alfa Romeo –IRI (Italy)	British Petroleum (UK)	ANIC - ENI (Italy)	CII-Honeywell Bull (France)	DIAG (W. Germany)	Charbonnages de France (France)	British N Oil Corp (UK)
Aérospatiale (France)	Alumix – EFIM (Italy)	British Leyland (UK)	Celltech – NEB (UK)	Berol Kemi – Statsföretag (Sweden)	Inmos Limited (UK)	Italimpianti – IRI (Italy)	Enterprise Minière et Chimique (France)	Brit Petro (UK)
Airbus (France, UK, Spain, W. Germany)	Gränges Aluminium (Norway)	Renault (France)	Elf-Aquitaine (France)	Beroxo – Statsföretag (Sweden)	International Computers Ltd. (UK)	IVG (W. Germany)	LKAB – Statsföretag (Sweden)	CFP- (France)
British Aerospace (UK)	Norsk Hydro (Norway)	SEAT – INI (Spain)	Rhône-Poulenc (France)	BP Chemicals (UK)	Finsiel – IRI (Italy)	Saipem – ENI (Italy)	National Coal Board (UK)	Dansk Natu (Denm)
CASA – INI (Spain)	Pechiney (France)	Volkswagen (W. Germany)	Transgene (France)	CFP-Total (France)	Luxor (Sweden)	Salzgitter (W. Germany)	ÖMV – ÖIAG (Austria)	ELF-Aq (France)
Dassault (France)	Vereignigte Metallwerke Ranshofen-Berndorf – ÖIAG (Austria)	Volvo Car (Netherlands)		CDF-Chimie (France)	Matra (France)	SERI – Renault (France)	Saarbergwerke (W. Germany)	AGIP (Ita)
Matra (France)	VIAG (W.Germany)			DSM (Netherlands)	SGS-ATES – IRI (Italy)	Technip (France)		ÖMV – (Aus)
Messerschmitt-Bölkow-Blohm - MBB (W.Germany)				ELF-Aquitaine (France)	Saint-Gobain (France)	Valmet (Finland)		Nes (Finl)
Rolls-Royce (UK)				Neste (Finland)	Telub (Sweden)	VÖEST-Alpine – ÖIAG (Austria)		Saarber (W. Ger)
SNECMA (France)				Norsk Hydro (Norway)	Thomson-Brandt (France)			Statoil (N)
				ÖMV– ÖIAG (Austria)	VÖEST-Alpine – ÖIAG (Austria)			Sver Petro Explor (Swe)
				Rhône-Poulenc (France)				VE (W.Ger)
				Saarbergwerke (W.Germany)				
				VEBA (W.Germany)				

Table A1.1: Major state-owned manufacturing companies in Western Europe in the early 1980s. Source: Author's adaptation and integration based on Monsen & Walters (1983, p.20).

	1978										1984		
	Post	Telecommunications	Electricity	Gas	Coal	Railways	Airlines	Motor Industry	Steel	Shipbuilding	Petrochemicals	Electronics	Motor Vehicles
Australia	●	●	●	●	○	●	◐	○	○	N.A.	N.A.	○	●
Austria	●	●	●	●	●	●	●	●	●	N.A.	N.A.	N.A.	N.A.
Belgium	●	●	◐	◐	N.A.	●	●	○	◐	○	N.A.	N.A.	N.A.
Brazil	●	●	●	●	●	●	◐	○	◐	○	◐	◐	○
Britain	●	●	●	●	●	●	◐	◐	◐	●	N.A.	N.A.	N.A.
Canada	●	◐	●	○	○	◐	◐	○	○	○	N.A.	N.A.	N.A.
France	●	●	●	●	N.A.	●	◐	◐	◐	○	◐	◐	◐
W. Germany	●	●	◐	◐	◐	●	●	◐	○	◐	N.A.	N.A.	N.A.
Netherlands	●	●	◐	◐	N.A.	●	◐	◐	◐	○	N.A.	N.A.	N.A.
India	●	●	●	●	●	●	●	○	◐	●	◐	◐	◐
Italy	●	●	◐	●	N.A.	●	●	◐	◐	◐	◐	◐	◐
Japan	●	●	○	○	○	◐	◐	○	○	○	N.A.	N.A.	N.A.
Mexico	●	●	●	●	●	●	◐	◐	◐	●	N.A.	N.A.	N.A.
South Korea	●	●	◐	○	◐	●	○	○	◐	○	N.A.	N.A.	N.A.
Spain	●	◐	○	◐	◐	●	●	○	◐	◐	N.A.	N.A.	N.A.
Sweden	●	●	◐	●	N.A.	●	◐	○	◐	◐	○	○	○
United States	●	○	◐	○	○	◐	○	○	○	○	N.A.	N.A.	N.A.

Publicly owned:
● all or nearly all; ◐ around 75%; ◑ around 50%; ◒ around 25%

Privately owned:
○ all or nearly all

N.A. Not available or negligible

Table A1.2: Output share of state ownership across sectors among relevant capitalist economies in 1978. Source: Author's adaptation from The Economist (1978) and from Ayub and Hegstad (1987).

Country	Value added over national GDP (Years)	Share of national investments (Years)	Share of national employment (Years)
Australia	9.4% (1978-79)	15.7% (1978)	2.8% (1980) [^]
Austria	14.5% (1978-79)	19.2% (1978-79)	3.8% (1980)
Belgium	2.5% (1978)	8.6% (1978)	7.5% (1980) [^]
France	9.3% (1978)	13.8% (1978)	5.1% (1980)
West Germany	8.3% (1978)	10.8% (1978)	4.2% (1980) [^]
Italy	6.6% (1978)	11.1% (1978)	2.5% (1980) [^]
Japan	N.A.	12.0% (1978)	1.6% (1980) [^]
The Netherlands	3.6% (1971-73)	10.4% (1978)	1.1% (1980) [^]
Norway	N.A.	13.3% (1978)	N.A.
Spain	4.0% (1979)	11.4% (1979)	5.4% (1975)
Sweden	6.0% (1978-1980)	24.5% (1978)	3.4% (1979) [^]
United Kingdom	6.1% (1978)	15.0% (1978)	8.5% (1980) [^]
United States	1.2% (1980)	4.1% (1980)	0.7% (1981) [^]
Developed economies	6.2%	13.1%	3.8%
Algeria	66.7% (1980)	69.5% (1980)	8.1% (1980)
Argentina	6.4% (1978)	14.0% (1978)	3.6% (1978)
Brazil	5.8% (1978)	21.0% (1978)	1.1% (1979)
Chile	11.0% (1978)	15.7% (1978)	3.8% (1979)
China	37.3% (1978) [*]	81.9% (1980)	78.3% (1978) ^{**}
Egypt	38.9% (1982)	47.8% (1978)	13.6% (1982)
India	9.1% (1980)	41.1% (1980)	8.0% (1980)
Mexico	6.9% (1978)	34.9% (1978)	3.5% (1978)
South Africa	14.3% (1978)	23.2% (1978)	N.A.
Korea, Republic of	10.4% (1980)	27.6% (1980)	1.6% (1980)
Turkey	5.5% (1980)	48.4% (1980)	3.6% (1980)
Developing economies	19.3%	38.6%	12.5%

Table A1.3: The size of the public enterprise sector in late 1970s and early 1980s. Source: Author's elaboration on the BIB Database (Haggarty & Shirley, 1997) and Short (1984) for output and investment figures, Tait & Heller (1983), Chabanas & Vergeau (1996), Toninelli (2000), Carreras & Tafunel (2005) for employment figures. Figures for China come from author's elaboration on Lee (2009) and on National Bureau of Statistics of China. Notes: Average values for developed and developing economies are unweighted; ^{}State-owned enterprises' value-added share with respect to gross output in industry and construction; [^]Referring to nonfinancial public enterprises; ^{**}Share of urban employment.*

Rank SOE	Rank	Company	Country	Industry	Sales (billions \$)	Employees
1	3	ENI	Italy	Energy	25.293	130,897
2	5	IRI	Italy	Conglomerate	23.353	504,915
3	7	Elf-Aquitaine	France	Energy	20.662	76,219
4	9	Pemex	Mexico	Energy	19.404	175,420
5	11	Française des Pétroles	France	Energy	18.158	44,981
6	19	Kuwait Petroleum	Kuwait	Energy	14.996	14,640
7	24	Petroleos de Venezuela	Venezuela	Energy	13.597	43,553
8	30	Renault	France	Automotive	12.226	213,725
9	44	Indian Oil	India	Energy	8.855	29,757
10	46	CGE	France	Conglomerate	8.479	161,900
11	56	DSM	The Netherlands	Energy	7.015	27,190
12	57	Saint-Gobain	The Netherlands	Conglomerate	7.015	138,000
13	59	National Coal Board	UK	Coal	6.950	243,300
14	60	YPF	Argentina	Energy	6.880	33,728
15	61	Thomson	France	Conglomerate	6.620	111,900
16	74	Rhone-Poulenc	France	Chemical	5.856	79,230
17	80	Neste	Finland	Energy	5.363	8,422
18	88	British Steel	UK	Steelmaking	5.008	78,750
19	100	BL	UK	Automotive	4.543	80,478
20	105	Usinor	France	Steelmaking	4.421	55,920
21	106	Statoil	Norway	Energy	4.364	4,855
22	109	Norsk Hydro	Norway	Aluminium	4.353	19,825
23	110	Sacilor	France	Steelmaking	4.433	63,583
24	111	Enpetrol	Spain	Energy	4.305	5,422
25	116	Turkiye Petrolleri	Turkey	Energy	4.179	16,504
26	120	Pechiney	France	Aluminium	4.063	48,230
27	130	VÖEST-Alpine	Austria	Steelmaking	3.780	69,988
28	135	Petro-Canada	Canada	Energy	3.626	6,697
29	146	Salzgitter	West Germany	Steelmaking	3.423	45,920
30	152	Oil & Natural Gas Commission	India	Energy	3.367	37,016
31	171	Steel Authority of India	India	Steelmaking	3.013	205,236
32	173	Cockerill Sambre	Belgium	Steelmaking	2.991	19,159
33	180	Aérospatiale	France	Aerospace	2.875	35,000
34	181	OMV	Austria	Energy	2.833	7,297
35	198	EFIM	Italy	Conglomerate	2.547	40,400
36	206	Saarbergwerke	West Germany	Coal	2.454	31,030
37	217	Burmah Oil	UK	Energy	2.297	21,474
38	218	Zambia Industrial & Mining	Zambia	Mining	2.272	131,390
39	220	Iscor	South Africa	Steelmaking	2.262	62,600
40	233	Petrogal	Portugal	Energy	2.161	6,910
41	239	VIAG	West Germany	Energy	2.097	20,979

42	262	Empresa Colombiana de Petrol	Colombia	Energy	1.906	10,403
43	265	Rolls-Royce	UK	Aerospace	1.881	40,900
44	273	Chemie Linz	Austria	Chemical	1.821	7,847
45	294	Vale	Brazil	Mining	1.684	20,299
46	295	Charbonnages de France	France	Coal	1.676	50,978
47	299	Tabacalera	Spain	Tobacco	1.657	8,614
48	305	SNECMA	France	Aerospace	1.628	25,475
49	316	Matra	France	Defence	1.570	28,000
50	317	Entreprise Minière et Chimique	France	Mining	1.569	12,761
51	321	Bull	France	Informatics	1.554	26,453
52	328	Codelco	Chile	Mining	1.534	25,339
53	343	SSAB	Sweden	Mining	1.445	15,202
54	348	Statsforetag	Sweden	Conglomerate	1.427	24,901
55	349	Empresa Nacional del Petroleo	Chile	Energy	1.416	3,531
56	368	British Shipbuilders	UK	Shipbuilding	1.322	48,500
57	374	Petroperu	Peru	Energy	1.309	9,821
58	388	Philippine National Oil	Philippines	Energy	1.205	9,316
59	394	Bharat Heavy Electricals	India	Conglomerate	1.191	73,180
60	407	Enso-Gutzeit	Finland	Paper and pulp	1.149	13,402
61	419	Ensidesa	Spain	Steelmaking	1.115	21,012
62	428	SEAT	Spain	Automotive	1.087	23,610
63	445	China Steel	Taiwan	Steelmaking	1.026	7,620
64	452	Valmet	Finland	Paper and pulp	0.999	16,258
65	464	Gecamines	Zaire	Mining	0.971	35,846
66	468	Usiminas	Brazil	Mining	0.959	14,606
67	476	Austra Tabakwerke	Austria	Tobacco	0.924	2,217
68	484	Siderurgica Nacional	Brazil	Steelmaking	0.896	27,208
Total SOEs					329.3	3,755,739
Total International 500 Ratio					1,878	18,931,865
13.6%					17.5%	19.8%

Table A1.4: SOEs in the 1985 'Fortune International 500' list. Sources: Author's elaboration from Fortune (1985). Notes: Figures refer to the year 1984.

	Number of SOEs	Number of employees	Share of national employment	Value of enterprises (US\$ bn.)	Value of enterprises (% of GDP)
Australia	15	49,945	0.44%	18.3	1.88%
Austria	11	119,265	2.92%	36.9	9.42%
Belgium	12	142,030	3.14%	125.2**	26.56%**
Canada	47	86,558	0.50%	28.3	1.93%
Chile	34	48,900	0.64%	22.2	5.93%
China	17,851	68,390,000	18.40%	1907.3	12.44%
Colombia	43	80,883	0.40%	169.5	29.98%
Czech Republic	125	140,000	1.65%	40.3	13.20%
Denmark	19	39,793	1.48%	15.0	5.99%
Estonia	53	25,217	4.10%	5.4	15.70%
Finland	53	224,671	9.05%	115.1	52.34%
France	68	2,538,746	9.84%	278.7	11.27%
Germany	75	1,063,093	2.72%	131.7	3.76%
Greece	56	58,597	1.59%	16.0	5.73%
Hungary	373	165,325	4.32%	17.9	7.81%
Ireland	25	43,138	2.35%	32.1	15.05%
Israel	34	54,959	1.64%	48.9	19.50%
Italy	17	526,911	2.33%	226.1	10.48%
Japan	26	340,848	0.54%	475.7	10.01%
South Korea	59	132,547	0.54%	200.9	12.47%
Latvia	75	52,272	5.97%	4.9	11.34%
Lithuania	138	42,946	3.37%	7.1	9.63%
Mexico	69	248,064*	0.51%	83.2	4.13%
Netherlands	26	78,286	0.94%	60.3	7.71%
New Zealand	18	31,088	1.41%	15.1	10.39%
Norway	50	285,256	11.03%	288.4	87.82%
Poland	336	224,255	1.44%	110.3	12.16%
Portugal	84	171,534	3.77%	7.7	2.77%
Slovenia	55	82,609	8.94%	16.1	27.10%
Spain†	55	103,407	0.59%	12.1	0.81%
Sweden	52	208,764	4.48%	116.5	27.37%
Switzerland	4	101,098	2.32%	39.7	8.58%
Turkey	51	283,595	1.14%	104.3	6.78%
United Kingdom^	18	429,692	1.45%	119.6	4.98%
United States	21	813,500	0.57%	60.4	0.37%
Total or Average (Without China)	20,048 (2,197)	77,427,792 (9,037,792)	3.33% (2.89%)	4,957.2 (3,049.9)	14.10% (14.15%)

Table A1.5: Overview of state-owned enterprises by country, end-2012. Sources: Adapted from OECD (2014) with author's elaboration on World Bank's data for GDP (Current US Dollar in PPP terms) and on OECD data for total employment. China's figures come from author's elaboration on data from National Bureau of Statistics of China. Notes: a) Figures in the table represent 'Majority-owned listed entities' (more than 50% ownership), 'Minority-owned listed entities' (between 10% and 50% ownership), 'Majority owned non-listed enterprises' and 'Statutory and quasi-corporations' grouped together. b) China's figures are restricted to 'Industrial enterprises', leaving out financial corporations; c) 'Value of enterprises' indicates the total value of enterprises; *Employees of PEMEX and Comisión Federal de Electricidad (CFE) in 2012; **Figures for Belgium are inflated by the minority stake in BNP Paribas and Dexia; ^Figures on employees and enterprise value for the UK are inflated by the government stake in RBS and Lloyds (disposed on 17 May 2017); †The value of some minority-holding (e.g. Airbus, Enagás, etc.) by the SEPI are not included.

Chapter 3. Methodological approach

IRI Database

The IRI Database has been built from documentation retrieved through personal research at the Central State Archives of Italy, where the IRI Archive is deposited. Absolute figures on IRI's main economic and financial variables have been taken from IRI's annual reports, consolidated financial accounts and other relevant archival documentation elaborated by the Institute's internal offices (especially the Studies Service).

The database is divided into a set of key variables: Revenues; Exports; Value added; Employment; Investments; Assets; Stock market; R&D personnel; R&D expenditure; Patents; Endowment fund; Mezzogiorno; Sources of financing; Destination of financing; Financial figures; Sectoral compositions; National market shares. The specific sources for each variable are detailed in boxes A3.1 to A3.17 below.

Using the most appropriate figures for the available years, historical time series on each variable have been reconstructed. Most aggregate time series begin around 1950, reflecting IRI's self-identification as an integrated industrial group, and terminate in 1999, when IRI was put under liquidation (effective in 2002). The series reported in the main text terminate in 1992 (or in 1991, when the figure was not available), when IRI was transformed into a joint-stock company. These series, matched with official data on the Italian economy, have enabled the estimation of relative shares and other relevant indexes. This represents the most original and comprehensive collection of quantitative data on the subject.

A few caveats are necessary. First, the values of Montecatini (Italy's largest chemical company), of which IRI was the largest shareholder, are never included in the aggregate figures. Despite its influence in the stability of Montecatini's governance, IRI always considered the Montecatini stake as a financial investment. As such, Montecatini, and later Montecatini-Edison (founded in 1966 after the merger with the former electric company Edison), was never formally incorporated in the IRI Group. Therefore, IRI's quantitative figures do not reflect its indirect influence over what in 1962 was still the 7th largest company in the country by revenues, with more than 40,000 employees.

Secondly, from 1987 IRI's aggregate figures do not include the variables relative to SGS-ATES (IRI's semiconductor company which merged with the French Thomson Semiconducteurs to become SGS-Thomson) – with the exception of the series relative to IRI's R&D expenditure, R&D personnel and sectoral composition in 1991. As IRI's stake into the new company fell to 50%, SGS-Thomson was excluded from the consolidated accounts. Nevertheless, the company remained effectively controlled by IRI for several years after 1987. Thus, IRI's figures from 1987 to 1992 come from its official documentation but are underestimated by the exclusion of the 13th largest semiconductor company in the world (in 1992), with approximately 1.5 billion dollars in total revenues and more than 15,000 employees (around 4,000 in Italy).

Revenues	IRI's total revenues From 1999 to 1975: IRI's consolidated accounts. From 1974 to 1972: IRI's annual reports. From 1971 to 1950: 'Serie storiche: Angelo Gentile' (Archivio Storico IRI, Busta Nera, STU/63).
	Average USD/Lira annual exchange rate Banca d'Italia, Tassi di Cambio.
	Italy's GDP Baffigi (2011).

Box A3.1: Sources for the variable 'Revenues'.

Exports	IRI's foreign revenues and total exports From 1999 to 1988: IRI's consolidated accounts. From 1987 to 1979: IRI's annual reports. Notes: manufacturing plus services. From 1978 to 1972: IRI's annual reports. Notes: prevalently manufacturing exports, air and maritime transports not included given the existing difficulties in settling payments in lire. From 1971 to 1950: 'Serie storiche: Angelo Gentile' (Archivio Storico IRI, Busta Nera, STU/63).
	Italy's total exports Baffigi (2011).

Box A3.2: Sources for the variable 'Exports'.

Value added	IRI's value added From 1999 to 1977: IRI's consolidated accounts (figures from 1980 to 1983 are taken from IRI's 1984 consolidated accounts, Table 2, p. 15). From 1976 to 1950 (with the exception of 1968): value added as a share of post-1976 value added over revenues (average: 53.9%).
	Italy's value added Baffigi (2011).
	Italy's value added in the non-agricultural commercial economy Baffigi (2011). Istat Serie Storiche - Tavola 12.10 - Valore aggiunto ai prezzi base per settore di attività economica - Years 1970-2010.
	Italy's value added in IRI sectors Baffigi (2011). Istat Serie Storiche - Tavola 12.10 - Valore aggiunto ai prezzi base per settore di attività economica - Years 1970-2010.

Box A3.3: Sources for the variable 'Value added'.

Employment	IRI's employees From 1999 to 1994: IRI's consolidated accounts. From 1993 to 1950: IRI's annual reports (from 1984 to 1972: 'Serie Storiche 1958-1976 e 1977-1984 (Dati elaborati da Angelo Gentile)' (Archivio Storico IRI, Serie Nera, Busta STU/604). In some years: Del Canuto (1990).
	Employees in the Italian economy Giordano & Zollino (2015), Tab_A4, Number of workers (headcounts).
	Labour costs From 1958 to 1999: IRI's annual reports.
	Unit labour costs Ameco Database.
	Acquisitions and divestments of IRI's companies (1950-1989) (Archivio Storico IRI, Serie Nera, Busta DG/130)

Box A3.4: Sources for the variable 'Employment'.

Investments	IRI's Total investments From 1999 to 1976: IRI's consolidated accounts. From 1975 to 1972: IRI's annual reports. From 1971 to 1950: 'Serie storiche: Angelo Gentile' (Archivio Storico IRI, Busta Nera, STU/63). 1949: IRI's 1949 annual reports (summation of investments in each sector). From 1948 to 1945: Table n.13, p. 73 in Saraceno (1956) 'Investimenti netti dei singoli esercizi del periodo 1945-1948'.
	Total investments in the Italian economy Baffigi (2011).
	Italy's total investments excluding housing construction and agriculture Baffigi (2011). Svimez (2011).
	Total investments in agriculture Svimez (2011).

Box A3.5: Sources for the variable 'Investments'.

Assets	Assets and shares From 1999 to 1933: IRI's annual reports.
	Assets from consolidated balance sheets From 1999 to 1975: IRI's consolidated accounts. From 1957 to 1974: IRI's consolidated accounts (Industrial section); 'Serie Storiche 1958-1976 e 1977-1984 (Dati elaborati da Angelo Gentile)' (Archivio Storico IRI, Serie Nera, Busta STU/604).

Box A3.6: Sources for the variable 'Assets'.

Stock market	<p>Stock market figures 1948-1980: 'Indici e dati relativi ad investimenti in titoli quotati' (Mediobanca R&S). 1978-1980: 'Calepino dell'Azionista' (Mediobanca R&S). 1981-1990: (1991) 'Rapporto sull'IRI' (Archivio Storico IRI, Bilanci, Ufficio Studi). 1991-1993: 'Società quotate' (Archivio Storico IRI, Serie Nera, FIN1732-FIN1733). De Luca (2002).</p>
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Box A3.7: Sources for the variable 'Stock market'.

R&D expenditure	<p>IRI's R&D expenditure and receipts From 1999 to 1992: IRI's annual reports. 1991: 'Ricerca e sviluppo Serie storica 1984-1991. Dati aziendali' (Archivio Storico IRI, Serie Nera, Busta STU/307). From 1990 to 1966: 'Ricerca e sviluppo Serie storica 1966-1990. Dati consolidati' (Archivio Storico IRI, Serie Nera, Busta STU/307). From 1963 to 1965: Various sources.</p> <p>Italy's R&D expenditure Serie storiche Istat - Tavola 20.1 Spesa per ricerca e sviluppo (R&S) per settore istituzionale.</p> <p>Italy's foreign technology payments and receipts Table 19, p. 130 in Antonelli & Barbiellini Amidei (2007).</p> <p>R&D over GDP OECD Science and technology indicators, basic statistical series, 1963-1979/80 (OECD Main Science and Technology indicators). World Bank (GDP Current LCU). UN Statistical Yearbooks 1972, 1970 (West Germany GDP at market prices).</p>
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Box A3.8: Sources for the variable 'R&D expenditure'.

R&D personnel	<p>IRI's R&D personnel From 1999 to 1992: IRI's annual reports. 1991: 'Ricerca e sviluppo Serie storica 1984-1991. Dati aziendali' (Archivio Storico IRI, Serie Nera, Busta STU/307). From 1990 to 1966: 'Ricerca e sviluppo Serie storica 1966-1990. Dati consolidati' (Archivio Storico IRI, Serie Nera, Busta STU/307). 1965: IRI's 1966 annual report 1963: 'Ricerca e sviluppo nel Gruppo IRI' (Archivio Storico IRI, Serie Nera, Busta DPL/41).</p> <p>Italy's R&D personnel Serie storiche Istat - Tavola 20.6 Addetti alla ricerca e sviluppo (R&S) per mansione e settore istituzionale (in numero di persone equivalenti a tempo pieno - Etp) From 1992 to 1986: Istat (1992).</p>
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Box A3.9: Sources for the variable 'R&D personnel'.

Patents	<p>IRI's patents Tab. 11, pp. 98-99 in Antonelli & Barbiellini Amidei (2007). From 1950 to 1970: Pastorelli (2006). From 1971 to 1975: Archibugi (1990), p. 69, Table 5, estimated from the average of 3.8% over the 1969-1976 period. From 1976 to 1987: Archibugi (1990), p. 71, Table 6.</p> <p>Italy's patents Tab. 11, pp.98-99 in Antonelli & Barbiellini Amidei (2007).</p>
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Box A3.10: Sources for the variable 'Patents'.

Endowment fund	Figures on the endowment fund From 1991 to 1937: IRI's annual report; (Archivio Storico IRI, Serie Nera, Busta CON/421; Busta DG/234). Conte & Piluso (2012).
	Figures on Italy's public expenditure Artoni & Biancini (2004).

Box A3.11: Sources for the variable 'Endowment fund'.

Mezzogiorno	IRI's employees in the South From 1992 to 1977: IRI's annual reports. From 1976 to 1972: 'Serie Storiche 1958-1976 e 1977-1984 (Dati elaborati da Angelo Gentile)' (Archivio Storico IRI, Serie Nera, Busta STU/604). From 1971 to 1950: 'Serie storiche: Angelo Gentile' (Archivio Storico IRI, Busta Nera, STU/63). Notes: from 1962 to 1958, employees of Finelettrica in the South estimated as the average of the percentage share in the period 1950-1957 (44.5%, with a minimum of 44.3% and a maximum of 46.8%) multiplied by the overall number of Finelettrica employees over that period.
	Total employees in the South From 2002 to 1977: Istat. From 1976 to 1951: Italian Statistical Yearbook (<i>Annuario Statistico Italiano</i>), various years.
	Total employees in the non-agricultural economy in the South Svimez (2011).
	IRI's investments in the South Not available from 1999 to 1993: 'Investimenti nel Mezzogiorno' disappears from the Annual Reports. From 1992 to 1978: IRI's annual reports (same year). From 1977 to 1972: IRI's annual reports (previous year). From 1971 to 1950: 'Serie storiche: Angelo Gentile' (Archivio Storico IRI, Busta Nera, STU/63).
	Gross domestic product in the South Svimez (2011).
	Investments in the South Svimez (2011).
	Total investments in the South excluding agriculture Svimez (2011).
	Extraordinary intervention by the Cassa del Mezzogiorno/Agenzia per il Mezzogiorno Svimez (2011).
	IRI's manufacturing plans with more than 1,000 employees in the South Guglielmetti & Padovani, R. (1981a). Guglielmetti & Padovani, R. (1981b). Alfa Romeo's 1980 annual report. IRI's 1980 annual report.

Box A3.12: Sources for the variable 'Mezzogiorno'.

Sources of IRI's financing	From 1948 to 1991: IRI's annual reports. Marsan (1992).
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Box A3.13: Sources for the variable 'Sources of IRI's financing'.

Destination of IRI's financing	From 1948 to 1992: IRI's annual reports.
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Box A3.14: Sources for the variable 'Destination of IRI's financing'.

Financial figures	Economic results (Archivio Storico IRI, Serie Nera, Busta CON/421).
	Financial figures (IRI Group) From 1999 to 1974, 1968: IRI's consolidated accounts.
	Financial figures (Institute) From 1999 to 1933: IRI's annual reports.
	IRI's obligations under circulation Mediobanca R&S (Various years) 'Indici e dati relativi ad investimenti in titoli quotati'.
	Liabilities components of the Institute 1983-1992: IRI's annual reports. 1948-1982: Marsan (1992).

Box A3.15: Sources for the section 'Financial figures'.

Sectoral composition	'Serie storiche: Angelo Gentile' (Archivio Storico IRI, Busta Nera, STU/63); IRI's annual reports (1981; 1991); IRI's consolidated accounts (1981; 1991); Finmeccanica's 1991 annual report; STET's 1991 annual report; 'Ricerca e sviluppo Serie storica 1984-1991. Dati aziendali' (Archivio Storico IRI, Serie Nera, Busta STU/307); 'Ricerca e sviluppo Serie storica 1966-1990. Dati consolidati' (Archivio Storico IRI, Serie Nera, Busta STU/307).
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Box A3.16: Sources for the section 'Sectoral composition'.

National market shares	<p>Late 1940s 'Attività, situazione attuale e fabbisogno finanziario dell'IRI (3.9.1948)' (Archivio Storico IRI, Serie Nera, Busta STO/522); Marsan (1992); De Bonis et al. (2012).</p>
	<p>Mid-1950s 'Notizie IRI N. 2' (Novembre 1957); IRI's 1956 annual report; "IRI – Programma quadriennale 1957-60' (Archivio storico IRI, Bilanci, Programmi quadriennali del Gruppo Iri); Italian Statistical Yearbook 1957; De Bonis et al. (2012).</p>
	<p>Mid-1960s Petrilli (1967); IRI's 1965 annual report; Italian Statistical Yearbook 1966, 1967; Alfa Romeo's 1965 annual report; Finmare's 1965-1966 annual report; 'Dati Gentile per Holland' (Archivio Storico IRI, Serie Nera, Busta STU/201); 'I programmi di investimento e di finanziamento del Gruppo IRI a fine 1966' (Archivio storico IRI, Bilanci, Programmi quadriennali del Gruppo Iri); De Bonis et al. (2012); 'Piano elettronico Iri 1970-80' (Archivio storico IRI, Serie Nera, Busta STU/517).</p>
	<p>Mid-1970s IRI's 1975 and 1976 annual reports; Finmare's 1975-76 annual report; Italian Statistical Yearbook 1977; Finsider's annual report 1975; Alfa Romeo's 1975 annual report; De Bonis et al. (2012); Lloyd's Register 1976/1977; Indagine conoscitiva del settore elettronico Commissione XII Industria e Commercio Camera dei Deputati (1977); Istat (1977); 'Sintesi della Relazione e Conclusioni del Comitato Tecnico Consultivo per L'elettronica e l'informatica (14 dicembre 1978)' (Archivio Storico IRI, Serie Nera, Busta STU/528); 'Piano Ansaldo 1977-1980' (Archivio Storico IRI, Serie Rossa, Busta R1111); 'Programmazione Aeritalia' (Archivio Storico IRI, Serie Rossa, Busta R1365); Istat (1979); Marsan (1992).</p>
	<p>Mid-1980s IRI's Yearbook (years 1985, 1986, 1987); IRI's 1985 and 1986 annual reports; Finmare's 1985 annual report; Alfa Romeo's 1986 annual report; Italian Statistical Yearbook 1986, 1987; The Economist (1987); 'IRI Programma del Gruppo 1989/1992' (Archivio Storico IRI, Bilanci); Istat (1988); 'Piano Quadriennale 1987-1992 SGS-Ates' (Archivio Storico IRI, Serie Nera, Busta R2798); 'Struttura settoriale e interdipendenze produttive del gruppo IRI: metodologia dell'indagine e risultati preliminari' (Archivio Storico IRI, Serie Nera, Busta DG/128).</p>
	<p>Early 1990s IRI's Yearbook 1992/1993; IRI's 1991 annual report; Finmare's 1990 annual report; 'Programma quadriennale IRI 1992-1995' (Archivio Storico IRI, Bilanci); Fincantieri's 1992-1995 plan; Iritecna's 1992-1995 plan; Finmeccanica's 1991-1994, 1992-1995 and 1993-1994 plans; STET's 1992-1995 plans; SME's 1992-1995 plan; Alitalia's 1992-1995 plan; Finsiel's 1993-1996 plan; Istat (1994).</p>

Box A3.17: Sources for the variable 'National market shares'.

Chapter 4. The IRI system of state-owned enterprises

	Years	Main events
1st Period Origins and first industrial policy operations	1933	The <i>Istituto per la Ricostruzione Industriale</i> (IRI) was established as a temporary public law entity to solve the banking crisis and to reform the national credit system.
	1937-1939	IRI was transformed into a permanent of public law entity, mandated with managing the industrial shareholdings previously owned by the three banks. IRI became an instrument for national industrial policy.
2nd Period War period	1940-1945	With Italy's involvement in World War II, IRI and its companies lost their autonomy, becoming almost entirely subject to the military needs of the Fascist regime.
3rd Period Confirmation	1946-1948	IRI was preserved after the World War II, with a new mandate for the industrial post-war reconstruction.
	1950s	IRI played a crucial role in the Italian 'economic miracle' (1953-1962). IRI's companies were actively involved in steelmaking, mechanical-shipbuilding, telecommunications sectors and in large infrastructure projects (national motorways).
4th Period A public entrepreneurship system of SOEs	1960s	IRI began its policy of industrialisation of the South. New initiatives were launched in the electronics, nuclear, informatics and car making sectors. Research and development within IRI started to assume a distinctive role.
	1970s	IRI's regional policy of investing in the South reached its peak. IRI's diversification continued in technologically-advanced productions. At the same time, the economic consequences of the 1973 oil shock, forced IRI to bail out several inefficient companies that the private sector could not restructure. At the end of the decade, the global crisis in the steelmaking sector negatively affected IRI's overall financial performance.
	1980s	IRI underwent a process of restructuring, with the rationalisation of its shareholdings. By the end of the decade, IRI's losses were turned into profits. The automotive company Alfa Romeo was sold to FIAT, while IRI took new initiatives and reinforced its presence in high-tech sectors: semiconductor, railway signalling, automation, aerospace, informatics, telecommunications, high value-added shipbuilding. Research and innovation efforts reached a new peak.
5th Period Privatisation and liquidation	1992	IRI was transformed into a joint-stock company with the totality of its shares transferred to the Treasury, as a juridical pre-condition for the progressive divestment of IRI-owned companies.
	1990s	A process of privatisation relative to IRI's companies took place. By the end of the decade, IRI had become a liquidation agency, with only few financial holdings in shipbuilding, TV broadcasting, air transport and shipping (later privatised).
	1999	IRI was put under liquidation (which happened in 2002) and shares of the remaining controlled companies were transferred to the Treasury.

Table A4.1: Historical overview of IRI (1933-2002). Source: Author's elaboration.

IRI's operating companies

IRI's Ranking	Ranking in Revenues	Ranking in Value Added	Name	Sector	Revenues (in 2018 million euros)	Value Added (in 2018 million euros)	Employees
1	2	1	SIP - Italiana Esercizio Telecomunicazioni	Telecommunications services	18,143	13,661	89,475
2	6	6	Ilva	Steelmaking	6,058	1,819	27,046
3	11	9	Alitalia	Air transport	4,342	1,446	18,895
4	15	10	Alenia	Aerospace and Electronics	3,359	1,221	21,836
5	18	8	RAI - Radiotelevisione Italiana	Radio and TV broadcasting	3,159	1,549	13,281
6	26	21	Fincantieri	Shipbuilding	2,177	569	19,750
7	27	13	Italtel SIT	Telecommunications electronics	2,152	780	9,031
8	33	7	Autostrade	Motorways	1,996	1,564	8,654
9	37	27	Ansaldo Componenti	Industrial engineering	1,857	503	6,837
10	40	43	Generale Supermercati	Retail	1,835	344	6,687
11	51	356	Sipra - Italiana Pubblicità	Advertising	1,418	65	647
12	58	14	Sirti	Telecommunications engineering	1,263	755	9,152
13	72	71	ATI - Aero Trasporti Italiani	Air transport	996	237	2,231
14	76	42	Autogrill	Retail and catering	943	347	6,067
15	111	29	Aeroporti Di Roma	Airports	723	488	6,650
16	118	147	Cirio Bertolli De Rica	Food	696	132	1,621
17	119	103	Italgel	Food	689	176	1,883
18	121	87	Ansaldo Trasporti	Railway infrastructure systems	680	199	2,563
19	122	70	Dalmine	Steel tubes	673	239	3,780
20	127	60	SGS Thomson Microelectronics	Semiconductors	653	263	4,249
21	129	113	Ansaldo Industria	Industrial automation	643	161	2,394
22	133	35	Italcable	Telecommunications services	616	409	3,223

IRI's Ranking	Ranking in Revenues	Ranking in Value Added	Name	Sector	Revenues (in 2018 million euros)	Value Added (in 2018 million euros)	Employees
23	145	127	Alenia Spazio	Aerospace	568	148	2,126
24	150	696	Sidercomit	Steelmaking	548	36	791
25	154	51	Ansaldo	Industrial engineering	529	317	852
26	159	188	Italstrade	Civil engineering	515	107	1,331
27	198	118	Siemens Data	Informatics	425	154	1,015
28	204	123	Elsag Bailey	Industrial automation	412	151	1,425
29	212	81	Italsiel	Informatics	397	211	2,204
30	213	180	Sogei	Informatics	396	109	1,511
31	218	133	Italtel Telematica	Telecommunications equipment	392	142	3,332
32	225	215	Italiana Condotte d'Acqua	Civil engineering	383	96	1,541
33	230	1,898	Ansaldo Energia	Industrial engineering	377	-133	300
34	233	227	Tubi Dalmine Ilva	Steel tubes	374	91	1,377
35	238	100	AET Telecomunicazioni	Telecommunications equipment	368	181	2,454
36	243	351	Sidermar di Navigazione	Maritime transport	362	65	874
37	252	109	Tirrenia di Navigazione	Maritime transport	352	166	2,373
38	254	624	Italposte	Constructions	351	40	364
39	268	344	Seleco	Consumer electronics	329	66	1,382
40	275	91	Italtel Sistemi	Telecommunications systems	321	195	2,939
41	293	179	Cementir	Cement	309	109	1,130
42	306	119	Telespazio	Satellite telecommunications	296	154	1,032
43	314	381	Cogne	Steelmaking	287	62	2,149
44	331	202	Pavesi	Food	270	102	1,362

IRI's Ranking	Ranking in Revenues	Ranking in Value Added	Name	Sector	Revenues (in 2018 million euros)	Value Added (in 2018 million euros)	Employees
45	386	206	Ilte	Printing	238	99	1,228
46	398	809	IM Intermetro	Railway infrastructures	231	30	236
47	400	1,714	Lloyd Triestino di Navigazione	Maritime transport	230	8	594
48	403	851	Ansaldo GIE	Industrial engineering	228	28	702
49	435	752	IMCO - Impresa Centrale di Costruzioni	Constructions	212	33	362
50	452	502	ICMI - Industrie Cantieri Metallurgici Italiani	Steel tubes	208	48	716
51	464	869	Innse Innocenti Engineering	Industrial engineering	197	32	624
52	470	763	SI.CO	Retail	198	28	232
53	485	335	Selenia Eltag Sistemi Navali	Electronics	193	67	681
54	490	1,195	Edil.Pro	Constructions	190	67	187

Table A4.2: IRI-owned companies among the 500 largest Italian industrial enterprises in 1991. *Source:* Author's elaboration based on Mediobanca (1992). *Notes:* The figures for Ilva, Alitalia and RAI correspond to the values of the operating companies incorporated within the broader respective groups.

Year	Name	Sector	Type	Aim	Shareholders
1938	Celdit	Cellulose	NI	TD	50% IRI ; 50% Cartiere Burgo
1939	SAIGS	Synthetic Rubber	NI	TD	50% IRI ; 50% Pirelli
1939	SANAC	Refractory Materials	NI	TD	50% IRI ; 12.7% ILVA ; 19.5% Società Miniere Argille Refrattari e Affini; 17.8% Richard Ginori
1939	Società Idroelettrica Sarca Molveno	Hydroelectric power generation	NI	CS	2% IRI ; 49% SIP ; 49% Edison
1940	ATB – Acciaierie e Tubificio Brescia	Steel products	AC	CS	50% Finsider ; 50% Falck
1945	San Giorgio	Electromechanical	AC	TD; CS	60% IRI ; 40% Third parties
1955	SENN	Electro-Nuclear Energy	NI	TD	85% Finelettrica ; 15% SEAF
1957	Alitalia	Air Transport	AC	CS	77.5% IRI ; 22.5% BEA
1960	Selenia	Electronics	NI	TD	40% IRI ; 40% Raytheon; 20% Edison
1961	Officine Meccanica Calabresi (OMECA)	Rolling stock Manufacturing	NI	CS; TD	50% Finmeccanica ; 50% FIAT
1961	Terninoss	Stainless Steel	NI	TD	50% IRI ; 50% US Steel
1961	Stabilimenti Meccanici Triestini	Textile Machinery	NI	CS	50% IRI ; 50% Snia Viscosa
1964	Società Italiana per Azioni per il Traforo del Monte Bianco	Civil Engineering	AC	CS	51% IRI ; 49% Third parties
1966	Asgen	Electromechanical Engineering	NI	TD	50% Finmeccanica ; 50% Compagnia Generale di Elettricità
1966	Grandi Motori Trieste	Naval Engines	NI	CS	50% IRI ; 50% FIAT
1966	Sirti	Telecommunications Engineering	AC	CS	50% IRI ; 50% Pirelli
1966	Società Generale Supermercati	Retail	AC	CS	60% SME ; 40% Third parties
1969	Aeritalia	Aircraft Manufacturing	NI	CS	50% IRI ; 50% FIAT
1969	Siemens Data	Data Processing	NI	TD; CS	49% STET ; 51 % Siemens AG
1969	Italsiel	Informatics	NI	TD; CS	51% SAGEA ; 15% STET ; 15% Finmeccanica ; 3% Finsider ; 1% IRI ; 15% Olivetti
1970	Alemagna	Food	AC	CS	50% SME ; 50% Alemagna Family
1971	Star	Food	AC	CS	50% SME ; 50% Findim
1972	SGS-ATES	Semiconductors	NI; AC	TD; CS	60% IRI ; 20% Olivetti; 20% FIAT
1972	Cirio	Food	AC	CS	50% SME ; 50% Third parties
1972	NIRA	Nuclear Energy Engineering	NI	TD	Ansaldo Meccanico Nucleare 57.5% ; 17.5% Agip Nucleare; 10%

					Franco Tosi; 10% FIAT; 5% Beelli
1974	Aeroporti di Roma	Airports	NI	CS	83% Italstat ; 5% Banca Commerciale Italiana; 5% Credito Italiano; 5% Banca di Roma; 2% Provincia di Roma
1974	Italdata	Informatics	NI	TD	50% STET ; 50 % Siemens AG
1975	Almare	Shipping	NI	CS	51% Finmare ; 49% Third parties
1976	Sovitalmare	Shipping	NI	CS	51% Finmare ; 49% Sovfracht
1976	Continentalmare	Shipping	NI	CS	51% Finmare ; 49% Continentale Italiana
1977	FOS	Optical Fibre Manufacturing	NI	TD	50% Sirti ; 50% Pirelli
1980	Arna	Automotive	NI	CS	50% Alfa Romeo ; 50% Nissan
1981	Carbomare di navigazione	Shipping	NI	CS	51% Finmare ; 49% Third parties
1981	ATR	Aircraft Manufacturing	NI	CS	50% Aeritalia ; 50% Aerospatale
1985	SEIAF	Industrial Automation	NI	TD	51% Elsag ; 49% IBM
1986	Optimes	Consumer Electronics	NI	TD; CS	51% STET ; 49% Phillips
1986	Necsy	Telecommunications System	DM	TD	65% STET ; 35% HP
1987	SGS-Thomson	Semiconductors	NI	CS	50% STET ; 50% French State
1988	Iritech	Venture Capital	DM	TD	77% IRI ; 3% Aeritalia ; 10% Nippon Investment & Finance ; 6% Taiyo; 2% Sumitomo; 2% Nagase
1988	Ansaldo ABB Componenti	Industrial Components	NI	CS	60% Ansaldo ; 40% ABB
1989	Italtel	Telecommunications Equipment	DM	CS; TD	80% STET ; 20% AT&T
1990	New Sulzer Diesel	Naval Engines	AC	CS; TD	42% Fincantieri ; 42% Bremer Vulkan Verbund; 6% NSD management; 10% Sulzer Brothers
1990	Nuova Forneria	Food	NI	CS	51% SME ; 24.5% Barilla; 24.5% Ferrero
1991	Ganz Ansaldo	Electro-mechanical engineering	NI; AC	CS	51% Ansaldo ; 49% Ganz Electric

Table A4.3. List of mixed-ownership companies where IRI and its subsidiaries were the majority or controlling shareholders and third-party companies were minority or equal shareholders. *Source:* Author's elaboration. *Notes:* IRI and its subsidiaries are highlighted in bold. NI=new initiative; AC=acquisition of a controlling stake; DM=divestment of a minority stake in favour of third-party partners. TD=technology development; CS=commercial strategy.

Sector Division	IRI's presence		Notable companies
	Degree	Frequency	
A – Agriculture, forestry and fishing			
01 – Crop and animal production, hunting and related service activities	Low	C	Maccarese
B – Mining and quarrying			
07 – Mining of metal ores	Low	A (1970s)	Monte Amiata
C – Manufacturing			
10 – Manufacture of food products	Medium	E1 (1960s)	Alivar, Cirio Bertolli De Rica, Italgel
11 – Manufacture of beverages	Low	E1 (1960s)	Alivar, Cirio Bertolli De Rica
13 – Manufacture of textiles	Medium	A (1930s)	Châtillon
17 – Manufacture of paper and paper products	Low	E2 (1930s) A (1980s)	Celdit
18 – Printing and reproduction of recorded media	Medium	E2 (1950s)	Ilte
20 – Manufacture of chemicals and chemical products	High	A (1980s)	Montecatini-Montedison
22 – Manufacture of rubber and plastic products	Medium	E2 (1950s)	SAIGS
23 – Manufacture of other non-metallic mineral products	Medium	E2 (1930s); E2 (1950s)	SANAC; Cementir
24 – Manufacture of basic metals	High	C	Italsider, Dalmine, Terni
25 – Manufacture of fabricated metal products, except machinery and equipment	Medium	E2 (1960s)	Asgen
26 – Manufacture of computer, electronic and optical products	High	E2 (1950s)	SGS-ATES, Italtel, Selenia
27 – Manufacture of electrical equipment	High	C	Ansaldo
28 – Manufacture of machinery and equipment n.e.c.	High	E2 (1960s) E2 (1960s)	Ansaldo, Italmimpianti; Elsag, Grandi Motori Trieste, INNSE;
29 – Manufacture of motor vehicles, trailers and semi-trailers	High	A (1980s)	Alfa Romeo
30 – Manufacture of other transport equipment	High	C	Italcantieri, Aeritalia, Ansaldo Trasporti
D – Electricity, gas, steam and air conditioning supply			
35 – Electricity, gas, steam and air conditioning supply	Medium	A (1960s)	SIP, SME
E – Water supply; sewerage, waste management and remediation activities			
37 – Sewerage	Low	E1 (1960s)	Bonifica, Condotte
38 – Waste collection, treatment and disposal activities; materials recovery	Low	E1 (1970s)	Condotte
39 – Remediation activities and other waste management services	Low	E1 (1960s)	Bonifica

F – Construction			
41 – Construction of buildings	Low	E2 (1970s)	Italposte
42 – Civil engineering	High	E1 (1940s)	Condotte, Italstrade
43 – Specialised construction activities	High	E1 (1960s)	Ansaldo Trasporti, Sirti
G – Wholesale and retail trade; repair of motor vehicles and motorcycles			
47 – Retail trade, except of motor vehicles and motorcycles	Medium	E1 (1960s)	Supermercati GS
H – Transportation and storage			
50 – Water transport	High	C	Tirrenia, Italia, Adriatica. Lloyd Triestino
51 – Air transport	High	E1 (1940s)	Alitalia
52 – Warehousing and support activities for transportation	Medium; High	E1 (1970s); E2 (1950s)	Aeroporti di Roma; Autostrade
I – Accommodation and food service activities			
56 – Food and beverage service activities	Low	E1 (1960s)	Autogrill
J – Information and communication			
58 – Publishing activities	Low	E2 (1950s)	Edindustria
59 – Motion picture, video and television programme production, sound recording and music publishing activities	High	E2 (1950s)	RAI
60 – Programming and broadcasting activities	High	E2 (1950s)	RAI
61 – Telecommunications	High	C	SIP, Italcable, Telespazio
62 – Computer programming, consultancy and related activities	Low	E2 (1960s)	Siemens Data, Italdata
63 – Information service activities	High	E2 (1960s)	Italsiel, Sogei
K – Financial and insurance activities			
64 – Financial service activities, except insurance and pension funding	High	C	Banca Commerciale, Credito Italiano, Banco di Roma, Mediobanca
M – Professional, scientific and technical activities			
70 – Management consultancy activities	High	E2 (1950s)	IFAP
72 – Scientific research and development	High	E2 (1960s)	Cselt, CSM, Cetena
73 – Advertising and market research	Medium	C	Sipra

Table A4.4: The sectoral presence of IRI-owned companies. Source: Author's elaboration based on modern ISIC Rev.4 standards. Notes: C=Constant, E1=Periodic (entry by acquisition); E2=Periodic (entry with new initiative) A=Periodic (abandoning).

IRI's sectoral subsidiaries

STET	<p>Type: Sectoral holding IRI period: 1933-1997ⁱ Headquarters: Turin Sectors: Telecommunication, electronics</p> <p>In 1933, IRI separated the three telephone concessionaires Stipel, Telve and Timo from the electrical energy companies of the controlled conglomerate Società Idroelettrica Piemonte, transferring all their shares to a new financial holding, Società Torinese Esercizi Telefonici (STET). In 1955, the STET group employed 14,617 headcounts (7.5% of total IRI's employees in the industrial section) and had total revenues of 39.2 billion lire (5.6% of total IRI's revenues), while accounting for 32.8% of total IRI's investments (42 billion lire). From 1957, STET and its companies increased in size and diversification. Telephone services were extended to the entire national territory with the acquisition of Italy's remaining two concessionaries (Teti and Set) and their incorporation into a single company called Società Italiana per l'Esercizio Telefonico (SIP) in 1964. SIP became the state monopolist for intra-urban telephone services, responsible for developing the national telecommunications infrastructure. With the acquisition of Italcable in 1965 and the establishment of Telespazio in 1961, STET began to operate international telecommunications services via landlines and satellites respectively. From the early 1960s, STET diversified into manufacturing, research and training activities. In 1960, SIT-Siemens (renamed Italtel from 1980) became the leading national producer of telecommunications equipment and installations. In 1966, STET acquired a controlling stake of Sirti, Italy's main telecommunications infrastructure company. In 1969, a partnership with the German Siemens AG gave birth to Siemens Data, specialising in data processing systems, followed by the establishment of Italdata (in 1974), dedicated to manufacturing information systems and computer equipment. From 1970 to 1988, with the aim of exploiting the technological applications on telecommunications systems, IRI assigned to STET the control of its electronic (Elsag, Selenia) and semiconductor companies (ATES already from 1963). In 1964, STET established Centro Studi e Laboratori Telecomunicazioni (CSELT), the leading national research laboratory in telecommunications and electronics technologies, with more than 500 researchers by the end of the 1970s. Scuola Superiore Guglielmo Reiss Romoli (SSGRR), established in 1976, became STET's renowned training centre for technicians and managers. At the end of the 1980s, with the transfer of Elsag, Selenia and of the semiconductor company SGS-Thomson to Finmeccanica, STET assumed the following configuration: a) telecommunication services; b) manufacturing of telecommunications equipment and infrastructure engineering; c) publications and data transmission services; d) ancillary activities and research. With 53 consolidated companies employing 125,958 workers, investing 10,619 billion lire (10.5 billion euros in 2018 prices) and total revenues amounting to 19,964 billion lire (19.8 billion euros in 2018 prices), by 1990 STET had become IRI's largest sectoral subsidiary by every account. In the same period, STET was pioneering mobile telecommunication technologies and broadband connection, while diversifying internationally with a series of foreign acquisitions. In 1994, STET's telephone operating companies were merged into a single entity denominated Telecom Italia (57.73% controlled by STET), representing the fifth largest telecommunications group in the world in terms of revenues (sixth in terms of call volumes), with a significant portfolio of foreign subsidiaries in 40 countries and the undisputed European leadership in the growing sector of mobile telecommunications servicesⁱⁱ. At the end of 1996, IRI's 46.86% controlling participation of STET was transferred to the Treasury, as a preliminary step towards its privatisation via public offer on the stock exchange, which took place in 1997, after the incorporation of STET into Telecom Italia. In the following decades, Telecom Italia experienced a progressive deterioration of its economic performance, together with a regression of its technological leadership and a loss of international market positions. In 2019, Telecom Italia was renominated TIM. As of October 2022, the French multimedia group Vivendi is TIM's majority shareholder (23.75% share), followed by Italy's state-controlled CDP with a 9.81% stake.</p>
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Box A4.1: The sectoral financial holding STET. Source: Author's elaboration from various sources.

ⁱ Listed on the stock exchange from 1936 to 1997.

ⁱⁱ With 5.7 million subscribers, Telecom Italia Mobile was by far the first European operator in mobile telecommunication services ahead of DeTeMobil (2.8 million) and Vodafone (2.8 million).

Finmare	Type: Sectoral holding IRI period: 1936-1999 ⁱⁱⁱ Headquarters: Genoa Sectors: Maritime transport, shipping
<p>In 1936, Finmare became IRI's second sectoral financial holding, established with the aim to reorganise maritime transport activities into four different companies, with a regional distribution of traffic routes. At its foundation, Finmare was one of the world's largest shipping groups, with 23,114 employees^{iv}, 206 vessels above 100 GT, representing a total tonnage of 1,357,000 GT (around 2% of the world's fleet). Shipping and maritime transport services were an essential source of foreign currency receipts, via trade and tourism. War destructions and requisitions brought Finmare on its knees: in 1946 it was left with only 14 vessels, accounting for less than 37,000 GT. Finmare partially rebuilt its fleet in the following years, recovering most of its pre-war global market share but it was soon faced with the diminishing importance of transoceanic maritime transport^v in favour of air traveling. In 1974, in accordance with national legislation^{vi} that reformed the maritime transport sector, Finmare started a profound reorganisation of its activities, moving towards the growing business of specialised cargo shipping. Finmare became a vertically integrated shipping company operating in four different sectors: a) bulk transport with companies Sidermar (for the steel industry) and Almare (for bauxite and other dry and liquid bulk); b) international freight liner services with companies Lloyd Adriatico (for Africa, non-Mediterranean Asia, Oceania), Italia (for the Atlantic and Pacific coasts of North and South America) and Adriatica (for the Mediterranean); c) passengers and cargo connections with national islands operated by Tirrenia (services to the main islands with extensions to Tunisia and Malta), Viamare (North-South connections) and regional companies; d) auxiliary services such as on-land container logistics (Interlogistica), on-board radiocommunications (Sirm), insurance (Aurora). In 1990, Finmare's revenues were 1,418 billion lire (1.4 billion euros in 2018 prices) of which more than 35% from foreign sources. At that time, the entire Finmare group was composed by 14 consolidated companies, employing 8,110 workers and operating a fleet of 152 ships, approximately 2.3 million GT, representing 21% of Italy's fleet and a 57.3% domestic share relative to the container shipping business. Finmare was eventually put into liquidation in 1999. All its operating companies were privatised between 1993 and 2012.</p>	

Box A4.2: The sectoral financial holding Finmare. *Source:* Author's elaboration from various sources.

ⁱⁱⁱ Listed on the stock exchange from 1952 to 1988.

^{iv} 3,629 managers and office workers and 19,485 sailors.

^v Until 1957 the share of total passenger transport operated by ships on the Europe-North America route was above 50% ('La Finmare: sintesi storica', p. 31, Archivio Storico IRI, Serie Nera, STU/61).

^{vi} Law n. 684 (20 December 1974).

Finsider	<p>Type: Sectoral holding IRI period: 1937-1988^{vii} Headquarters: Rome Sectors: Steelmaking</p> <p>In 1937, IRI created its third sectoral financial holding for the steelmaking companies Ilva and Dalmine (specialised in tubes), for the conglomerate Terni and for the steelmaking division of Ansaldo, which had been spun off as a new company (SIAC) in 1935. At that time, the four steelmaking companies were producing 75% of national pig iron and 45% of national crude steel, employing over 55,000 workers. Finsider established itself as the national leader in steelmaking, reorganising productions around integrated steelworks with blast furnaces, located on coastal sites. Until the mid-1970s, Finsider was the largest among IRI's sectoral subsidiaries. With the establishment of the Taranto plant in 1959, Finsider further expanded its production capacity (reaching a 58.9% national share of crude steel produced in 1975), turning Italy into the second largest steel producer in Europe after West Germany^{viii}. From its foundation, Finsider pursued a vertical integration strategy into iron ore mining (Ferromin, in 1939), refractory materials (Sanac, in 1939), commercial services (Sidercomit, in 1947), cement making (Cementir, in 1951), plant engineering (Cosider, in 1957; Italmianti, from 1966), research on metal materials (CSM, in 1963). It also diversified into special steels such as silicate magnetic steel (with the US Armco in 1950) and stainless steel (with Terninoss, a 1961 joint-venture with the United State Steel Corporation). The 1975-1985 global steelmaking crisis forced a deep restructuring of Finsider's activities around a more homogeneous product-company specialisation: Nuova Italsider in flat rolled products, Dalmine in tubes, Terni Acciai Speciali in stainless steels and magnetic sheet, Deltasider in special steels, Acciaierie di Piombino in long products. In 1985, Finsider was still the third largest steelmaker group in the world^{ix} with a total crude steel output of 13.45 million tons, 11,439 billion lire in total revenues (approximately 15 billion euros in 2018 prices) and 92,088 employees. In 1988, it was liquidated as part of an overall restructuring plan.</p>
Ilva	<p>Type: Sector leader company IRI period: 1989-1995^x Headquarters: Rome Sectors: Steelmaking</p> <p>By 1987, the enduring structural crisis in the steelmaking sector had brought IRI's steelmaking companies to a critical financial situation. On that year, Finsider's net financial debts were higher than total revenues, and net losses amounted to 14.7% of Finsider's gross value of production. In 1988, IRI decided to separate Finsider's most promising assets (Italsider, Nuova Deltasider, Terni Acciai Speciali and others), establishing a new multidivisional company named Ilva (active since 1989). Past losses were absorbed by IRI. Thanks to the restructuring operations and to the cyclical improvement of the global steelmaking sector, Ilva was able to register positive economic results in 1989 and 1990. In 1990, Ilva's revenues amounted to 10,730 billion lire (10.6 billion euros in 2018 prices), of which 31.4% foreign. With an overall output of 11.5 million tons, Ilva ranked seventh among the world's largest producers, accounting for 8% of total steel produced in the EEC (13% relative to special steels and 11% of cast iron). Ilva's 72 consolidated companies employed 49,823 workers, a significant reduction from the 1980 peak of 114,400. As part of its privatisation programme, in 1993 Ilva was divided in two separate companies: Ilva Laminati Piani (ILP) and Acciai Speciali Terni (AST), specialised in rolled products and stainless steels respectively. AST was sold to the ThyssenKrupp Group in 1994 and it is currently owned by the Arvedi Group. ILP was sold to the Riva Group in 1995, which renamed the company as 'Ilva'. In 2014, the new Ilva was put into extraordinary administration and in 2018 ArcelorMittal acquired its assets. At the end of 2020, a new company called 'Acciaierie d'Italia' was created, which is set to be 60% owned by the state investment agency Invitalia by 2024, with ArcelorMittal retaining a 40% minority stake.</p>

Box A4.3: The sectoral financial holding Finsider and its successor, the sector leader company Ilva. *Source:* Author's elaboration from various sources.

^{vii} Listed on the stock exchange from 1940 to 1988.

^{viii} Finsider's global production share of crude steel increased from 0.94% in 1938 to 2% in 1975.

^{ix} Preceded only by Nippon Steel (28.56 million tons) and by US Steel (15.15 million tons).

^x The sector leading company Ilva was 100% owned by IRI, thus never listed on the stock exchange.

Finmeccanica	<p>Type: Sectoral holding IRI period: 1948-2000^{xi} Headquarters: Rome Sectors: Mechanical engineering, aerospace, electronics</p> <p>This sectoral financial holding was created in 1948 with the aim to complete the civil reconversion and the corporate restructuring of IRI's shipbuilding and mechanical productions. In 1948, Finmeccanica's employees amounted to 88,500 (over 40% of IRI's total), of which over 59,000 involved in shipbuilding activities. At the time of its foundation, Finmeccanica was accounting for 25% of the national mechanical-shipbuilding production, distributed differently among the various sub-sectors: 80% of shipbuilding (Ansaldo, CRDA, Navalmeccanica), 60% of armaments and munitions (Industria Meccanica Napoletana), 40% of national machines (San Giorgio, Stabilimenti S. Eustachio, Metalmeccanica), 25% of rolling stocks (Officine Meccaniche Ferroviarie Pistoiesi), 10% of motor vehicles (Alfa Romeo), 5% of electrical machines (San Giorgio), 3% of aircraft production. Finmeccanica remained IRI's most diversified sectoral manufacturing holding, changing configurations through time due to subsequent entries into new sectors or to the abandonment of certain productions. When in 1959 shipbuilding activities were separated and concentrated in the new sectoral financial holding Fincantieri, Finmeccanica employed 30,000 workers and was mostly focused on the automotive sector with the car making company Alfa Romeo. Over the 1950s, Finmeccanica invested in three different fields of electronics: radar and defence electronic systems (with Microlambda in 1951, later turned into Selenia in 1960); industrial automation with the electronic division of Nuova San Giorgio (and its spin-off Elsag in 1969); semiconductors (with ATES in 1959). In the following years, Finmeccanica transferred its electronics companies ATES (1963) Selenia and Elsag (1970) to STET and its rolling stock companies to the state holding company EFIM, concentrating on three main sectors: automotive (with Alfa Romeo), electro-mechanics (with Ansaldo) and aerospace (with the leading national company Aeritalia, established in 1969). In the late 1980s, while Alfa Romeo was privatised (acquired by FIAT in 1986), IRI transferred back to Finmeccanica the three electronics companies SGS-Thomson, Elsag and Selenia in 1989. At the end of that decade Finmeccanica started an internationalisation process with significant foreign acquisitions in the fields of industrial automation (Bailey Controls) and railway signalling (Union Switch & Signal). In 1990, Finmeccanica's 61 consolidated companies employed over 55,000 workers. The Finmeccanica group accounted for 11.6% of national business R&D and had consolidated revenues of 7,924 billion lire (7,862 billion euros in 2018 prices) distributed across the following activities (with the exclusion of the non-consolidated semiconductor company SGS-Thomson): aerospace (32%), defence electronic systems (14%), civil electronic systems (5%), energy engineering (27%), transport manufacturing and engineering (8%), industrial automation (13%), biomedical (1%). Finmeccanica underwent several transformations in the following decades: the divestment of civil activities (industrial automation, transport, energy, semiconductors) and the specialisation in aerospace productions (mostly helicopters with AgustaWestland) and defence systems. In 2000, IRI divested via public offer 43.7% of its participation in Finmeccanica, transferring the residual share to the Treasury. In 2016, Finmeccanica was consolidated into a multidivisional company denominated Leonardo. As of today (2022), the Italian Ministry of Economy and Finance remains Leonardo's controlling shareholder with a 30.2% stake.</p>
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Box A4.4: The sectoral financial holding Finmeccanica. *Source:* Author's elaboration from various sources.

^{xi} Finmeccanica remained 100% owned by IRI. In 1992, it was listed on the stock exchange.

Autostrade	<p>Type: Sector leader company IRI period: 1950-1999^{xii} Headquarters: Rome Sectors: Motorways</p> <p>Autostrade was established by IRI in 1950 with the aim to study and elaborate a plan for the construction of Italy’s main motorway: the 753 kilometres of ‘<i>Autostrada del Sole</i>’ between Naples and Milan. Autostrade coordinated the project (in 1956 it had only 263 employees), designed by IRI’s construction company Italstrade, which was completed between 1956 and 1964. State funding was limited to a 36% share of total financing needs, the remaining being covered with the issuing of 30-year obligations, to be repaid through future motorways toll payments, as Autostrade became the managing concessionaire of the motorway. The same model was applied to the construction of other critical highway infrastructures, such as the Bologna-Taranto motorway along the Adriatic Sea Coast. This made Autostrade IRI’s sector leading company for the motorways sector, an independent role preserved also after its transfer to IRI’s sectoral financial holding for infrastructures Italstat in 1982, as testified by the maintenance of a separate section in IRI’s four-year plans. By 1990, Autostrade had built and was operating 3,006 km of motorways, 48.7% of the national total (including toll free highways). Autostrade had acquired a consolidated leadership in motorways infrastructures, operating 10% of EEC’s motorways in terms of mileage. It also demonstrated a unique innovation capacity with the development and introduction of the proprietary technology ‘Telepass’, the first large scale system of dynamic tolling in the world, currently the most diffused in Europe. In 1990, Autostrade had 10,200 employees and total revenues amounted to 1,987 billion lire (around 2 billion euros in 2018 prices), making up for almost half of total Italstat’s revenues. Autostrade was privatised between 1999 and 2000, when IRI sold its controlling stake of 86.58% to a financial holding controlled by the Benetton family. As of today, it is still the main motorways operator in Italy, under the new denomination Autostrade per l’Italia. In 2021, the control of the Autostrade per l’Italia (86.86% of its capital) has been acquired by the state investment bank CDP, in partnership with the investment companies Blackstone and Macquire.</p>
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Box A4.5: The sector leader company Autostrade. Source: Author’s elaboration from various sources.

^{xii} Listed on the stock exchange from 1987.

Finelettrica	Type: Sectoral holding IRI period: 1952-1965 ^{xiii} Headquarters: Rome Sectors: Electric energy
<p>In 1952, IRI grouped its electric energy companies – SME, SIP, Società Trentina di Elettricità (STE), the electric energy division of the conglomerate Terni and other smaller electric energy companies – into a sectoral financial holding participated by Finsider (with a 20% share). The aim was to promote new investments in thermoelectric power plants and to coordinate electric energy distribution over the areas in which they operated (parts of the North-West and most of the continental Southern regions). Finelettrica became one of the largest electric energy groups in Italy, with 19,465 employees in 1962. Its distribution networks covered 46% of Italy's continental territory, serving 40% of its population. Between 1952 and 1962, Finelettrica's total production capacity augmented from 7.2 TWh to 16.5 TWh, increasing its share of national production from 23.3% to 25.5%. In 1955, Finelettrica established a new electric energy company called SENN, with the aim to build a 160 MW nuclear power plant, the first to be realised in Europe with the BWR technology. With the nationalisation of the electric energy sector at the end of 1962, Finelettrica's electric energy utilities were obliged to transfer their assets to the new national public corporation (Ente Nazionale per l'Energia Elettrica, ENEL). With the corresponding financial compensations, in 1964 SIP consolidated STET's telephone concessionaries into a single company, changing its name into 'Società Italiana per l'Esercizio Telefonico', whereas in 1963 SME became a financial holding called 'SME – Società Meridionale Finanziaria', reinvesting its newly available resources in food and paper activities located in the South. In 1965, Finelettrica was eventually merged into Finsider.</p>	

Box A4.6: The sectoral financial holding Finelettrica. *Source:* Author's elaboration from various sources.

^{xiii} Listed on the stock exchange from 1953 to 1965.

RAI	<p>Type: Sector leader company IRI period: 1952-2000^{xiv} Headquarters: Rome Sectors: TV and Radio Broadcasting</p> <p>RAI (Radio Audizioni Italia) was the national radio broadcasting company, founded in 1944 from the transformation of Ente Italiano per le Audizioni Radiofoniche (EIAR), the national radio company established in 1927. From 1933, STET's company SIP had become EIAR's majority shareholder, but a 1952 convention imposed the transfer of 75.45% of RAI's capital to IRI and granted a 20-year concession on national frequencies. On 1954, RAI's name was changed into RAI – Radiotelevisione Italiana, to mark the beginning of national TV broadcasting. RAI became IRI's sector leader company in radio and television broadcasting. At the end of that year, RAI had 4,540 employees (2,500 in the radio sector) and only 88,000 subscribers, with a TV coverage that could reach only 58% of the population. A second national channel was launched in 1962 and a third one in 1979. With law n. 103 of 1975, IRI assumed the full ownership of RAI, and a special parliamentary committee was attributed a central supervisory and control, thus limiting IRI's managerial autonomy. By that time, RAI's coverage of both channels reached more than 90% of the Italian population, for a total number of 11.4 million subscribers, second only to Great Britain in terms of relative television diffusion^{xv}. In 1984, RAI introduced its teletext service 'Televideo', while in 1990 it pioneered direct high-definition broadcasting for the 1990 World Cup, using digital point-multipoint transmission via satellite and optical fibre cables. In 1990, the RAI group comprised 9 consolidated companies – involved in TV and Radio broadcasting (RAI), publishing (Nuova ERI), advertising (Sipra) and marketing (Sacis) – for a total number of 15,882 employees. Television activities were located across 21 regional offices, 6 production centres, 7 training and research centres and 4 international offices. Total revenues amounted to 3,535 billion lire (3.5 billion euros in 2018 prices). Currently, Rai's controlling shareholder is the Ministry of the Economy and Finance, which currently owns 99.56% of its shares.</p>
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Box A4.7: The sector leader company RAI. Source: Author's elaboration from various sources.

^{xiv} Rai remained a non-listed company controlled by IRI.

^{xv} At the end of 1973, the ratio between TV density (subscribers over 1,000 inhabitants) and per capita income, indexed to 1 for Italy was 0.59 in France, 0.60 in Germany and 1.20 in Great Britain (Marsan, 1992).

<p>Alitalia</p>	<p>Type: Sector leader company IRI period: 1957-2000^{xvi} Headquarters: Rome Sectors: Air transport</p>
<p>The airline company Alitalia – Linee Aeree Italiane was established in 1957 from the merger between two pre-existing companies founded after World War II, in partnership with Trans World Airlines (Linee Aeree Italiane – LAI) and British Overseas Airways Corporation (Alitalia - Aerolinee Italiane Internazionali). In 1958, IRI acquired an 88.8% stake of Alitalia, which became the national flag carrier. At that time, Alitalia had 4,074 employees and operated 45 turboprop airplanes. Alitalia’s revenues amounted to 26.1 million lire (362 million euros in 2018 prices), only 2.8% of IRI’s total revenues. In 1960, Alitalia introduced the first turbojet airplanes (4 DC8 and 4 Caravelle) and by 1969 it was the first European airline to have its entire fleet composed by turbojet airplanes (74 in total). In 1963, Alitalia established a separated company named ATI, dedicated entirely to national routes. As part of a deliberate strategy to integrate air transport services with airport infrastructures, in 1983 IRI transferred to Alitalia the control of Aeroporti di Roma (ADR), previously held by the financial sectoral company Italtat, to relaunch and modernise Italy’s main airport (Rome Fiumicino). By 1990, Alitalia and ATI’s fleet had reached 133 units, for a total number of 23,025 employees. Total revenues of the Alitalia Group (20 consolidated companies, including ADR) amounted to 5,491 billion lire (5.4 billion euros in 2018), corresponding to 8.9% of IRI’s total revenues. Alitalia’s remained under IRI’s control until 2000, when its 53.01% controlling stake was transferred to the Treasury, before its complete privatisation in 2008 to a consortium of national investors. In 2015, Etihad Airways operated a capital increase in Alitalia which implied the acquisition of 49% of its shares. Already under special administration since 2017, Alitalia was re-nationalised in 2020 after the Covid-19 crisis, with the establishment of ITA Airways, a new company 100% owned by the Ministry of the Economy and Finance (as of October 2022).</p>	

Box A4.8: The sector leader company Alitalia. Source: Author’s elaboration from various sources.

^{xvi} Listed on the stock exchange from 1968.

<p>Fincantieri</p> <p>In 1959, IRI's shipbuilding activities (around 37,000 employees) were separated from Finmeccanica and grouped into a new sectoral financial holding, with the aim to restructure and preserve production capacity, while improving the technical efficiency and specialisation of the shipyards. At the time of its establishment, Fincantieri controlled 78.3% of national shipbuilding production (4% of the world's ships launched), with four main fully integrated shipyards, six mechanical plants and various companies involved in repairing ships and vessels. Fincantieri's main shipbuilding groups were: Ansaldo, located around the areas of Genoa, La Spezia and Livorno; Cantieri Riuniti dell'Adriatico (CRDA) located at Monfalcone and Trieste; Navalmeccanica, in the area of Naples. The new financial holding sought to overcome overlapping productions and duplications of functions, with a unitary strategy for the whole Fincantieri group. A first example was the establishment of a research centre on shipbuilding technologies (CETENA) in 1962. However, it was only in 1966 when Fincantieri and IRI coordinated the concentration of the most efficient shipyards of Genoa, Monfalcone and Castellamare into a single operating company called Italcantieri, planning the closure of the smaller and costlier shipyards (e.g. Trieste). Fincantieri's plan aimed at specialising productions at the shipyard level, while achieving further vertical integration through a joint-venture with FIAT on large naval engines (Grandi Motori Trieste). In 1973, Fincantieri absorbed Cantieri Navali del Tirreno e Riuniti, the only major private shipbuilder, which had been under critical economic conditions for years. Fincantieri's share of national shipbuilding production (in terms of large units) increased to 90%, which became almost total in 1979 with the incorporation of Cantiere Navale Breda (previously controlled by the other state holding company EFIM). In 1984, IRI decided the incorporation of all Fincantieri's subsidiaries into a new multidivisional shipbuilding company.</p>	<p>Type: Sectoral holding IRI period: 1959-1984^{xvii} Headquarters: Rome Sectors: Shipbuilding</p>
<p>Fincantieri</p> <p>In 1984, Fincantieri and IRI decided the incorporation of Fincantieri's eight shipbuilding companies into a single multidivisional company, which retained the original denomination but moved the headquarters from Rome to Trieste. The new Fincantieri was organised into four divisions – Merchant Shipbuilding, Military Shipbuilding, Ship Repair and Diesel Engines – plus the research and development companies CETENA (shipbuilding and marine propulsion) and Diesel Ricerche (marine and land engines). Fincantieri acquired the engine company Isotta Fraschini in 1986 and a 42% stake of Sulzer Diesel in 1990, the second largest producer of two and four strokes naval diesel engines (with a 30.9% global market share). In 1990, the Fincantieri group was characterised by 4 consolidated companies and 20,449 employees. Total revenues amounted to 1,364 billion lire (1.4 billion euros in 2018 prices). In the same year, Fincantieri ranked fourth at the global level in terms of merchant ships' market share, while occupying the first position in the segment of cruise ships. Relative to the ECC, Fincantieri accounted for 10% of total production capacity. Fincantieri is currently the largest non-Asian shipbuilder in the world. It is listed on the Milan Stock Exchange, with 71.64% of its capital subscribed by CDP, Italy's state-owned investment bank.</p>	<p>Type: Sector leader company IRI period: 1984-2002 Headquarters: Trieste Sectors: Shipbuilding</p>

Box A4.9: The sectoral financial holding Fincantieri and its transformation into a sector leader company. *Source:* Author's elaboration from various sources.

^{xvii} Fincantieri was always 100% owned by IRI, thus never listed on the stock exchange.

SME – Società Meridionale Finanziaria	Type: Sectoral holding IRI period: 1963-1996 ^{xviii} Headquarters: Naples Sectors: Food and retail distribution
<p>At its confirmation as a permanent public entity in 1937, IRI controlled only 10% of Società Meridionale di Elettricità^{xix} (SME), an electric energy conglomerate operating in the continental South of Italy. IRI's stake reached 18.9% in 1939, when two IRI-owned electric energy companies – Unione Esercizi Elettrici (UNES) and Italian Superpower Corporation – were incorporated in SME. From 1951, IRI assumed the control of SME through Finelettrica, acquiring shares from foreign investors and subscribing SME's capital increases. By 1954, IRI's overall stake was 31.5% and SME could be considered as a fully consolidated IRI-owned company. Following the nationalisation of the sector, in 1963 SME was transformed into a financial holding with a new denomination 'Società Meridionale Finanziaria'^{xx} (SME) and a mandate to invest the compensation funds from the nationalisation into new manufacturing activities, particularly located in the underdeveloped South of Italy. By 1973, SME's investment portfolio was mostly focused on food processing (50.6% of total invested capital) and retail (6.6% of total invested capital) sectors. At the same time, it was characterised by a significant degree of diversification, with controlling stakes in paper and pulp companies (3.5% of total invested capital), in automotive components (2.2% of total invested capital). It also devoted more than 30% of its total invested capital in minority equity participations. With the acquisition of the food processing company Alimont in 1974 and the divestments of other activities between 1978-1982, in 1983 SME was formally transformed into IRI's sectoral financial holding for companies operating in food processing (Alivar, Cirio Bertolli De Rica, Italgel), retail distribution (Generale Supermercati, GS) and catering services (Autogrill). SME pursued a vertical integration strategy in research (with the establishment of its research centre CRAI in 1978) and industrial engineering activities for food-production systems and installations (with the creation of Tecnal in 1979). In 1990, SME ranked 32nd in the world among similar industrial groups involved in food processing, catering and distribution, with 5,302 billion lire in revenues (around 5.3 billion euros in 2018 prices) and 22,279 employees distributed across 63 consolidated companies. SME was Italy's 6th largest group in the food processing segment, with a leading position in both large-scale retailing (excluding cooperative and associated organisations) and catering. In 1993, SME privatised most of its food processing companies, while at the end of 1994 IRI's controlling stake in SME^{xxi} was divested through a private sale offer. By 1996, IRI liquidated its remaining equity position in SME, which was merged by incorporation in the GS group in the same year.</p>	

Box A4.10: The sectoral financial holding SME. *Source:* Author's elaboration from various sources.

^{xviii} Listed on the stock exchange from 1963 to 1996.

^{xix} Meaning 'Southern Company of Electricity'.

^{xx} Meaning 'Southern Holding Company'.

^{xxi} IRI owned 61.12% of its shares at the end of 1993.

Italstat	<p>Type: Sectoral holding IRI period: 1968-1991^{xxii} Headquarters: Rome Sectors: Civil engineering and infrastructures</p> <p>Italstat was established in 1968 from the Studies Department of the Autostrade company. From the 1940s, IRI had become progressively involved in the fields of civil engineering and infrastructures. In a first instance, with the reorganisation of Italstrade (1940), a leading national player in the engineering of roads, waterworks, hydro-electric installations and other civil engineering projects. Second, with the establishment of Autostrade (1950), the company dedicated to building and operating the national motorways network. Third, in 1970 IRI acquired the controlling stake of Società Italia per Condotte d'Acqua, the national leader in general construction and civil engineering works. Finally, IRI had a few direct participations of concessionaires, operating the Mont Blanc Tunnel^{xxiii} (since 1964) and the motorways around Naples (since 1966). Since 1973, Italstat incorporated all these companies – with the exception of Autostrade – becoming IRI's sectoral financial holding for civil engineering and infrastructures activities, with a predominant domestic position in this field. While playing the role of general contractor, Italstat's companies were diversified around three main areas: civil engineering and public construction works; concessionaires of infrastructures; project planning and studies for industrial constructions activities. In 1974, Italstat acquired the control of Aeroporti di Roma, with the responsibility to renovate and operate Rome's airports of Fiumicino and Ciampino, accounting for around 42% of national passengers transport and 44% of cargo services. In 1982, IRI transferred to Italstat its direct control of Autostrade, which accounted for 43% of the national motorways network. In 1990, the year before its incorporation into a new sector leading company called Iritecna, Italstat comprised 105 consolidated companies divided into seven categories: a) engineering services; b) general construction and large-scale installations; c) residential and public housing; d) construction of public buildings and related services under franchise; e) infrastructural construction and management under franchise; f) maintenance of infrastructures and public works; g) community-interest urban infrastructures. Italstat was the largest Italian group in civil engineering, with 23,739 employees and total revenues amounting to 3,912 billion lire (3.9 billion euro in 2018 prices). In 1991, Italstat was merged with Italimpianti in IRI's short-lived engineering conglomerate Iritecna.</p>
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Box A4.11: The sectoral financial holding Italstat. Source: Author's elaboration from various sources.

^{xxii} Italstat was always 100% owned by IRI, thus never listed on the stock exchange.

^{xxiii} The world's largest road tunnel between 1965 and 1978.

Finsiel	<p>Type: Sectoral holding IRI period: 1981-1992^{xxiv} Headquarters: Rome Sectors: Informatics</p> <p>Towards the end of the 1960s, IRI decided to address the lack of domestic capacity in the information systems sector^{xxv}. With the participation of non-IRI companies (representing 42% of its equity value), in 1969 IRI established the software company Italsiel, with the aim of realising the State General Accounting's information system. Informatics activities grew considerably within the IRI Group during the 1970s, with Italsiel creating Sogei in 1976, which became responsible for developing the information system of the national tax registry for the Ministry of Finance. The need to elaborate information systems for industrial, insurance and banking activities, together with the creation of regional companies, led IRI to establish Finsiel^{xxvi} (in 1981), a new financial holding for informatics and software engineering. In less than a decade, Finsiel became the largest software manufacturer in Italy (12% market share), the second largest in Europe (1.5% market share) and the eighth largest in the world (0.3% market share). Finsiel's activities encompassed design, production, implementation and maintenance of information systems and equipment, software products and integrated hardware-software systems. Its companies also provided data processing and network management services. The Finsiel group included a specialised research and development centre (Tecsiel) and a foreign subsidiary in California (Softsiel Corporation). In 1990, Finsiel was composed by 15 consolidated companies, employing 5,941 workers, mostly young and permanently retraining graduates (between 300 and 500 each year). Finsiel's total revenues amounted to 967 billion lire (959 million euros at 2018 prices), of which around 75% from the public administration and 25% from industrial and financial costumers. Finsiel was incorporated into STET at the end of 1992 and its subsidiaries merged into a single operating company in 1994. In 2005, Telecom Italia sold Finsiel to the digital services company Almagia, which eventually incorporated it in 2007.</p>
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Box A4.12: The sectoral financial holding Finsiel. Source: Author's elaboration from various sources.

^{xxiv} Finsiel was always 100% owned by IRI, thus never listed on the stock exchange.

^{xxv} In 1968, 90% of total medium-high electronic systems installed in Italy were provided by the US companies IBM, Univac and Honeywell (Marsan, 1992).

^{xxvi} With a 17% participation from the Bank of Italy.

Italimpianti	Type: Sector leader company IRI period: 1989-1991 ^{xxvii} Headquarters: Genoa Sectors: Plant engineering
<p>Its foundation dated back to 1957, when the company named Cosider was mandated to provide technical and engineering services to Finsider's companies. In 1966, Cosider evolved into an industrial plant provider, after the incorporation of Siderforni (specialising in design and manufacturing of blast furnaces) and Ansaldo's plant engineering activities. In 1971, Cosider's name was eventually changed into Italimpianti. It was only in 1985, with the transfer of Finsider's companies involved in designing and manufacturing industrial machines (Innse, Tagliaferri, Infagraria, Cimimontubi, Nuova Cmf, Cmf Sud e Fmi-Mecfond), that Italimpianti became a sector leader company in plant engineering (still under Finsider's control). In 1988, IRI assumed the direct ownership of Italimpianti, following the separation from Finsider, as part of the overall restructuring of IRI's steelmaking activities. With the transfer of other complementary companies from Finsider, Italimpianti assumed the double configuration of a systems engineer and plant maker, with a specialised focus on the steelmaking sector, as IRI's activities in power plant engineering remained under Ansaldo, Finmeccanica's manufacturing conglomerate. In 1990, Italimpianti incorporated 20 consolidated companies, employing 5,415 workers. Total revenues amounted to 2,057 billion lire (around 2 billion euros in 2018 prices). In 1991, it was merged with Italstat into Iritecna.</p>	

Box A4.13: The sector leader company Italimpianti. Source: Author's elaboration from various sources.

^{xxvii} Italimpianti was always 100% owned by IRI and Finsider, thus never listed on the stock exchange.

Cementir	<p>Type: Sector leader company IRI period: 1988-1992^{xxviii} Headquarters: Rome Sectors: Cement production</p> <p>Firstly established as Siderurgica Triestina in 1947, in 1951 it took the denomination Società Cementerie del Tirreno (Cementir), with the opening of the cement production unit at Ilva's steelworks of Bagnoli (in 1953), the first in Europe to produce cement for blast furnaces. Cementir was the outcome of Finsider's strategy to vertically integrate in the production of special cement for industry applications. At the same time, it introduced an element of competition in the domestic market, which was dominated by the group Italcementi. In 1958, Cementir represented 6.7% of total national cement production, increased to 12% by 1968. In the meantime, Cementir established new production plants in Naples, Taranto, Arquata, Spoleto, Livorno. The increased volume of production was also accompanied by a qualitative improvement in the final product, signalled by the specialisation in high-resistance cement and by the dynamic of foreign demand (in 1966 Cementir was accounting for around 60% of Italy's cement exports). Cementir effectively became IRI's sector leader company in the cement sector from its very foundation, even if it was directly controlled by the steelmaking holding Finsider. In 1988, as part of the restructuring of Finsider's activities, Cementir was spun off and its control passed on to IRI. Cementir was the smallest among IRI's sector leader companies: in 1990 it was composed by 2 consolidated entities, with 1,732 employees and total revenues amounting to 426 million lire (423 million euros in 2018 prices). With 6 production units, it represented 10% of cement production in Italy (2% in the EEC). Cementir was privatised in 1992, when it was acquired by the Caltagirone group. In 2017, Cementir Italia was sold to Italcementi (currently a 100% subsidiary of the HeidelbergCement Group), assuming the denomination CemItaly.</p>
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Box A4.14: The sector leader company Cementir. *Source:* Author's elaboration from various sources.

^{xxviii} Listed on the stock exchange from 1955.

Iritecna	Type: Sectoral holding IRI period: 1991-1993 ^{xxix} Headquarters: Rome Sectors: Civil and industrial engineering
<p>Iritecna represented a late and short-lived attempt to create a sector leader company for civil and industrial engineering, grouping Italmimpianti with Italtat and some activities of Ansaldo Industria (a subsidiary of Finmeccanica). Iritecna was meant to play the role of general contractor for large engineering projects, such as the East Bridge of the Danish <i>Storebælt</i> (the longest in Europe) or the consortia IRICAV Uno and IRICAV Due, established in 1991 to realise two high-speed railway segments between Rome and Naples and between Padua and Verona. Iritecna was organised into six divisions: general contracting, engineering services, engineering products, infrastructure franchising, civil engineering, real estate. In 1992, it was composed by 91 companies, employing 24,644 employees. Total revenues amounted to 7,763 billion lire (6.9 billion euros in 2018 prices) of which 31.4% from foreign activities. At the same time, the stagnant demand for public construction works due to Italy's fiscal tightening, together the deepening crisis of the steelmaking sector on which it was still deeply involved, created huge losses during the first year (26.3% of total revenues). Iritecna was eventually liquidated in 1993, and its assets transferred to a new financial holding called Fintecna. Between 1994 and 1997, Fintecna privatised most of Iritecna's previously controlled companies, with the exception of Autostrade, separated in 1997 and privatised by IRI between 1999 e 2000. In 2002, at the end of the liquidation process, Fintecna incorporated IRI's residual assets. Fintecna is currently a financial company 100% owned by CDP, with a specialisation in liquidation of industrial and real estate assets.</p>	

Box A4.15: The sectoral holding Iritecna. Source: Author's elaboration from various sources.

^{xxix} Iritecna was 100% owned by IRI, thus never listed on the stock exchange.

Sectoral subsidiary	Company	Type of activity
STET	SIT-Siemens/Italtel (1950)	Manufacturing of telecommunications equipment
	ILTE (1951)	Printing
	Cselt (1961)	R&D centre on telecommunications and electronics
	Sirti (1966)	Telecommunications infrastructure engineering
	Softe (1970)	Financial services
	ATES/SGS-ATES (1970-1988)	Manufacturing of semiconductors
	SSGRR (1976)	Corporate training school
	Necsy (1986)	Manufacturing of testing systems and instruments for telecommunications networks
Finsider	Ferromin, Rimifer, Ferralba (1939)	Mining of iron ore
	SANAC (1939)	Manufacturing of refractory materials for the steelmaking industry
	Sidercomit (1947)	Selling and purchasing services
	Cementir (1951)	Manufacturing of cement for industrial applications (steelmaking)
	Sidermar (1956)	Shipping of steelmaking products
	Cosider/Italimpianti (1957)	Steelmaking plant engineering
	CSM (1963)	R&D centre on metal productions
	INNSE (1974)	Manufacturing of industrial machines for the steelmaking industry
Fincantieri	CETENA (1962)	R&D centre on maritime technology
	GMT (1966-1984)	Manufacturing of large maritime diesel engines
	Isotta Fraschini (1986)	Manufacturing of medium size high-speed diesel engines
	Sulzer Diesel (1990)	Manufacturing of large maritime diesel engines

Table A4.5: Vertical integration within IRI's sectoral subsidiaries STET, Finsider and Fincantieri. Source: Author's elaboration.

Sectoral subsidiary	Company	Type of activity	
Finmeccanica	Marconi Italiana (1948) ATES (1959-1963) SGS-Thomson (1989)	Manufacturing of electronic components and semiconductors	
	Microlambda (1951) Selenia (1960-1970; 1989) Alenia (1990)	Manufacturing of radars, satellites, electronic systems for telecommunications, defence and air traffic control	
	Nuova San Giorgio (1954) Elsag (1969-1970) Elsag Bailey (1989)	Manufacturing of electronic systems and industrial automation technologies	
	IMAM (1951) Aerfer (1955) Aeritalia (1969) Alenia (1990)	Manufacturing of civil and military aircraft, manufacturing of space components and satellites	
	Omeca (1961) Ansaldo Trasporti (1980)	Manufacturing of rolling stocks and railways signalling systems	
	Ansaldo Meccanico Nucleare (1966) NIRA (1973) Ansaldo Energia (1991)	Nuclear and thermoelectric power plant engineering	
	VM Stabilimenti Meccanici (1971-1989); Isotta Fraschini (1979-1986); Ducati Meccanica (1979-1985);	Manufacturing of diesel engines	
	Ansaldo Biomedical Electronic Division (1982) Esaote Biomedica (1986)	Manufacturing of biomedical electronic machinery	
	SME	Alfacavi (1964-1981) Celdit; CIR (1964-1979)	Manufacturing of cables Manufacturing of paper products
		Società Generale Supermercati (1966)	Large scale retail
		Aerhotel (1968-1981)	Accommodation services
		Motta (1968)	Food processing (sweets)
		Alemagna; Alivar (1970)	Food processing (snacks, crackers, biscuits, catering)
		Cirio (1972)	Food processing (sauces, oil, wines)
Italgel (1975)		Food processing (ice cream)	
Autogrill (1979)		Catering	
Italstat		Condotte d'Acqua (1970); Italstrade (1971)	Civil engineering for large infrastructure projects
		IPI (1972); Svei (1972); Italposte (1974)	Construction of public buildings
	REP (1974)	Construction works with industrialised and prefabricated building methods	
	Aeroporti di Roma (1974)	Concessionary management of Rome's airports	
	Italtekna (1974)	Engineering services and studies	
	Autostrade (1982)	Motorways franchise	
STET	Telespazio (1961)	Satellite telecommunications services	
	ATES (1963) SGS-ATES (1972-1988)	Electronic components and semiconductors	

Italcable (1965)	International landline telecommunications
Selenia (1970-1988)	Manufacturing of radars, air-traffic control systems, defence systems
Elsag (1970-1988)	Postal and industrial automation systems
Siemens Data (1969)	Data processing system services
Italdata (1974)	Manufacturing of medium and large-scale information systems
Finsiel (1992)	Informatics and software
Stream (1993)	Multimedia services
Telecom Italia Mobile (1995)	Mobile Telecommunication Services

Table A4.6: Horizontal diversification within IRI's sectoral subsidiaries Finmeccanica, SME, Italstat and STET.
Source: Author's elaboration.

Legal act	Content
Royal Decree Law n. 5 (23 January 1933)	Foundation of the <i>Istituto per la Ricostruzione Industriale</i> (IRI) as a temporary public law entity
Ministerial Decree (30 January 1933)	1933 IRI Statute
Ministerial Decree (19 June 1934)	1934 IRI Statute
Royal Decree Law n. 905 (24 June 1937)	Transformation of IRI into a permanent entity
Decree of the Head of Government (31 December 1937)	1937 IRI Statute
Lieutenant Decree n. 446 (19 April 1946)	1946 IRI Statute
Legislative Decree n. 51 (12 February 1948)	1948 IRI Statute
Law n. 1589 (22 December 1956)	Institution of the Ministry for State Holdings and specification of its role relative to IRI
Law n. 48 (27 February 1967)	Institution of the Interministerial Committee for Economic Programming
Decree of the President of the Republic n. 554 (14 June 1967)	Functions relative to IRI of the Interministerial Committee for Economic Programming and of the Ministry for State Holdings
Law n. 675 (12 August 1977)	Institution of the Interministerial Committee for Industrial Policy and specification of its role relative to IRI
Law n. 14 (24 January 1978)	Norms for the Parliamentary control over the appointments in public law bodies
Decree Law n. 333 (11 July 1992)	Transformation of IRI into a joint-stock company (IRI S.p.A.) with shares 100% owned by the Treasury

Table A4.7: Main legal acts concerning IRI. Source: Author's elaboration.

The Institute's main bodies and roles

The Board of Directors

The Board of Directors (*Consiglio di Amministrazione*) was the ultimate decision-making body of the Institute – and, in turns, of IRI. Article 9 stated “The Board of Directors has full powers for the management of the Institute”.

The Board's prerogatives^{xxx} included:

- a) The decision over all the operations regarding the acquisition and divestment of shareholdings.
- b) The decision of issuing obligations by the Institute.
- c) The decision of purchasing and selling industrial and real estate assets.
- d) The preparation and submission of the Institute's financial accounts.
- e) The possibility of instituting specific and temporary Technical Advisory Committees and the adoption of subsequent decisions based on their recommendations.
- f) The submission to the Council of Ministers of any proposed amendment to the Statute.
- g) The attribution of the temporary power of signature, on the advice of the General Director, to other officers of the Institute for specific administrative duties of the Institute.
- h) An advisory function to the Chairman on the appointment of the Institute's General Director.
- i) An advisory function to the Prime Minister^{xxxii} on the appointment of three experts on financial and industrial affairs to the Board itself.

As foreseen by article 8 (with its later modifications), the Board of Directors was composed by 13 members (increased to 14 in 1967):

- a) IRI's Chairman;
- b) IRI's Vice Chairman;
- c) Three experts on financial and industrial affairs appointed for a three-year renewable period by the Prime Minister^{xxxii}, on the advice of the Board itself;
- d) The State Accountant General;
- e) The Director General of the Treasury;
- f) The Director General of State Property^{xxxiii};
- g) The Director General of Industry;
- h) A representative of the Ministry of Post and Telecommunications;
- i) A Director General of the Mercantile Marine;
- j) The General Director of national employment from the Ministry of Labour and Social Security;
- k) A Director General of the Ministry of Defence;
- l) A representative of the Ministry for the Budget and Economic Programming^{xxxiv} (since 1967)

^{xxx} As foreseen by articles 6, 9, 13 and 23 of the 1948 statute.

^{xxxii} To the Minister of State Holdings, following Law n. 1589 (22 December 1956).

^{xxxiii} To the Minister of State Holdings, following Law n. 1589 (22 December 1956).

^{xxxiii} A Director General of the Ministry of State Holdings, following Law n. 1589 (22 December 1956).

^{xxxiv} Added in 1967, in conformity with article 1 of Presidential Decree n. 775 (2 August 1967), under the powers conferred by article 30 of Law n. 48 (27 February 1967).

The statutory dispositions obliged the Board to be summoned at least once a month (in fact, it gathered 1.1 times per month^{xxxv}). Resolutions were taken by an absolute majority of votes, provided that at least nine member were attending. These constituted binding decisions, without the need for external approval^{xxxvi}. This was not required as, by virtue of its very same composition, the ministerial members were representing all the interested sectoral and political positions. With this respect, a former IRI's Chairman^{xxxvii} defined the Institute's Board of Directors as a "real place for discussions" which "did not limit itself to registering the decisions presented by the management".

In practice, given the extent and complexity of IRI's activities, the centrality of this body was effectively complemented by the role of sectoral subsidiaries and by the Institute's technocracy, which introduced a more decentralised and dialectical decision-making process within the IRI Group.

Managerial decisions at the company level were the responsibilities of single operating companies and sectoral subsidiary (when they had broader strategic implications). Instead, all of IRI's major initiatives on which the Board of Directors had the ultimate deciding role were coordinated between the sectoral subsidiaries and the Institute's technocracy^{xxxviii}.

The Executive Committee

The Executive Committee^{xxxix} (*Comitato di Presidenza*) was the management core of the Institute. It was composed by five members: the Chairman, the Vice Chairman and the three experts appointed by the Prime Minister^{xl}. Its official convenings were held regularly and more frequently than the Board's meetings, on average 2.5 times per month^{xli}. However, as reported by a former IRI's Chairman^{xlii}, the Executive Committee operated with a daily frequency as it was "the common thread of the Institute's policy".

Provided that at least three members were attending, the Executive Committee could take resolutions of its own by an absolute majority. It decided upon matters delegated to it by the Board of Directors and, in cases of urgency, upon those pertaining to the Board – with the exclusion of the operations regarding the purchase or divestment of shareholdings, industrial and real estate assets, and the issuing of obligations.

^{xxxv} In the period ruled by the 1948 Statute, the Board gathered 604 times between its first meeting on 9 March 1948 and its last one as a public law entity on 29 July 1992. On average, Board meetings were held every 26.8 days. (Archivio Storico IRI, Serie Nera, Organi Deliberanti di Controllo e di Coordinamento).

^{xxxvi} As opposed to the 1937 Statute, which subjected all major decisions adopted by the Board – concerning the acquisition and divestment of assets (article 11) or the issuing of obligations (article 5) – to the prior authorisation of the Ministry of Finance or the Head of Government.

^{xxxvii} Interview with Romano Prodi (11 September 2019), author's translation from Italian.

^{xxxviii} Interview with Romano Prodi (11 September 2019), who made reference to the examples of the joint-venture SGS-Thomson and of the optical fibre initiative between Pirelli and STET.

^{xxxix} As defined by articles 10 and 11 of the 1948 statute.

^{xl} By the Minister of State Holdings, following Law n. 1589 (22 December 1956).

^{xli} The total number of meetings of the Executive Committee was 1,325, the first being held on 8 March 1948 and the last on 29 July 1992. On average, it gathered every 12.2 days. (Archivio Storico IRI, Serie Nera, Organi Deliberanti di Controllo e di Coordinamento).

^{xlii} Interview with Romano Prodi (11 September 2019), author's translation from Italian.

The Chairman and the Vice Chairman

Name	Period	Professional background
Alberto Beneduce	January 1933 – November 1939 (6 years and 10 months)	University professor of Statistics, financier
Francesco Giordani	November 1939 – October 1943 (3 years and 11 months)	University professor of Chemistry
Abolished under receivership	October 1943 – March 1946	
Giuseppe Paratore	March 1946 – July 1947 (1 year and 4 months)	Business executive, financier, MP
Abolished under receivership	July 1947 – February 1948	
Enrico Marchesano	February 1948 – March 1950 (2 years and 1 month)	Lawyer, bank official
Isidoro Bonini	April 1950 – December 1955 (5 years and 8 months)	Engineer, business executive
Aldo Fascetti	April 1956 – September 1960 (4 years and 5 months)	Lawyer
Giuseppe Petrilli	October 1960 – October 1978 (18 years)	University professor of Economics and Finance, business executive
Pietro Sette	January 1979 – October 1982 (3 years and 9 months)	Lawyer, business executive
Romano Prodi	October 1982 – November 1989 (7 years and 1 month)	University professor of Economics
Franco Nobili	November 1989 – May 1993 (3 years and 6 months)	Business executive
Romano Prodi	May 1993 – June 1994 (1 year and 1 month)	University professor of Economics
Michele Tedeschi	July 1994 – June 1997 (2 years and 11 months)	Business executive
Gian Maria Gros Pietro	June 1997 – November 1999 (2 years and 5 months)	University professor of Economics
Piero Gnudi	December 1999 – November 2002 (2 years and 11 months)	Accountant

Table A4.8: List of IRI's Chairmen from its foundation until its liquidation. *Notes:* Names coloured in black refer to the period 1948-1992.

IRI's Chairman was the leading managerial role of the Institute (and of IRI). Its main prerogatives^{xliii} were as follows:

- a) It was the legal representative of the Institute towards administrative authorities and third parties.
- b) It summoned and chaired both the Board of Directors and the Executive Committee.
- c) In cases of urgency, it could take decisions whose competence pertained to the Executive Committee, provided that the latter was informed in the first subsequent meeting.

^{xliii} From article 6 of the 1948 statute.

- d) It proposed to the Council of Ministers^{xliv} the appointment of the General Director of the Institute.
- e) With the advice of the General Director, he was responsible for the appointments of the Institute's officials and for changes regarding the organisation of its personnel.

In practice, IRI's Chairman concentrated in the same person the functions of Chief Executive Officer and Chairman of a typical corporation. Both the Chairman and the Vice Chairman were appointed for a renewable period of three years by a decree of the President of the Republic, upon proposal of the Prime Minister^{xlv}, after consultation with the Council of Ministers. The Vice Chairman operated closely with the Chairman, with full powers vested to him in case of absence or inability of the Chairman^{xlvi}.

Name	Period	Professional background
Camillo Ara	April 1934 – April 1937 (3 years)	Lawyer, bank official
Francesco Giordani	June 1937 – November 1939 (2 years and 5 months)	University professor of Chemistry
Suspended	November 1939 – September 1943	
Abolished under receivership	October 1943 – November 1946	
Antonio Pesenti; Oscar Sinigaglia	November 1946 – July 1947 (8 months)	University professor of Economics; Business executive
Imbriani Longo	February 1948 – January 1950 (1 year and 11 months)	Engineer, bank official
Bruno Visentini	March 1950 – March 1973 (23 years)	University Professor of Law, lawyer, business executive
Vincenzo Storoni	May 1973 – April 1977 (3 years and 11 months)	Lawyer
Pietro Armani	August 1980 – March 1991 (10 years and 7 months)	University professor of Public Economics

Table A4.9: List of IRI's Vice Chairmen from its foundation until its liquidation. *Notes:* Names coloured in black refer to the period 1948-1992.

As reported in Table A4.8, the length of Chairmanships in the period 1948-1992 was varying. Giuseppe Petrilli held office for the longest period (18 uninterrupted years between 1960 and 1978), followed by Romano Prodi, who led IRI for more than 7 years in the 1980s. Fixed-term and renewable appointments of the Chairman and of the other members of the Executive Committee implied a significant degree of stability in the management of the Institute. In the period 1948-1992, the Institute had 7 Chairmen and only 4 Vice Chairmen (see Table A4.9), compared to 45 different national governments in the same period^{xlvii}.

The professional backgrounds of IRI's Chairmen and Vice Chairmen were also variegated. The Institute's leading executive positions were held prevalently by professional lawyers,

^{xliv} To the Minister of State Holdings, following Law n. 1589 (22 December 1956).

^{xlv} Of the Minister of State Holdings, following Law n. 1589 (22 December 1956).

^{xlvi} Article 7 of the 1948 Statute.

^{xlvii} Counted from the Fifth De Gasperi Government (23 May 1948 – 26 January 1950) to the Seventh Andreotti Government (12 April 1992 – 27 June 1992).

engineers, university professors and business executives in either state-owned or private companies.

The gross compensation of IRI's Chairman and Vice Chairman was determined by the Ministry for State Holdings with specific decrees^{xlviii}. In 1991, annual compensations amounted to 312.5 million lire^{xlix} and to 187.5 million lire^l respectively for the Chairman and the Vice Chairman. Despite the critical responsibilities that came with their roles, the remuneration of IRI's top executives was far from exorbitant. In fact, over the period 1979-1992, the average pay ratio between the Chairman and the Vice Chairman relative to the average IRI employee was only 7.5 and 4.1 times respectively (Figure A4.1).

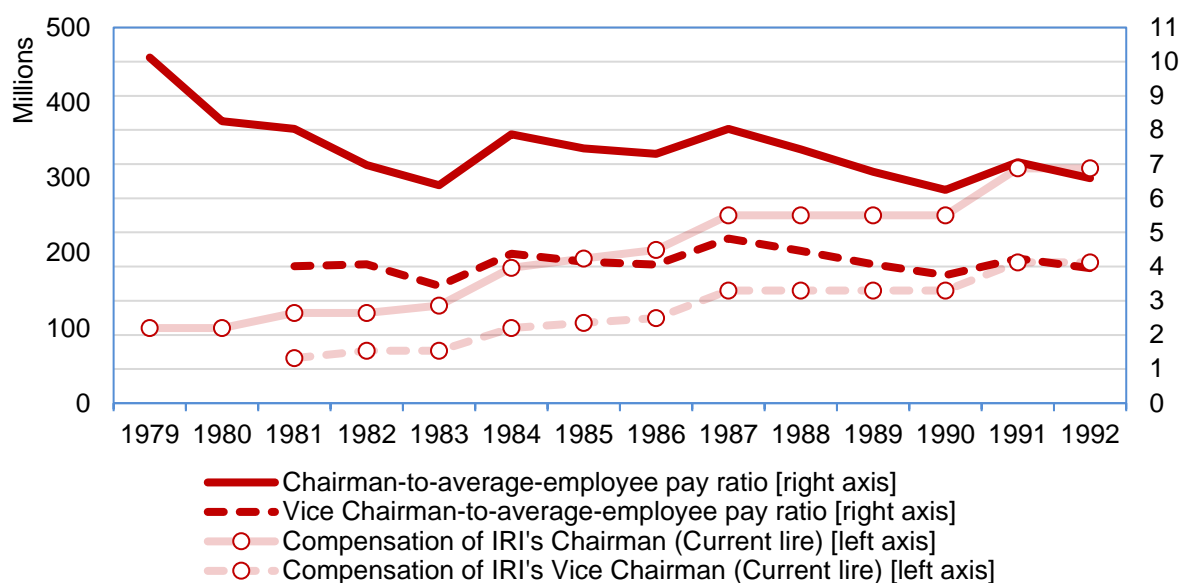


Figure A4.1: Compensation of IRI's Chairman and Vice Chairman. Source: Author's elaboration on IRI Database. Notes: Darker lines represent the ratio of Chairman and Vice Chairman's compensation relative to the average IRI employee (right axis); lighter lines represent the nominal compensation of IRI's Chairman and Vice Chairman (left axis) as established by Ministerial Decrees.

The Board of Auditors

The Board of Auditors supervised the Institute's accounting, administrative and financial management, attending meetings of the Board of Directors and attesting the validity of IRI's accounts.

Following the modification of article 14^{li}, the Board of Auditors was composed by:

- a) A senior official from the public administration assuming the role of Chairman of the Board;
- b) A State Attorney;
- c) A representative from the Ministry of State Holdings;
- d) A representative from the Treasury;
- e) A representative from the General Accounting Office of the State;

^{xlviii} Following Article 11 of Law n. 14 (24 January 1978).

^{xlix} Approximately 291,000 euros in 2018 prices.

^l Approximately 175,000 euros in 2018 prices.

^{li} With Law n. 736 (9 August 1967).

Two substitute representatives of the Ministry of State Holdings and of the General Accounting Office of the State could attend the Board's meetings. Members of the Board of Auditors were appointed with a decree by the Minister of State Holdings. The Auditors exercised an internal control on the accounting, administrative and financial management of the Institute, as well as over its compliance with the Statute. They attended the meetings of the Board of Directors, certifying the transparency of the Institute's financial accounts and of its bond issuing plans.

Representative of the national Court of Auditors

In the original statutory formulationⁱⁱⁱ, the Board of Auditors was chaired by a representative from the national Court of Auditors, pursuant to the provisions regarding "the financial management of entities receiving regular budgetary support from the State", as foreseen by article 100 of the Italian Constitution.

Following subsequent legislationⁱⁱⁱ, from 1967 a separate supervisory role was introduced in the figure of a magistrate from the national Court of Auditors, appointed by its President, attending the meetings of the Board of Directors and of the Board of Auditors.

Technical Advisory Committees

At its foundation, the Institute lacked the necessary technical personnel to deal with the sectoral reorganisation of its controlled subsidiaries, therefore it had to rely on *ad hoc* technical advisory and study committees composed by officials from the Institute, executive managers of the operating companies and external experts^{iv}.

The 1937 Statute^{iv} introduced among its executive organs a permanent 'Technical Advisory Committee', with consulting functions over: new industrial initiatives to be adopted by the Institute; the most efficient organisation of the operating companies; the most important transformations of existing production processes^{vi}.

The 1948 Statute eliminated the permanent Technical Advisory Committee. Its competences were partly absorbed by the Executive Committee and partly by the Institute's offices under the General Directorate. *Ad hoc* Technical Advisory Committees could be established by the Board of Directors to provide a consulting advice for the Institute's management on specific issues (see Table A4.10).

ⁱⁱⁱ Article 14 of the 1948 statute, letter a).

ⁱⁱⁱ Article 12 of Law n. 259 (21 March 1958) introduced the compulsory attendance of a magistrate from the national Court of Auditors to the meetings of the Boards of Executives and of the Boards of Auditors relative to public bodies or regularly state-funded entities. With following Decrees of the President of the Republic (11 March 1961 and 8 March 1965), IRI was listed among the public bodies to which the prevision applied.

^{iv} Technical committees were established to deal with problems related to military steelmaking (1934) as well as with the reorganisation of the shipbuilding sector (1934) and of the maritime transport sector (1936).

^{iv} Article 13 of the 1937 statute included the Technical Advisory Committee among the executive organs of the Institute. Following article 23, the Technical Advisory Committee was composed by: the Chairman of the Institute, the Vice Chairman of the Institute, a representative from the Fascist Confederation of industrialists, a representative from the Fascist Confederation of industry workers, one or more executive directors of IRI's companies or experts in the field under discussion.

^{vi} As specified by article 24 of the 1937 statute.

Year	Denomination
1948	For the mechanical sector
1948	For the technical education
1958	For the shipyards
1959	For the 'Carbosarda' project
1961	For the project of a 380 KV dorsal power line
1968	For the maritime transport sector
1975	For the steelmaking sector
1975	For the areas of loss
1978	For electronics and informatics
1980	For the maritime transport sector
1980	For the improper burdens

Table A4.10: List of Technical Advisory Committees established by the Board of Directors of the Institute in the period 1948-1992.

These Committees were summoned when the questions to be addressed were particularly complex, therefore deserving further scrutiny from IRI's officials, executives of IRI's subsidiaries and external experts. Although the recommendations of the Technical Advisory Committees were not formally binding, a former IRI Chairman noted^{lvii}:

Their eventual adoption [by the Institute's Board of Directors] depended on the authority of the Committee's members. However, even when their opinions were not fully considered, their work was useful, inasmuch as it elevated the discussion on the issue.

The General Director and the Deputy General Director

The Institute's General Director was established as early as 1934^{lviii} as a key executive role within the Institute, directly appointed by the Chairman and responsible for the overall management of the Institute's offices. The 1948 Statute confirmed the General Director's managerial role^{lix}, but its appointment became the responsibility of the Council of Ministers, following the proposal of the Institute's Chairman^{lx}.

The General Director presided over the Institute's technostructure, reported directly to the Chairman and was responsible for implementing the resolutions adopted by the Board of Directors and by the Executive Committee. The General Director participated, with an advisory vote, to the meetings of the Board of Directors, to the Executive Committees and to the Technical Advisory Committees. During the meetings of Board of Directors and of the Executive Committee, the General Director provided the Chairman with all the necessary background knowledge, commenting on the more technical aspects, sometimes illustrating the cases under discussion.

The General Director was a unique figure within the Institute, combining an *executive role* with respect to the Institute's offices, an *enforcing role* relative to the deliberations of the governing organs of the Institutes and finally a *public role* due to its direct political appointment and to its representing role on behalf of the Institute in parliamentary hearing sessions.

^{lvii} Interview with Romano Prodi (11 September 2019), author's translation from Italian.

^{lviii} Article 47 of the 1934 Statute formally established the General Directorate of the Institute and the figure of the General Director as its head.

^{lix} Specified by article 21.

^{lx} Article 6 of the 1948 Statute. The Minister of State Holdings later became responsible for its appointment, following Law n. 1589 (22 December 1956).

A former IRI Chairman defined the General Director as “the machine’s boss”^{lxi}, the person that “translated general discussions into numbers”. The General Director, by incorporating the technical and financial expertise of the Institute’s offices with autonomous managerial responsibilities, was very influential in IRI’s decision-making process. He spent several hours per week with the Chairman, briefing him on all the most important questions regarding IRI’s companies and the sectors in which they operated. The General Director and the Chairman were also complementary in terms of their professional background, as the General Director was typically a figure with a long-standing experience as a business executive, often in IRI’s subsidiaries or in other state-owned or private companies.

Name	Period	Professional background
Donato Menichella	August 1934 – October 1943 (9 years and 2 months)	Bank official
Giovanni Malvezzi	November 1943 – May 1944 (6 months)	Bank official
[Abolished]	May 1944 – March 1946	
Donato Menichella	March 1946 – May 1946 (2 months)	Bank official
Giovanni Malvezzi	May 1946 – July 1947 (1 year and 2 months)	Bank official
[Abolished]	July 1947 – January 1948	
Arturo Ferrari	February 1948 – July 1957 (9 years and 5 months)	Business executive
Salvino Sernesi	August 1957 – July 1964 (6 years and 11 months)	Business executive
Silvio Golzio	December 1964 – August 1968 (3 years and 8 months)	Business executive
Leopoldo Medugno	September 1968 – May 1976 (7 years and 8 months)	University professor of Statistics, business executive
Alberto Boyer	June 1976 – May 1979 (2 years and 11 months)	Business executive
Antonio Zurzolo	June 1979 – December 1988 (9 years and 6 months)	Business executive
Michele Tedeschi	January 1989 – June 1993 (4 years and 5 months)	Business executive
Enrico Micheli	June 1993 – May 1996 (2 years and 11 months)	Business executive
Pietro Ciucci	May 1996 – June 2002 (6 years and 1 month)	Business executive

Table A4.11: List of General Directors of the Institute from its foundation until its liquidation. *Notes:* Names coloured in black refer to the period 1948-1992.

Furthermore, the length of the General Director’s mandate was not predetermined and it did not coincide with the one of the Chairman (see Table A4.11). The overlapping of these two key managerial figures facilitated a smoother conduct of IRI’s internal strategy through time. A

^{lxi} Interview with Romano Prodi (11 September 2019), author’s translation from Italian.

newly elected Chairman could seek the appointment of a different General Director and operate a profound reorganisation of the Institute's offices, but this never happened. On the opposite, the General Director normally introduced the new management to IRI's recent affairs.

The figure of Deputy General Director found a statutory mention only with respect to its delegated power of signature^{lxii}, together with the General Director. The Deputy General Director was directly appointed by the Chairman and its role^{lxiii} was to assist the General Director in the management of the Institute's offices and to assume all of the General Director's prerogatives in case of its absence or impediment. With the General Director, it attended the meetings of the Board of Directors, of the Executive Committee and of Technical Advisory Committees (without an advisory vote).

The General Economic Consultant

The General Economic Consultant was a non-statutory position – corresponding to the role of a modern chief economist – instituted in 1966^{lxiv} by the Institute's Chairman. The only General Economic Consultant in IRI's history was Professor Pasquale Saraceno, which held this position until its death in 1991.

Professor Saraceno started his career at IRI only few months after its foundation in 1933. In subsequent years, he held executive positions within the Institute as Head of the Technical Inspectorate (1934), Central Director of the Financial Division (1948), Central Director of the Studies and Programming Service (1953). From its appointment as General Economic Consultant in 1966^{lxv}, he became a consulting source for IRI's management^{lxvi} in the post-war period. He was appointed in the boards of various IRI-controlled companies, he took part in several Technical Advisory Committees and advised the newly appointed Chairmen on any crucial issue regarding the Group^{lxvii}.

As General Economic Consultant, Professor Saraceno acted as a *de facto* ambassador of IRI, through his international network. He was notably involved with British policymakers in 1965^{lxviii} to provide advice on the establishment of the Industrial Reconstruction Corporation^{lxix}, a public

^{lxii} In article 23 of the 1948 statute.

^{lxiii} This was clearly outlined in the minutes of a meeting of the Board of Director (3 February 1966), which reported the appointment of Leopoldo Medugno as Deputy General Director of the Institute ('Verbale n. 246 – Adunanza del 3 febbraio 1966', Archivio Storico IRI, Serie Nera, Busta AG/485).

^{lxiv} With deliberation of the Chairman on 15 January 1966, as reported in the minutes of a meeting of the Board of Director on 3 February 1966 ('Verbale n. 246 – Adunanza del 3 febbraio 1966', Archivio Storico IRI, Serie Nera, Busta AG/485).

^{lxv} Parallel to its role as General Economic Consultant, Professor Saraceno held executive positions in various IRI's companies. He became President of IRI's school of management IFAP, and Chairman of Italsiel, IRI's software company that was established in 1969 upon his suggestion. In 1970, he also became President of Svimez, the most important think-tank on the industrial development of the South, which he helped founding in 1946.

^{lxvi} 'Contratto Iri di consulenza' (Archivio Storico Pasquale Saraceno, Documenti personali, Storia rapporti d'impiego. Vecchi contratti; Iri).

^{lxvii} This happened as late as 1982, when Romano Prodi was appointed Chairman (Interview with Romano Prodi, Alessandro Ovi and Giuseppe Parlatore, 19 November 2018).

^{lxviii} 'Viaggio sulla "Raffaello" con i laburisti' (Archivio Storico Pasquale Saraceno, Viaggi Prof. Saraceno, Busta 66-67).

^{lxix} The Industrial Reorganisation Corporation (IRC) was established in 1966. Despite its original intention to become the British version of the IRI model, the IRC effectively operated as a merchant bank, financing and facilitating mergers in the automotive (British Leyland), electronics (General Electric Company) and informatics (International Computers Ltd) sectors (Edwards & Gandy, 2019; Holland, 1972). The IRC was wound up already in 1970. Five years later, the UK established a proper state holding company called National Enterprise Board (Roy, 1977).

law body inspired on the IRI model. In 1966, he was delegated by IRI's Chairman to establish a collaboration between IRI and Spain's state holding group *Instituto Nacional de Industria*^{lxx} (INI). He also maintained collaborative relations with Swedish policymakers in 1969^{lxxi}, who were about to set up a state holding company^{lxxii} explicitly modelled on IRI's structure.

^{lxx} 'Documento base di accordo con Ini (attenzione)' (Archivio Storico Pasquale Saraceno, "Istituto nacional industria, Ini-Spagna", Busta 46).

^{lxxi} 'Viaggio in Svezia, settembre 1969, non fatto' (Archivio Storico Pasquale Saraceno, 'Viaggi prof. Saraceno', Busta 66-67).

^{lxxii} Established in 1970, the state holding company *Statsföretag* concentrated under its control all major state-owned companies in the steelmaking, mining, shipbuilding and lumber sectors (Törnblom, 1977).

Name	Career within the Institute	Business executive positions outside of the Institute
Year of birth		
Education		
First generation (Hired in the 1930s)		
Pasquale Saraceno	1934 – Hired 1938 – Deputy Director 1946 – Central Co-Director (Inspectorate) 1948 – Central Director (Financial Affairs) 1953 – Central Director (Studies) 1966-1990 – General Economic Consultant	1966 – Chairman of Infrasad [IRI] 1969 – Chairman of Italsiel [IRI]
Born in 1903		
Economics and commerce		
Luigi Chialvo	1937 – Hired 1945 – Deputy Director 1953 – Central Co-Director 1957 – Central Director (General Secretariat)	1971 – Chairman of Italstat [IRI]
Born in 1906		
Economics		
Aldo Serangeli	1934 – Hired 1946 – Deputy Director (Inspectorate) 1953 – Central Co-Director (Inspectorate) 1962 – Central Director (Mechanical, Steelmaking, Shipbuilding Participations) 1966 – Central Director (Inspectorate)	
Born in 1909		
Economics and commerce		
Sergio Paronetto	1934 – Hired at the Studies Office 1936 – Head of the Technical Secretariat and Assistant of the General Director 1943 – Deputy General Director	
Born in 1911		
Political science		
Second generation (Hired in the period 1944-1956)		
Carlo Obber	1944 – Hired as Functionary (Inspectorate) 1946 – Procurer 1948 – Deputy Director (Financial Affairs) 1953 – Central Co-Director (Financial Affairs) 1957 – Central Director (Financial Affairs and Participations in Banks)	
Born in 1913		
Economics and commerce		
Carlo Alberto Morosetti	1944 – Hired as Deputy Director 1946 – Central Co-Director (Staff and General Affairs) 1953 – Central Director (Staff and General Affairs)	1957 – Chairman of Edindustria [IRI] 1960 – Chairman of IFAP [IRI]
Born in 1897		
Law		
Leopoldo Medugno	1945 – Hired as Clerk 1949 – Functionary 1952 – Procurer 1954 – Deputy Director	1960 – General Director of Finmeccanica [IRI] 1976 – Chairman of Banco di Roma [IRI]
Born in 1920		
Law		

	1960 – Central Director (Mechanical, Steelmaking, Shipbuilding Participations) 1966 – Deputy General Director 1968 – General Director	
Gaetano Cortesi Born in 1912 Economics and commerce	1945 – Hired as Procurer 1952 – Deputy Director 1960 – Central Director (Inspectorate)	1966 – CEO of Italcantieri [IRI] 1971 – CEO of Fincantieri [IRI] 1974 – CEO and Chairman of Alfa Romeo [IRI] 1978 – President of Cassa per il Mezzogiorno
Veniero Ajmone Marsan Born in 1918 Law	1946 – Hired as Clerk at the Institute 1953 – Procurer 1962 – Central Co-Director (Studies) 1967 – Central Director (Studies)	
Alberto Capanna Born in 1910 Economics and commerce	1949 – Hired as Procurer 1950 – Deputy Director (Studies)	1966 – General Director of Finsider [IRI] 1969 – CEO of Finsider [IRI] 1976 – Chairman of Finsider [IRI]
Fausto Calabria Born in 1922 Law	1951 – Hired as a Clerk 1953 – Functionary 1962 – Central Co-Director 1964 – Central Director	1979 – Chairman of Mediobanca [IRI]
Giuseppe Glisenti Born in 1919 Economics	1955 – Hired as Central Co- Director (Labour Problems) 1958 – Central Director (Labour Problems)	1965 – Chairman of Intersind 1965-1966, 1968-1969 – Chairman of IFAP [IRI] 1972 – Chairman of Rinascente 1977 – General Director of RAI [IRI] 1987 – Chairman of Finmeccanica [IRI]
Franco Viezzoli Born in 1925 Economics and commerce	1956 – Assistant to the General Director 1964 – Central Director (Coordination)	1976-1986 – Chairman and CEO of Finmeccanica [IRI] 1987-1996 – President of ENEL
Franco Schepis Born in 1922 Mathematics and Civil Engineering	1962 – Central Co-Director (Public Relations) 1964 – Central Director (Public Relations) 1970 – Central Director (General Affairs and Secretariat)	1956 – Director of Press Services of RAI [IRI] 1981-1986 – CEO and deputy chairman of Autostrade
Third generation (Hired in the 1960s)		
Marcello Bigi	1966 – Clerk 1968 – Inspector 1972 – Senior Inspector 1977 – Central Co-Director (Inspectorate) 1979 – Central Director (Inspectorate)	
Emilio Acerna	1964 – Clerk	

Born in 1937	1969 – Inspector 1974 – Procurator 1980 – Deputy Director 1988 – Central Co-Director (General Affairs)	
Umberto Del Canuto Born in 1937	1966 – Clerk 1967 – Functionary 1970 – Procurer 1974 – Deputy Director 1980 – Central Co-Director (Studies)	
Giorgio Massone	1966 – Clerk 1967 – Functionary 1971 – Procurer 1975 – Deputy Director 1990 – Central Co-Director (Planning and Control)	1993 - General Director of SPI [IRI]
Luciano Pistolesi	1967 – Inspector 1980 – Central Co-Director (Inspectorate)	
Aldo De Chiara Born in 1934 Economics and commerce	1980 – Central Co-Director (Inspectorate)	
Fabrizio Antonini	1967 – Clerk 1967 – Functionary 1970 – Procurer 1974 – Deputy Director 1980 – Central Co-Director (General Affairs) 1988 – Central Director (General Affairs)	
Agostino Paci Born in 1930 Law	1967 – Functionary 1970 – Procurer 1973 – Deputy Director 1975 – Central Co-Director (Labour Problems)	1982 – President of Intersind 1984 – Chairman of Sofin [IRI] 1988 – Chairman of SPI [IRI] 1988 – Deputy Chairman of Finmeccanica [IRI]
Silvano Allevi Born in 1926	1968 – Deputy Director 1975 – Central Co-Director (Accounting) 1980 – Central Director (Accounting – Administration)	
Michele Savarese	1975 – Central Director Legal Affairs 1986-1991 – Secretary of the Board of Directors	
Fourth generation (Hired in the late 1970s/early 1980s with previous business experience)		
Michele Tedeschi Born in 1940 Law	1979 – Central Director (Labour Problems) 1985 – Deputy General Director 1988 – General Director 1992 – CEO IRI SpA 1994 – Chairman IRI SpA	Before 1979 – Executive positions in STET 1993 – CEO of STET [IRI SpA] 1998 – Chairman of Istituto Poligrafico e Zecca dello Stato 2002 – Chairman of Siemens SpA

Bruno Steve	1984 – Central Co-Director (Planning and Control)	Before 1984 – Executive positions in STET [IRI]
Born in 1941	1986 – Central Director (Planning and Control)	1995 – CEO of Finmeccanica [IRI SpA]
Duccio Valori	1980 – Central Co-Director (Studies and Planning)	1971 – Executive position EFIM
Born in 1941	1991 - Central Director (Studies)	1976 – Director of the Study Office EGAM
Public economics		1987 – CEO of Iritech [IRI] 1995 – Chairman of Stream [IRI SpA]
Renato Cassaro	1980 – Central Co-Director (Financial Affairs)	
Born in 1940	1986 – Central Director (Financial Affairs)	
Franco Simeoni	1990 – Central Director (Planning and Control)	1989 – General Co-Director of STET [IRI]
Born in 1935	1993 – Deputy General Director of IRI SpA	1994 – General Director of Telecom Italia [IRI]
Economics and commerce		1996 – Chairman of Nuova Telespazio [IRI]
Ezio Lepidi	1980 – Central Co-Director (Administration)	
	1991 – Central Director (Administration)	
Enrico Micheli	1980 – Deputy Director	Before 1980 – Executive positions in Alitalia [IRI] and Intersind
Born in 1938	1984 – Central Co-Director (Labour Problems)	
Law	1987 – Central Director (Labour Problems)	
	1993 – General Director IRI Spa	
Pietro Ciucci	1986 – Central Co-Director (Financial Affairs)	Before 1986 – Executive positions in Autostrade [IRI]
Born in 1950	1996 – General Director IRI SpA	2006 – Chairman of ANAS
Economics and commerce		

Table A4.12: List of top officials of the Institute and their respective careers. *Source:* Author's elaboration on Felesini (2013) and various sources from the IRI archive (Archivio Storico IRI, Ordini di Servizio; Archivio Storico IRI, Serie Nera).

The internal organisation of the Institute into Services and Divisions

This section presents the internal organisation and evolution of the Institute's most relevant offices, in chronological order of establishment.

Secretariat and General Affairs

The office 'Secretariat and General Affairs'^{lxxiii} was created at the moment of IRI's establishment 1933 with the aims of providing administrative services and of dealing with questions regarding the Institute's staff.

The main responsibilities of the Secretariat and General Affairs Service were clearly specified in 1953^{lxxiv}. Some of them were largely preserved^{lxxiv} in the following decades:

- Secretariat of the Board of Directors and of the Executive Committee;
- Relations with the Ministries and other public institutions;
- Various administrative services: administrative management of IRI's shareholdings, internal registry, treasurership, library, archive, post office, telephone services, management of auxiliary personnel, etc.;
- Relations with IRI's offices.

Other responsibilities were transferred – temporarily or permanently – to new autonomous offices:

- Legal affairs (autonomous office in the years 1973-1977, 1980-1982 and from 1989 when it became the Functional Unit 'Legal Affairs, Tax Affairs and Institutional Relations');
- Staff management (transferred to the Labour Problems Division in 1979);
- Trade unions affairs (transferred to the Labour Problems Division in 1957);
- Press office (transferred to the Public Relations Service in 1962, incorporated in 1970, autonomous from 1979 to 1983, then part of the External Relations Division until 1989);
- The Coordination Office, created by separation from the Secretariat and General Affairs in 1960^{lxxv} with the aim of coordinating the General Director and the office of the Chairman with the various sectors of the Institute. In 1970, the Service was transferred to the Secretariat and General Affairs Service with all its functions.

In the following decades, the Secretariat and General Affairs Service was intermittently responsible for the Public Relations Office in the years 1970-1977, 1979-1983 and from 1989, when it assumed the denomination 'Functional Unit Secretariat, General Affairs and Public Relations'. Its formal transformations into a 'Division' (in 1977) and into a 'Functional Unit' (in 1987) did not alter its structure and roles.

^{lxxiii} 'Secretariat and General Affairs' (*Segreteria e Affari Generali*) is here adopted to refer to the various denominations that the office assumed: General Secretariat (1944); General Affairs and Personnel Service (1948); General Secretariat Service (1960); General Affairs Division (1977); General and Legal Affairs Division (1983); Functional Unit Secretariat and General Affairs (1987); Functional Unit Secretariat, General Affairs and Public Relations (1989).

^{lxxiv} 'Ordinamento degli uffici. Deliberazione presidenziale del 1° agosto 1953' (Archivio Storico IRI, Ordini di servizio).

^{lxxv} From a communication of the General Director on 21 December 1960 'Comunicazione 14/1960 [21 dicembre 1960]' (Archivio Storico IRI, Ordini di servizio).

Accounting – Administration

An office ‘Accounting – Administration’^{lxxvi} was active since the very establishment of IRI in 1933, but the first specification of its responsibilities was formulated only in 1944^{lxxvii}:

- The Institute’s general accounting;
- The management of issued obligations (a prerogative of this office until 1957^{lxxviii} and from 1981^{lxxix});
- The relations with the Central Bank and other financial entities (until 1957);
- The temporary management of IRI’s non-sectoral financial holdings (until 1953, when this role was attributed to the Financial Affairs Service).

In the following decades, the Accounting Service preserved and expanded its role over the Institute’s general accounting^{lxxx}, becoming responsible for:

- The management of VAT registers;
- The preparation of the Institute’s budget and of its profits and losses statement;
- The drafting of IRI’s consolidated balance sheets and of income statements;
- The technical support to the controlling organs of the Institute.

With the reorganisation of 1977^{lxxxi}, the Service was transformed into ‘Accounting and Administrative Control Division’, with new competences over the internal budgeting and information system (until 1983) of the Institute. In 1981^{lxxxii}, it was redenominated ‘Administrative Division’, following the attribution of administrative functions from the General Affairs and from the Finance^{lxxxiii} Divisions.

The new Division acquired a growing importance within the Institute’s structure (see Table A4.12 below), with a primary responsibility in formulating the Institute’s budget and IRI’s consolidated financial accounts.

Inspectorate

The figure of a ‘Technical Inspector’ was foreseen in IRI’s 1934 Statute (article 49), but it was only with the 1937 Statute (article 36) that a ‘Technical Inspectorate’ was formally recognised as a constituent part of its internal structure. In fact, the ‘Inspectorate’^{lxxxiv} – together with the Studies Service – was arguably the most important office of the Institute, especially after it

^{lxxvi} ‘Accounting – Administration’ (*Contabilità - Amministrazione*) is here adopted to refer to the various denominations that the office assumed: Accounting of the Institute Office (1944); General Accounting Service (1948); Accounting and Administrative Control Division (1977); Administrative Division (1981); Administration Division (1983).

^{lxxvii} In a deliberation of the Commissioner Tecchio on 9 May 1944 ‘Delibera commissariale n. 5 del 9 maggio 1944-XXII, Milano’ (Archivio Storico IRI, Ordini di servizio).

^{lxxviii} ‘Delibera presidenziale 23 ottobre 1957’ (Archivio Storico IRI, Ordini di servizio).

^{lxxix} ‘Ordine di servizio 2/81 [18 marzo 1981]’ (Archivio Storico IRI, Ordini di servizio).

^{lxxx} As specified in ‘Ordine di servizio [14 ottobre 1975]’ (Archivio Storico IRI, Ordini di servizio).

^{lxxxii} ‘Ordine di servizio [10 novembre 1977]’ (Archivio Storico IRI, Ordini di servizio).

^{lxxxiii} Following ‘Ordine di servizio 2/81 [18 marzo 1981]’ (Archivio Storico IRI, Ordini di servizio).

^{lxxxiii} Limited to the issuing of obligations.

^{lxxxiv} ‘Inspectorate’ (*Ispezzorato*) is here adopted to refer to the various denominations that the office assumed: Technical Inspectorate (1937); Financial and Inspectorate Department (1944); Inspectorate Office (1948); Inspectorate Service (1953); Inspectorate Division (1978); Management Control and Inspectorate Division (1980); Inspectorate Division (1984).

became an independent office in 1948^{lxxxv}. The Inspectorate represented a peculiar instrument of auditing, information gathering and control developed by the Institute to facilitate its control over IRI's subsidiaries.

A 1944 internal document^{lxxxvi} firstly defined its role as the “controlling body of the companies subject to IRI”. It further specified and distinguished its functions as *continuative* and *occasional*.

Continuative functions – those performed by its own initiative – were:

- The revision of the companies' balance sheets, in order to verify their economic, financial and patrimonial situations;
- The monthly, quarterly and biannual examination of the companies' financial accounts;
- The comparison of companies within each sector, based on their balance sheets and financial accounts;
- The formulation of IRI's consolidated balance sheets and financial accounts.

Occasional functions – required by the Chairman or by the heads of other offices – were:

- The examination of particular situations pertaining to a specific company, in order to facilitate related financial operations from the Institute;
- The revision of the balance sheets of companies to be divested or acquired by IRI;
- The investigation over the technical, productive and commercial efficiency of specific companies and the elaboration of proposals for their reorganisation.

These functions were only slightly modified or integrated in subsequent decades, with the attribution of further responsibilities in the areas of research, business organisation, training and internal information services.

The Inspectorate performed its duties in two ways:

1. By appointing one of its officials on the Boards of Auditors of IRI's sectoral subsidiaries and operating companies;
2. By designating one of its officials to a specific task or investigation, which implied a direct access to the production sites and to any relevant document relative to the interested company.

The Inspectorate would then elaborate detailed technical reports, made available to other offices – Shareholdings, Studies, Planning and Control, Financial and Banking Affairs – with which they closely operated. Such continuous and direct flow of information over the main productive activities and financial results of its subsidiaries facilitated the management of the Institute in developing a more precise and coordinated strategy for the IRI Group.

This emerged clearly from the words of Chairman Petrilli^{lxxxvii}, during a 1964 meeting organised by the Inspectorates of the IRI Group. IRI's Chairman stressed how the responsibilities of the

^{lxxxv} 'Delibera presidenziale del 1° luglio 1948' (Archivio Storico IRI, Ordini di servizio).

^{lxxxvi} 'Disposizione di servizio. Norme per il funzionamento dell'Ispettorato' (Archivio Storico IRI, Serie Nera, Busta STO/536).

^{lxxxvii} The speech of Chairman Petrilli was reproduced in 'Saluto del Prof. G. Petrilli ai partecipanti all'incontro Ispettorati di Gruppo' (Archivio Storico IRI, Serie Nera, Busta P/10, Fascicolo 4).

Inspectorates and the nature of their control went beyond the narrow perspective of a mere accounting revision, but ultimately turned these controlling operations into a “factor of coordination, modernisation and impulse” for the entire Group.

The importance of the Inspectorate was significantly diminished when its management control functions were separated and attributed to the newly established Planning and Control Division in 1984 (see below).

Studies

A ‘Studies’^{lxxxviii} office was operative within the Institute from its foundation, but it acquired an autonomous standing only in 1953. Together with the Inspectorate, from which it received internal information on IRI’s companies, the Studies Service was the most important office of the technostructure, representing the historical memory and strategic brain of the Institute. Its critical importance within the Institute is highlighted by the directorship of Pasquale Saraceno from 1948 to 1966, succeeded by his closest collaborator Veniero Ajmone Marsan, who headed the office uninterrupted until 1983.

The study and planning functions of the Studies Service with respect to the IRI Group were reinforced and specified in 1957^{lxxxix}, coinciding with the inauguration of IRI’s four-year plans and with the consolidated vision of the IRI Group as an integrated industrial conglomerate, rather than a diversified financial holding:

[The Studies Service] will continue to implement its past duties, yet intensifying its contacts with the sectoral holdings, in order to represent the coordinating centre of any activity in the field of studies, researches, planning and legislation, by making available its analytical results to the companies of the Group as well as by collecting and coordinating figures and studies from the sectoral holdings in the areas of interest for the various sectors.

In doing so, particular attention will be reserved to “market studies”, both generic and specific on the single sectors in with the Group operates.

Since then, the Studies Services assumed the role of ‘technical secretariat’ for the General Directorate and assumed responsibilities^{xc} on:

- Elaborating IRI’s industrial plans (in collaboration with the Services Participations, Inspectorate, Financial and Banking Affairs and Problems of Labour);
- Preparing IRI’s annual reports (in collaboration with the Services Participations, Inspectorate, Financial and Banking Affairs, Accounting, Labour Problems).

It also collaborated in:

- Examining and certifying the programmes of IRI’s subsidiaries (responsibility of the Service Participations).

^{lxxxviii} ‘Studies’ (*Studi*) is here adopted to refer to the various denominations that the office assumed: Studies and Statistics Office (1944, under the General Secretariat); Studies Office (1948, under the Financial Division); Economic Studies and Planning Service (1953); Studies Division (1977); Studies and Planning Division (1979); Studies and Strategies Division (1984); Functional Unit Studies (1987).

^{lxxxix} Following the Chairman’s deliberation on 23 October 1957 ‘Ordinamento degli uffici [23 ottobre 1957]’ (Archivio Storico IRI, Ordini di servizio). Author’s translation from Italian.

^{xc} ‘Comunicazione del 14 ottobre 1975’ (Archivio Storico IRI, Ordini di servizio).

- Examining and revisiting the balance sheets of IRI's subsidiaries (responsibility of the Inspectorate).

Until its transformation into a 'Division' in 1977^{xcii}, the Studies Service maintained the following activities^{xcii}:

- Study and analysis of technical elements in order to identify and propose potential strategies regarding the sectors in which the IRI Group was involved;
- Study and research of new potential areas of intervention;
- Study of cross-sectoral problems (development of the South, R&D, etc.) not addressed by other Services;
- Study – in collaboration with other national and international entities – on general economic policy problems (e.g. sources of energy, technological progress, ecology, informatics, infrastructures, etc.).

In the period 1977-1979, the planning function was separated from the Studies Service and in 1984 it was eventually merged with the control management function (from the Inspectorate) into the newly established 'Planning and Control Division'^{xciii}. The resulting 'Studies and Strategy Division' was further depreciated and deprived of most of its direct managerial functions in 1987^{xciv} with the transformation into the 'Functional Unit Studies' and the concurrent creation of a 'Committee for the Strategies'^{xcv}. On September 1993^{xcvi}, in line with the progressive liquidation of the Institute during the privatisation phase, the Studies Unit became the first historical office of the Institute to be permanently abolished.

Financial and Banking Affairs

Established in 1944^{xcvii}, the office 'Financial and Banking Affairs'^{xcviii} was assigned responsibilities on the management of IRI's banking shareholdings and on the general finance

^{xcii} 'Ordine di servizio [10 novembre 1977]' (Archivio Storico IRI, Ordini di servizio).

^{xciii} 'Ordine di servizio [14 ottobre 1975]' (Archivio Storico IRI, Ordini di servizio).

^{xciv} Following a deliberation of the Chairman on 26 January 1984 'Ordine di servizio 1/84 [26 gennaio 1984]' (Archivio Storico IRI, Ordini di servizio).

^{xcv} Following a deliberation of the Chairman on 20 January 1987 'Ordine di servizio n. 2/87 [20 gennaio 1987]' (Archivio Storico IRI, Ordini di servizio).

^{xcvi} Participated by the heads of other Divisions and Chaired by the General Director, the Committee for the Strategies inherited the previous attributions of the Studies Division, such as the elaboration of "proposals for the industrial and financial strategy of the Group and their subsequent hypotheses of structural configurations and allocation of resources". It was also responsible for evaluating the "presence or development of entrepreneurial sectors", for formulating "proposals relative to the entry or exit into and from industrial sectors" or to "alliances and joint-ventures or important specific projects for relevant products, services, markets, with a national and international perspective". With the transformation of IRI into a joint-stock company in 1992, the Committee for Strategies was abolished as reported in a deliberation of IRI's CEO on 1st February 1993 'Ordine di servizio n. 1/93 [1^o febbraio 1993]' (Archivio Storico IRI, Ordini di servizio).

^{xcvii} Following a deliberation of IRI's CEO on 16 September 1993 'Comunicazione di servizio 9/93 [16 settembre 1993]' (Archivio Storico IRI, Ordini di servizio).

^{xcviii} Following a deliberation of the Commissioner Tecchio on 9 May 1944 'Delibera commissariale n. 5 del 9 maggio 1944- XXII, Milano' (Archivio Storico IRI, Ordini di servizio).

^{xcviii} 'Financial and Banking Affairs' (*Affari Finanziari e Bancari*) is here adopted to refer to the various denominations that the office assumed: Financial and Inspectorate Department (1944); Financial Division (1948); Financial and Banking Affairs Service (1953); Financial Affairs and Banking Shareholdings Service (1962); Finance Division (1977).

of the Institute. As for its functions^{xcix}, they were initially divided into *continuative* and *occasional*.

Continuative functions – those performed by its own initiative – were:

- The management of IRI's shareholdings in Banca Commerciale Italiana, Credito Italiano, Banco di Roma, Banco di Santo Spirito, Credito Fondiario Sardo – IRI's controlled commercial banks.
- The elaboration of the Institute's budget and the control over its implementation during the financial year;
- The analysis of IRI's subsidiaries, in order to coordinate their financial management with the Institute;
- The operations on the financial markets.

Occasional functions – required by the Chairman or by the heads of other offices – were:

- The raising of funds for the direct financing of IRI's companies;
- The raising of funds for the acquisition of new shareholdings, the creation of new companies and for capital injections in IRI's controlled or participated companies;
- The proposal over any exchange of shareholdings;
- The analysis of any financial operation from the Institute, including the issuing of obligations.

From 1948^c to 1953 the 'Financial Division' was headed by Pasquale Saraceno and incorporated the office 'Studies', before it became autonomous. In 1957^{ci}, while preserving its previous responsibilities over the Institute's financial management and banking shareholdings, the Financial and Banking Affairs Service was also attributed the competences of the Office Obligations. In this period the Service collaborated also in drafting IRI's four-year industrial plans as well as the Institute's annual reports.

The 1977 reorganisation in Divisions^{cii} confirmed most of its previous attributions, further specifying aims and roles, in particular; the coordination with the Planning Division relative to the financial needs for the investment plans of the IRI Group; the integration with the financial programmes of IRI's sectoral subsidiaries and leading operating companies.

Shareholdings

The 'Shareholdings'^{ciii} offices were established by the Institute in 1948^{civ} to reinforce the supervision on its sectoral subsidiaries as well as on its operating companies. The three Shareholding Services were organised on a broad sectoral basis.

^{xcix} Specified with the instruction of the Commissioner on 17 May 1944 'Disposizione di servizio. Norme per il funzionamento del reparto finanziario' (Archivio Storico IRI, Serie Nera, Busta STO/536).

^c 'Delibera presidenziale del 1° luglio 1948' (Archivio Storico IRI, Ordini di servizio).

^{ci} 'Delibera presidenziale 23 ottobre 1957' (Archivio Storico IRI, Ordini di servizio).

^{cii} 'Ordine di servizio [10 novembre 1977]' (Archivio Storico IRI, Ordini di servizio).

^{ciii} 'Shareholdings' (*Partecipazioni*) is here adopted to refer to the various denominations that the offices assumed: Management of Shareholdings 'A' and Foreign, 'B' and 'C' Services (1948); Coordination of Financial Holdings Service (1953), Direct Shareholdings Service (1953).

^{civ} This decision was formalised by the Board of Directors on 26 June 1948 'Consiglio di Amministrazione 26 giugno 1948' (Archivio Storico IRI, Serie Nera, Busta AG/582, Fascicolo 4).

In 1953^{cv}, the sectoral organisation of the Shareholdings Services was temporarily abandoned in favour of a functional division between a Service dedicated to the 'Coordination of Financial Holdings' (STET, Finmare, Finsider, Finmeccanica, Finelettrica) and a second Service focusing on 'Direct Shareholdings' (RAI, Alitalia, Italstrade, Celdit, Maccaresse, and others).

In 1957 a new sectoral organisation of the Shareholding Services was introduced, in order to "obtain the maximum degree of coordination among companies with homogeneous characteristics operating in complementary areas"^{cvi}. They were divided into:

- Service Shareholdings 'A' – relative to the mechanical-shipbuilding (Finmeccanica and Fincantieri from 1959) and steelmaking (Finsider) shareholdings. In 1970^{cvii}, the renamed 'Service shareholdings in manufacturing companies' was divided into five sectors, three of them covering the sectoral holdings, the remaining two focusing on 'Foreign trade' and 'International promotion'.
- Service Shareholdings 'B' – relative to the electric energy (Finelettrica), telephone (STET), maritime transport (Finmare) and air transport (Alitalia) shareholdings. In 1968^{cviii}, the Service was attributed the responsibilities on the infrastructural participations as well as on those previously held by the Service Shareholdings 'C', which was suppressed on that year. In 1975^{cix}, the renamed 'Service shareholdings in companies of services or companies of concessionaires activities or others' was reorganised into four sectors: Sector A (Autostrade, Italstat, RAI); Sector B (SME, SPA); Sector C (STET); Sector D (Finmare and Alitalia).
- Service Shareholdings 'C' – relative to all the other shareholdings. The service was abolished in 1968^{cx} and its responsibilities transferred to the Service Shareholdings 'B'.

The Shareholdings Services were attributed functions of management control on the sectoral subsidiaries and on the direct participations of the Institute.

Their responsibilities were to:

Follow, day by day, the activity of the financial holdings, and through them or also directly, the management of the controlled subsidiaries, coordinating the work of the financial holdings on issues of common interests and controlling the precise execution of plans and programmes arranged in the various sectors of activity^{cx}.

These roles were to be performed through the relationship with the sectoral holdings, the recurring collection of data, the interactions with the Inspectorate but especially through the presence of an appointed representative in the boards of executives and boards of auditors of the companies:

^{cv} 'Ordinamento degli uffici. Deliberazione presidenziale del 1° agosto 1953' (Archivio Storico IRI, Ordini di servizio).

^{cvi} 'Ordinamento degli uffici [23 ottobre 1957]' (Archivio Storico IRI, Ordini di servizio).

^{cvii} From a communication of the General Director 'Ordine di servizio on 28 July 1970 [28 luglio 1970]' (Archivio Storico IRI, Ordini di servizio).

^{cviii} From a communication of the General Director on 5 November 1968 'Ordine di servizio [5 novembre 1968]' (Archivio Storico IRI, Ordini di servizio).

^{cix} From a deliberation of the Chairman on 14 October 1975 'Delibera presidenziale del 14 ottobre 1975' (Archivio Storico IRI, Ordini di servizio).

^{cx} From a communication of the General Director on 5 November 1968 'Ordine di servizio [5 novembre 1968]' (Archivio Storico IRI, Ordini di servizio).

^{cx} 'Ordinamento degli uffici [23 ottobre 1957]' (Archivio Storico IRI, Ordini di servizio), author's translation from Italian.

In order to allow IRI's Chairmanship and the Directorate a constant knowledge of the diverse problems and of the ongoing activities regarding the various sectors in which the financial holdings and single companies operated^{cxii}.

The Shareholdings Services – with their appointed members in IRI's sectoral subsidiaries and major companies – were assigned a key role in consolidating the corporatisation of IRI as an integrated industrial group.

In 1977^{cxiii} the Shareholdings Services were abolished and most of their attributions were transferred to the newly established Planning Division.

Labour Problems

Established in 1955^{cxiv}, the Service 'Labour Problems'^{cxv} was responsible for the study and proposal of solutions to problems concerning labour conditions and industrial relations. Its creation reflected the need by the Institute to coordinate and harmonise into a unique general orientation the labour policy of the IRI Group.

Until 1971, the Service was notoriously headed by Giuseppe Glisenti, previous leading official of the Cristian-Democratic trade union CISL, who later assumed executive roles in IRI's training company IFAP and in IRI's organisation of business (Intersind), founded in 1958 following its detachment from the national employers' federation (Confindustria).

In 1975^{cxvi}, the Service was organised in three different sectors with dedicated functions:

- Industrial relations and labour policies;
- Management of labour problems in business activities;
- Professional training.

These three areas remained the main focus of Labour Problems in the following decades, with the addition of the responsibility over the Institute's staff management starting on 1979^{cxvii}.

Public Relations

A first public relations unit was introduced in 1957^{cxviii} under the General Secretariat, followed by an autonomous 'External Relations' office in 1960^{cxix} that was made responsible for the

^{cxii} 'Ordinamento degli uffici [23 ottobre 1957]' (Archivio Storico IRI, Ordini di servizio), author's translation from Italian.

^{cxiii} 'Ordine di servizio [10 novembre 1977]' (Archivio Storico IRI, Ordini di servizio).

^{cxiv} 'Servizio del lavoro (nascita e costituzione - 'Relazioni umane')' (Archivio Storico IRI, Serie Nera, Busta AG/3246, Fascicolo 1).

^{cxv} 'Labour Problems' (*Problemi del lavoro*) is here adopted to refer to the various denominations that the office assumed: Labour Affairs Service (1955); Labour Problems Service (1957); Labour Affairs Service (1967); Labour Problems Division (1977); Staff and Labour Problem Division (1980); Labour Problems and Resource Management (1987).

^{cxvi} 'Ordine di servizio [14 ottobre 1975]' (Archivio Storico IRI, Ordini di servizio).

^{cxvii} 'Ordine di servizio 8/79 [8 novembre 1979]' (Archivio Storico IRI, Ordini di servizio).

^{cxviii} 'Delibera presidenziale 23 ottobre 1957' (Archivio Storico IRI, Ordini di servizio).

^{cxix} 'Comunicazione 14/1960 [21 dicembre 1960]' (Archivio Storico IRI, Ordini di servizio).

Institute's institutional affairs. The Service 'Public Relations'^{cxx} was established in 1962^{cxxi} to coordinate the public relations strategy for the IRI Group as a whole.

The Service was led by Franco Schepis, former executive of the public broadcaster RAI, who became Central Director of the General Affairs Service (from 1970 until 1980), when in 1970^{cxxii} Public Relations was abolished as an autonomous Service and its functions were transferred to the very same General Affairs Service. Franco Schepis innovated IRI's public relations strategy, contributing to the construction of a unitary corporate identity of the IRI Group, resumed in the slogan he personally coined "IRI: a formula for progress".

The Service was responsible for:

- The relations with public institutions, the press, the public opinion, the media;
- The organisation of press conferences and official visits of public authorities and business executives;
- The organisation of conferences on themes regarding the IRI Group;
- The relations with the public relations offices of IRI's subsidiaries;
- The policy of advertising on printed magazines and newspapers on behalf of the IRI Group;
- The editorial activities of the IRI Group, in particular the publication of the house organ 'Notizie IRI'^{cxxiii} and of the specialised magazine 'Civiltà delle Macchine'^{cxxiv}.
- The collection and storage of press releases and photos.

The Public Relations office – as an independent Division 'External Relations' (1977-1979; 1983-1989) placed under the General Affairs Division (1979-1983; 1989-) – preserved these functions in the following decades, with the temporary separation of the Press Office (1979-1983) and with the exclusion of international public affairs (responsibility of the Foreign Affairs Division from 1979).

International Relations – Foreign Affairs

Established in 1962^{cxxv} as the 'International Relations'^{cxxvi} Service, its original responsibilities were:

- The relationships with the European Economic Community and with other international economic organisations;

^{cxx} 'Public Relations' (*Relazioni pubbliche*) is here adopted to refer to the various denominations that the office assumed: External Relations Office (1960); Public Relations Service (1962).

^{cxxi} Following a deliberation of the Chairman on 5 April 1962 'Ordine di servizio [9 aprile 1962]' (Archivio Storico IRI, Ordini di servizio).

^{cxxii} Following a deliberation of the General Director on 16 November 1970 'Ordine di servizio [16 novembre 1970]' (Archivio Storico IRI, Ordini di servizio).

^{cxxiii} 'Notizie IRI' (*IRI News*) was founded in 1957 as a bi-monthly house organ of the IRI Group.

^{cxxiv} 'Civiltà delle macchine' (*Civilisation of machinery*) was a bi-monthly magazine founded in 1953 – initially sponsored by Finmeccanica, then by IRI (from 1957) – by the poet Leonardo Sinisgalli with the aim to combine humanistic culture, art and technical knowledge.

^{cxxv} Following a deliberation of the Chairman on 5 April 1962 'Ordine di servizio [9 aprile 1962]' (Archivio Storico IRI, Ordini di servizio).

^{cxxvi} 'International Relations – Foreign Affairs' (*Rapporti Internazionali - Estero*) is here adopted to refer to the various denominations that the office assumed: International Relations Service (1962); External Relations Division (1977); Foreign Affairs Division (1979); Internationalisation of the Group and Technological Innovation Division (1989).

- Drafting of notes and collection of documents on the economic situation of foreign countries;
- The coordination and support of IRI's companies exporting efforts;
- The organisation of internships for technicians and other experts from developing countries^{cxxvii};
- The participation of the IRI Group to international fairs and the support to IRI's companies participating to international events.

From 1970 to 1979 the Service was abolished and its functions distributed to other Services. In 1979^{cxxviii}, the Division 'Foreign Affairs' was recreated with functions essentially inherited from the previous International Relations Service. The Foreign Affairs Division was also made responsible for the Institute's foreign branches^{cxxix}. The functions and structure of the Division remained substantially unaltered until 1989, when it was renamed 'Internationalisation of the Group and Technological Innovation'.

Planning and Control

The establishment of the 'Planning and Control Division' in 1984^{cxxx} amounted to a significant transformation of the Institute's traditional structure. By inheriting the planning functions from the Studies and Planning Division^{cxxxi} and the control responsibilities from the Management Control Division and Inspectorate, it became the key managerial office of the Institute.

As showed in Table A4.13, by 1988^{cxxxii} the Planning and Division Function was involved in all major activities of the Institute, with a primary responsibility on most of them. Its main duties were:

- The elaboration of strategic directions for IRI's subsidiaries, in order to formulate joint plans;
- The examination and evaluation of industrial plans submitted by IRI's subsidiaries, their validity and coherence with the general and sectoral objectives of the Group;
- The elaboration of IRI's industrial plan, based on those of the sectoral subsidiaries and other directly controlled companies;
- The programming relation for the Minister of State Holdings;
- IRI's annual report and the biannual report for the Italian Companies and Exchange Commission (CONSOB);
- The evaluation of main investment projects, the control of their evolution and the satisfaction of their objectives;
- The study and development of homogeneous planning and control techniques for the IRI Group, in collaboration with the sectoral subsidiaries.

^{cxxvii} Under the responsibility of the International Technical Cooperation Office, established in 1962.

^{cxxviii} 'Ordine di servizio 8/79 [8 novembre 1979]' (Archivio Storico IRI, Ordini di servizio).

^{cxxix} IRI had foreign branches in Brussels, Moscow, Beijing, Tokyo and Washington.

^{cxxx} From a deliberation of the Chairman on 26 January 1984 'Ordine di servizio 1/84 [26 gennaio 1984]' (Archivio Storico IRI, Ordini di servizio).

^{cxxxi} Previously, the Planning office obtained the temporary autonomous status of 'Division' for only two years between 1977 and 1979.

^{cxxxii} Table adapted by the author from a similar one appearing at page 5/bis of 'Ordine di servizio n. 2/88 [28 luglio 1988]' (Archivio Storico IRI, Ordini di servizio).

In the following years, the structure and functions of the Planning and Control Division remained essentially unaltered.

Activities	Divisions with a primary responsibility	Divisions with functional auxiliary roles								
		Administration (A)	External Affairs (EA)	Financial Affairs (FA)	Inspectorate (I)	Labour Problems (LP)	Planning and Control (P&C)	External Relations (ER)	General Affairs (GA)	Studies (S)
Planning process of the IRI Group	P&C		X	X		X	X	X		X
Budget of the Institute	A	X	X	X	X	X	X	X	X	X
IRI's annual report	P&C	X	X	X		X	X	X	X	X
IRI's consolidated balance sheets	A	X		X	X	X	X	X		
IRI's informative system	P&C	X	X	X	X	X	X	X	X	X

Table A4.13: Main activities of the Institute in 1988 and responsible Divisions. Source: Author's elaboration.

IRI in the Italian system of State Holdings

In 1948, the governance of IRI in the context of the national political economy was based on a mix of rules deriving from its Statute and other customary practices. This was recognised as a problem by the legislators, which in 1953 established the ‘Giacchi Commission’^{cxxxiii} to reform IRI’s Statute, in order to address its juridical uncertainties and the absence of formalised policy mandates (Ministero dell’Industria e del Commercio, 1955b).

Eventually, IRI’s Statute was never amended, but since then the governance system under which IRI operated was progressively shaped and formalised by the passing of a series of laws (see Table A4.7) that, by the late 1970s, had built what came to be known as the ‘system of State Holdings’ (Sareceno, 1975a). The following sections will briefly outline the functions of these external public authorities and their relations to IRI within the system of State Holdings.

The ministerial supervision through a dedicated Ministry of State Holdings

IRI was conceived as a public law entity with an endowment fund, therefore it did not have a formal superior ‘owner’ of its capital. Nonetheless, it remained under the supervision of the Treasury, the Ministry of Finance and the Ministry of Industry (Ministero dell’Industria e del Commercio 1955a, p. 141).

In 1956^{cxxxiv}, all the SOEs controlled by IRI, ENI, FIM^{cxxxv} and by the Ministry of Finance were put under the responsibility of the newly-established *Ministero delle Partecipazioni Statali* (Ministry of State Holdings). The Ministry did not have direct administrative relations with the single operating subsidiaries. It dealt exclusively and directly with the so-called *enti di gestione* (management entities) – public law bodies at the apex of the state holding companies (such as the Institute with IRI).

The Ministry was assigned two main formal responsibilities from its institutive law (Guarino, 1974):

- The appointment of elective board members in the management entities;
- The authority of supervising the conduct of the management entities with respect to any breach of administrative and other legal rules.

Other attributions were specified in 1967^{cxxxvi}, following the establishment of the Interministerial Committee for Economic Programming:

- Communicating to the management entities the general policy directives of the Interministerial Committee for Economic Programming, together with specific directives for their implementation. The ministerial directive was not intended as ‘an order’ but rather as ‘an indication’^{cxxxvii} on the programmes, subject to the valuation and interpretation of the management of the state holding companies. As explained by

^{cxxxiii} From the name of Orio Giacchi, a distinguished Professor of Law at the Catholic University of Milan.

^{cxxxiv} With Law n. 1589 (22 December 1956).

^{cxxxv} EFIM’s predecessor.

^{cxxxvi} Article 3 from Decree of the President of the Republic n. 554 (14 June 1967).

^{cxxxvii} As stated by Professor Saraceno (Senato della Repubblica, 1982b, p. 139) in a hearing to the Italian Senate. In the same cycle of hearings Massimo Severio Giannini, Professor of Administrative Law, reported that “the political directives to the management entities have little substance. In practice, the management entity receives from the Ministry an indication of programme, rather than a directive” (Senato della Repubblica, 1982, p. 104).

Saraceno (1975a, p. 45), the policy directives from the Interministerial Committee and from the Ministry for State Holdings were eventually reconciled, reaffirmed and transformed into operative decisions by the Board of Directors.

- Formally authorising a series of operations from the management entities:
 - Acquisition or divestment of companies or controlling participations;
 - Establishment of new companies;
 - Deliberations regarding the share capital of controlled companies;
 - Statutory modifications;
 - Deliberations on mergers;
 - Deliberations on liquidation processes.

In practice, the authorisation from the Ministry proved to be an *ex post* supervisory function, aimed at recording and controlling the managerial decisions assumed by the state-holding companies^{cxviii}.

Thus, the Ministry of State Holdings maintained supervisory and policy coordinating functions. It supervised the management entities (IRI included) without constituting a superior shareholding level, as it did not own their capital^{cxix}. Furthermore, the minister for State Holdings did not assume the role of a 'supermanager' (Guarino, 1974). The Ministry did not impose sectoral economic policies of its own on the public law bodies for which it was responsible. As explained by Saraceno (1982, p. 9):

The institution of the Ministry [of State Holdings] did not modify the pre-existing position of state-owned enterprises with respect to other administrations [...] The institution of a Ministry of State Holdings did not imply that industrial policy was carried out by the Ministry of State Holdings if the companies were state-owned and by Ministries responsible for various fields if they were private^{cxl}.

The Ministry was the supervisor of the state-holding system. Its role was to facilitate the coherence between the industrial plans of the state holding companies and the broader sectoral economic policies formulated by the public authorities. On an annual basis, each management entity had to submit its financial accounts and a programming report to the Ministry of State Holdings, which in turn presented them to Parliament as an attachment to the Ministry's budget^{cxli}.

Policy orientation of the state holding companies

With the 1948 Statute, the general policy orientation of IRI was responsibility of the Council of Ministers. Already in 1950, the technical complexity of IRI's activities imposed the delegation of the policy orientation function to a dedicated 'Committee of ministers for IRI'^{cxlii}. With the

^{cxviii} In relation to a legal controversy regarding the divestment of participations by IRI, sentence n. 2091 (25 March 1986) of the Supreme Court of Cassation declared the inadmissibility for Ministerial authorisations to create impediments to the 'entrepreneurial activity' of the management entity.

^{cxix} As explained by Professor Saraceno (p. 164) in a hearing to the Italian Senate (Senato della Repubblica, 1982b).

^{cxl} Author's translation from Italian.

^{cxli} According to Article 10 of Law n. 1589 (22 December 1956).

^{cxlii} The Committee was composed by the Treasury Minister, by the Minister of Finance, the Minister of Labour, the Minister of Industry, the Minister for Merchant Marine, the Minister of Post and Telecommunications, the Minister for Foreign Trade, the Minister of Transports. 'Comitato dei ministri per l'Iri' (Archivio Storico IRI, Serie Nera, Busta STO/569).

establishment of the Ministry of State Holdings in 1956, a new ‘Permanent Committee for State Holdings’^{cxliii} became responsible for the general policy orientation of the state holding companies.

The governance of the state shareholding system was permanently transformed in 1967 with the establishment of the ‘Interministerial Committee for Economic Programming’^{cxliiv} (*Comitato Interministeriale per la Programmazione Economica*, CIPE). CIPE was intended as the overarching authority responsible for national economic policymaking. It specifically indicated the general policy directives^{cxlv} aimed at “promoting and coordinating the activity of the public administration and of the public bodies” towards the implementation of the national economic programme^{cxlvi}.

With respect to public law management entities such as IRI and ENI^{cxlvii}, CIPE assumed a policy coordination role in terms of:

- Verifying the conformity of the national economic programme to the annual and pluriannual programmes of IRI and other state holding companies under the supervision of the Ministry of State Holdings;
- Formulating general economic plans to be supervised by the Ministry of State Holdings. These plans included the list of investments, their sectoral diversification and their geographical localisation; the identification of their financing methods; indications on the provision of raw materials and energy sources; employment and labour policies; price targets; organisational elements on direct and indirect shareholdings;
- Approving the programming report of the state holding companies;
- Expressing a non-binding opinion on the augmentation of the endowment fund of state holding companies.

From 1977^{cxlviii}, the newly-established ‘Interministerial Committee for Industrial Policy’ (*Comitato Interministeriale per la Politica Industriale*, CIPI) assumed the functions of CIPE with respect to industrial policy. Following the proposal of the Ministry of State Holdings, CIPI was also responsible for approving the execution of specific pluriannual programmes for “industrial restructuring and reconversion”^{cxlix} pertaining to the state holding companies.

^{cxliii} From Article 4 of Law n. 1589 (22 December 1956), the committee was chaired by the Prime Minister and composed by Minister for State Holdings, the Minister for the Budget, the Treasury Minister, the Minister of Industry and the Minister of Labour.

^{cxliiv} Following Law n. 48 (27 February 1967). CIPE was chaired by the Prime Minister and composed by the Minister for the Budget, the Minister for Foreign Affairs, the Treasury Minister, the Minister of Finance, the Minister of Industry, the Minister for Agriculture, the Minister for Foreign Trade, the Minister of State Holdings, the Minister for Public Works, the Minister of Labour, the Minister of Transports, the Minister for Merchant Marine, the Minister for Tourism and the Minister for Extraordinary Intervention in the South and in depressed areas of Centre-North.

^{cxlv} CIPE’s directives – general, not specific in their nature – were neither instructions, nor orders, they limited themselves to assigning an objective, while leaving the recipient the freedom to determine means and ways to reach it (Guarino, 1974).

^{cxlvi} From Article 16 of Law n. 48 (27 February 1967).

^{cxlvii} As specified in Article 2 of Decree of the President of the Republic n. 554 (14 June 1967).

^{cxlviii} With Law n. 675 (12 August 1977). CIPI was chaired by the Prime Minister and composed by the Minister of the Budget and Economic Programming, the Treasury Minister, the Minister of Industry, the Minister of State Holdings, the Minister of Labour, the Minister for Extraordinary Intervention in the South.

^{cxlix} As foreseen by Article 3 of Law n. 675 (12 August 1977), which introduced a Fund addressed to financing projects of industrial restructuring and reconversion of manufacturing and extractive companies.

External controls on state holding companies: national Court of Auditors and Parliament

Apart from the operational controls implicit in the supervisory role of the Ministry of State Holdings, the system of state holding companies was subject to two external and interrelated public controls.

First, the national Court of Auditors exercised its autonomous control on the state holding companies, as foreseen by the Italian Constitution with respect to all the beneficiaries of permanent public funding. IRI and other state holding companies fell under this category, due to the public and permanent nature of their endowment funds (Saraceno, 1982, p. 15). The control of the Court applied on the management entities, rather than on their subsidiaries (Saraceno, 1975a). Apart from the above-mentioned representative in the Boards of Directors and Boards of Auditors of the state holding companies, a special section of national Court of Auditors was entrusted with evaluating the annual financial accounts of the very same management entities. On an annual basis, the Court then reported to Parliament the results of its control on the financial management of each state holding company.

Second, Parliament held a significant controlling function through its ultimate approval or rejection of increases in the endowment funds of the state holding companies. Furthermore, the annual financial accounts and the programming reports of the management entities had to be presented yearly by the Ministry of State Holdings.

Finally, with two pieces of legislation between 1977^{cl} and 1978^{cli} a Committee composed by 15 Deputies and 15 Senators from the two Chambers was attributed the faculty of expressing non-binding opinions on: the pluriannual programmes of the state holding companies; reports submitted by the Ministry of State Holdings; the proposals for increasing the endowment funds; the proposals for appointing the Chairpersons and their deputies of the three state holding companies. With respect to the appointment of those top executive positions, the Government had to motivate its choice on the basis of the professional qualification of the candidates and “in relation to the ends and the managerial guidelines to be pursued”.

^{cl} From Article 13 of Law n. 675 (12 August 1977).

^{cli} Law n. 14 (24 January 1978).

Chapter 5. The economic and financial dimensions of IRI

Revenues

	IRI's revenues over Italy's GDP (Average values)	IRI's total revenues per employee (Average annual growth rates in real terms)
1950-1960	4.3%	8.9%
1961-1970	4.6%	3.1%
1971-1980	5.1%	1.5%
1981-1992	6.0%	4.7%
1950-1992	5.0%	4.5%

Table A5.1: Average figures on IRI's revenues in different periods. *Source:* Author's elaboration on IRI Database. *Notes:* IRI's total revenues per employee refer to the number of employees in the industrial section (excluding the banks) and are measured in constant 2018 euros.

Foreign revenues

	IRI's foreign revenues over Italy's exports (Average values)	IRI's foreign revenues per employee (Average annual growth rates in real terms)
1950-1960	4.6%	14.8%
1961-1970	3.8%	7.3%
1971-1980	5.9%	31.0%
1981-1992	5.9%	13.0%
1950-1992	5.1%	15.7%

Table A5.2: Average figures on IRI's foreign revenues in different periods. *Source:* Author's elaboration on IRI Database. *Notes:* IRI's foreign revenues per employee refer to the number of employees in the industrial section (excluding the banks) and are measured in constant 2018 euros.

Value added

	Average values of IRI's shares of			Average values of	
	Italy's value added	Italy's value added in the non-agricultural commercial economy	Italy's value added in IRI sectors	IRI's annual productivity growth rates in real terms	Non-IRI's annual productivity growth rates in real terms
1950-1960	2.7%	3.7%	6.3%	8.9%	5.1%
1961-1970	2.8%	3.6%	6.3%	3.1%	7.5%
1971-1980	3.5%	4.4%	8.2%	0.6%	3.5%
1981-1992	2.9%	3.6%	7.5%	5.5%	2.1%
1950-1992	3.0%	3.8%	7.1%	4.6%	4.4%

Table A5.3: Average figures on IRI's value added and labour productivity in different periods. *Source:* Author's elaboration on IRI Database. *Notes:* 1) 'IRI sectors' refers to those macro sectors where IRI was involved: manufacturing, constructions, transports, communications and energy utilities until 1962; 2) Labour productivity is measured as real value added (measured in 2018 constant euros) divided by the number of employees (in the industrial section in the case of IRI, which excludes the banks); 3) For the sake of comparability, the non-IRI figure for productivity growth refers to the IRI sectors.

Employment

	Average number of IRI's employees	Average number of IRI's employees (industrial section)	Average values of IRI's shares of	
			Employees in the Italian economy	Italy's employees in the non-agricultural commercial sector
1950-1960	233,296	205,666	1.1%	2.1%
1961-1970	296,866	264,681	1.5%	2.3%
1971-1980	508,950	459,247	2.5%	3.5%
1981-1992	461,825	404,600	2.1%	2.8%
1950-1992	375,961	333,879	1.8%	2.6%

Table A5.4: Average figures on IRI's employment. Source: Author's elaboration on IRI Database. Notes: Industrial section represents the IRI Group excluding banks.

Investments

	IRI's share of			
	IRI's fixed investments over Italy's GDP (Average values)	Italy's fixed investments (Average values)	Italy's fixed investments excluding agriculture and housing construction (Average values)	IRI's fixed investment over IRI's revenues (Average values)
1950-1960	1.1%	4.7%	6.0%	25.9%
1961-1970	1.3%	5.3%	8.0%	28.7%
1971-1980	1.4%	5.7%	8.3%	24.4%
1981-1992	1.0%	4.6%	6.3%	20.6%
1950-1992	1.2%	5.1%	7.1%	24.7%

Table A5.5: Average figures on IRI's revenues. Source: Author's elaboration on IRI Database.

Assets

	IRI Group's assets over Italy's GDP (Average values)
1957-1960	11.3%
1961-1970	12.2%
1971-1980	13.9%
1981-1992	13.9%
1957-1992	13.2%

Table A5.6: Average figures on IRI Group's assets over GDP in different periods. Source: Author's elaboration on IRI Database.

Structure of liabilities of the Institute

Structure of liabilities of the Institute			
	Bonds	Other debts	Equity
1948-1960	45.1%	20.9%	34.4%
1961-1970	59.7%	7.9%	32.4%
1971-1980	30.4%	23.3%	46.6%
1981-1992	27.2%	51.9%	20.9%
1948-1992	41.0%	26.8%	32.3%

Table A5.7: Structure of liabilities of the Institute (average share over different periods). *Source:* Author's elaboration on IRI Database.

Listed IRI bonds under circulation

	Average share of IRI bonds over national listed bonds	Average share of IRI bonds over non-government listed bonds
1948-1960	4.6%	16.4%
1961-1970	4.7%	7.7%
1971-1980	0.8%	1.2%
1981-1992	1.1%	6.5%
1948-1992	2.8%	8.4%

Table A5.8: Listed IRI bonds under circulation (average shares over different periods). *Source:* Author's elaboration on IRI Database.

Chapter 6. The public missions of IRI

The Southern mission

1950	Main units	Employees (% of IRI)
Electric energy	Minority control of SME, the main company providing electric energy to the continental South of Italy.	6,747 (44.3%)
Steelmaking	Production units at Bagnoli and Torre Annunziata (near Naples), up to 300,000 tons of crude steel and 350,000 tons of pig iron – 17% and 60% of IRI's production capacity.	6,237 (11.5%)
Mechanical engineering	Largest production units in the area of Naples: rolling stocks, aircraft engines, military productions. Smaller plants in Taranto and Palermo.	4,934 (10.3%)
Shipbuilding	Shipyards in Castellamare di Stabia and dry dock in the harbour of Naples.	4,104 (13.4%)
Banks	Branches of the three IRI banks.	4,032 (15.2%)
Other manufacturing	Cement production unit at Bagnoli; production of clay and kaolin refractory materials at Cagliari; cellulose production at Chieti.	2,385 (28.8%)
Infrastructure	Minor railway infrastructures.	1,142 (27.6%)
Other non-manufacturing	Minor mining and tourism activities.	1,087 (92.3%)
Maritime Transport	Of the four Finmare's transport companies, only Tirrenia had its headquarters located in the South (Naples).	514 (5.1%)
Telephones	Of STET's three telephone companies, only Timo operated in few southern provinces (Abruzzo and Molise). Only 12,000 subscriptions.	410 (3.9%)
Radio and Television	18 Radio installations for 670,000 subscribers (21% of the national total). No TV installation.	370 (10%)
Total	(Including SME)	31,962 (14.6%)

Table A6.1: IRI's main units in the South in 1950. Source: Author's elaboration from Camera dei Deputati (1962) and from 'Serie storiche di dati su gruppo Iri' (Archivio Storico IRI, Serie Nera, Busta STU/63).

Year	Sector		IRI's main operations in the South (1950-1957)
1950	Steelmaking	E	Expansion of the Bagnoli plant with the introduction of a new Thomas converter and a third blast furnace.
1951	Electronics	I	Establishment of Microlambda at Bacoli near Naples, first national producer of radars.
1951	Paper	E	New paper production unit at Celdit's cellulose making plant (Chieti), doubled in 1958.
1951	Rolling stock; Aircraft	A	Incorporation of Aerfer's plant and acquisition of IMAM and AVIS, specialised in aircraft and rolling stock manufacturing.
1951	Aircraft	R	Alfa Romeo's restructuring of the production unit for aircraft engines at Pomigliano D'Arco.
1951-	Electric energy	A	IRI increased its participation in the electric energy company SME, obtaining a <i>de facto</i> control (with a stake of 31.5% in 1954). In 1952, SME was grouped under the new sectoral financial holding Finelettrica (1952).
1951	Shipbuilding	R	Reconstruction and modernisation of the Castellamare shipyard.
1951	Paper	R	Installation of a paper mill at Celdit's Chieti plant for cellulose production.
1952	Electronics	I	Establishment of a production plant at L'Aquila by Marconi Italiana, to produce electronic components.
1952	Mechanical	I	Establishment of Fabbrica Macchine Industriali, specialised in the production of machine tools.
1954	Cement	I	The newly founded cement company Cementir (1951) established the first European plant specialised in cement production for blast furnaces at Bagnoli.
1954	Shipbuilding	R	Establishment of the company SEBN to renovate and manage the dry dock of Naples.
1955	Steelmaking	I	Installation of Dalmine's production unit for welded tubes at Torre Annunziata.
1955	Aircraft	R	Establishment of IMAM-Aerfer and concentration of aircraft productions at Pomigliano D'Arco (cells) and Naples Capodichino (testing and repairing).
1956	Textile	A	Acquisition of Manifatture Cotoniere Meridionali, the largest cotton producer in the South.
1956	Motorways	I	Inauguration of construction works for the Milan-Naples motorways ' <i>Autostrada del Sole</i> '.
1956	TV Broadcasting	E	TV coverage of the South in less than 3 years (instead of the 12 originally foreseen).
1957	Telephones	A	Acquisition of the telephone companies TETI and SET and their incorporation under the sectoral holding STET.
1957	Nuclear energy	I	Establishment of SENN to build a nuclear power plant at Garigliano near Caserta (1959-1963).

Table A6.2: IRI's main operations in the South (1950-1957). Source: Author's elaboration. Notes: E = Expansion; A = Acquisition; I = New initiative; R = Restructuring.

1957	Main units	Employees (% of IRI)	Average investments (1950-1957)
Steelmaking	Production units at Bagnoli up to 427,000 tons of crude steel and 602,000 tons of pig iron – 17% and 60% of IRI's production capacity. Production of seamless tubes at Torre Annunziata (35,000 tons).	7,801 (13.3%)	15.1%
Electric energy	Majority control of SME, the only provider of electric energy to the continental South.	7,710 (46.1%)	67.5%
Mechanical engineering	Largest production units in the area of Naples: rolling stocks, aircraft engines, motor vehicles, industrial machines. Smaller plants in Taranto and Palermo.	7,012 (16.2%)	4.3%
Other manufacturing	Production of clay and kaolin refractory materials at Cagliari; cellulose and paper production at Chieti; textile production near Salerno.	6,142 (44.8%)	1.6%
Banks	Branches of the three IRI banks.	4,282 (15.1%)	0.0%
Telephones	Coverage of the entire Southern territory by STET's telephone companies SET, TETI and TIMO.	4,016 (15.7%)	3.4%
Shipbuilding	Shipyard in Castellamare di Stabia (production capacity of 40,000 GT) and dry dock in the harbour of Naples.	3,309 (12%)	1.5%
Other non-manufacturing	Minor mining and tourism activities.	1,088 (81.4%)	0.7%
Electronic engineering	Production of electronic systems (radars) near Naples. Production of electronic components at L'Aquila.	930 (12.1%)	0.0%
Infrastructure	Minor railway infrastructures and first sections of the main motorways network.	770 (22.9%)	1.4%
Maritime Transport	Of the four Finmare's transport companies, only Tirrenia had its headquarters located in the South (Naples).	513 (3.7%)	0.0%
Radio and Television	Radio and TV coverage of the entire Southern territory.	492 (7.6%)	2.2%
Cement	Cement production unit at Bagnoli.	425 (37.3%)	2.2%
Air Transport	Southern branches of national airline Alitalia.	50 (1.6%)	0.0%
Total		44,540 (17.7%)	100%

Table A6.3: IRI's sectoral involvement and main units in the South in 1957. Source: Author's elaboration from Camera dei Deputati (1962) and from 'Serie storiche di dati su gruppo Iri' (Archivio Storico IRI, Serie Nera, Busta STU/63).

Year	Sector		IRI's main operations in the South (1958-1973)
1958; 1964	Paper	E	Installation of a second and third paper mill.
1959	Steelmaking	I	Establishment of a new integrated steelworks at Taranto, inaugurated in 1961 and fully operational in 1965, with annual capacity of 3 million tons.
1959	Shipbuilding	A	Acquisition of Taranto's shipyards Cantieri Navali di Taranto (1,500 employees) abandoned by private owners (FIAT and Tosi).
1960	Steelmaking	E	New (fourth) blast furnace at Bagnoli's steelworks, doubling its overall output.
1960	Electronics	R	Microlambda transformed into Selenia, a joint-venture between Finmeccanica, Raytheon and Edison to produce radars and other electronic defence systems.
1960	Mechanical	I	Establishment of Dürkopp Italia, a joint-venture between Finmeccanica and Dürkoppwerke AG to produce ball bearings at Casoria near Naples (from 1962).
1961	Mechanical	I	Establishment of Walworth Europa, a joint-venture between Finmeccanica and other private companies, to produce petrochemical valves near Messina.
1961	Rolling stocks	I	Establishment of Omeca (50-50 joint venture with FIAT), a rolling stock manufacturing company with production unit at Reggio Calabria.
1961	Motor vehicles	R	Transfer of Alfa Romeo's production of commercial vehicles at Pomigliano D'Arco.
1961	Rolling stock	R	Concentration of IMAM-Aerfer's rolling stock production at the Pozzuoli plant, with reparations concentrated under AVIS, located at Castellammare di Stabia.
1961	Semiconductors	I	The newly-established company ATES took over the L'Aquila plant from Marconi Italia (in 1959) and began the construction of a production plant for semiconductors at Catania.
1962	Diesel engines	I	Inauguration of Alfa Romeo's production unit for diesel engines at Pomigliano D'Arco.
1962	Steelmaking	E	Doubling of Dalmine's production capacity at the Torre Annunziata unit (up to 70,000 annual tons).
1962	TV broadcasting	E	Inauguration of RAI's new television production centre (two studios) in Naples, the first TV production unit in the South.
1962	Telecommunications	I	Installation of the satellite dish at Fucino's testing station.
1962	Motorways	I	Completion of the Rome-Naples tract of the Milan-Naples A1 motorway (completed in 1964).
1962	Telecommunications equipment	I	Inauguration of SIT-Siemens's new production plant for telecommunications equipment at Santa Maria Capua Vetere (Caserta).
1963	Air Transport	I	Establishment of ATI, Alitalia's subsidiary for national routes with headquarters and operative centre at Naples Capodichino Airport.
1964	Telecommunications equipment	I	Inauguration of SIT-Siemens's new production plant for telecommunications equipment at L'Aquila.
1964	Electric energy engineering	I	Acquisition of the electric cables manufacturer Alfacavi and inauguration of a Southern plant at Airola (Benevento) in 1967.
1965	Cement	I	New production plant next to Taranto's steelworks with production capacity of 600,000 tons, increased to 1.6 million tons by 1973.
1966	Steelmaking	I	Establishment of Icrof's Taranto unit dedicated to subsidiary steelmaking activities (recovery of iron from scrap steel, industrial cleaning and repair of steel plants, industrial maintenance, etc.)
1966	Telecommunications	A	Acquisition of Sirti, the national leader in telecommunications installations and infrastructures, with its Southern Division in Salerno and a manufacturing plant of line accessories for telecommunications at Bari.

1967	Steelmaking	E	Expansion of Taranto steelworks' with capacity up from 3 to 4.5 million tons per year, completed in 1970.
1968	Cement	I	Construction of a new production plant at Maddaloni (Caserta), with a production capacity of 1.3 million tons (operative from 1974).
1968	Car making	I	Construction of the Alfasud production unit at Pomigliano D'Arco, the first car-making plant in the South of Italy, inaugurated in 1972.
1969	Motorways	I	Completion of the Naples-Bari A17 motorway, began in 1962.
1969	Aerospace	R	With the establishment of Aeritalia, from the merger of Aerfer and FIAT Aviazione, the Pomigliano plant becomes the centre of Aeritalia's civil aircraft division.
1969	Telecommunications equipment	A	Acquisition by SIT-Siemens of Raytehon-Elsi's production plant for telecommunications equipment at Palermo.
1970	Steelmaking	E	Expansion of the Taranto steelworks with the installation of the fifth blast furnace, increasing total output capacity to 10.5 million tons (by 1975).
1970	Rolling stock	A	Establishment of the rolling stock manufacturer (locomotives) Italtrafo, following the acquisition of the electrotechnical company OCREN located near Naples.
1972	Telecommunications equipment	I	Inauguration of SIT-Siemens's new production plant for telecommunications equipment at Carini (Palermo).
1972	Food	A	Acquisition of Cirio, the largest food processing company in the South, with most of its production sites in the Campania region.
1969-1973	Car making	I	A series of new investment initiatives by SME supporting the creation of Alfasud's supply-chain (with more than 2,900 new jobs created): Gallino Sud at Marcianise (near Caserta) for plastic molding; Fimit Sud at Pignataro Maggiore (near Caserta) for thermo- and sound-absorbing materials; IVI Sud at Caivano (near Naples) for car varnish; Fapsa at Airola (near Benevento) for polyurethane foam. Expansion of FAR's car battery plant at Casalnuovo (Naples), from annual production of 80,000 to 1 million.
1973	Motorways	I	Completion of the A14 Bologna-Canosa (extended to Taranto in 1975), began in 1963.
1973	Motorways	I	Completion of the bypass around Naples, began in 1966.
1973	Shipbuilding	A	Acquisition of the only remaining private shipbuilding group under liquidation (Cantieri Navali del Tirreno e Riuniti), with shipyards at Palermo.
1973	Energy engineering	A	Acquisition of Termosud from the state holding company EFIM, specialising in power plant components, with production site at Gioia del Colle (Bari).

Table A6.4: IRI's main operations in the South (1958-1973). Source: Author's elaboration. Notes: E = Expansion; A = Acquisition; I = New initiative; R = Restructuring.

1973	Main units	Employees (% of IRI)	Average investments (1958-1973)
Steelmaking	Steelworks at Bagnoli and Taranto with annual output of 1.6 and 5.2 million tons of crude steel respectively, amounting to 60% of IRI's production and to one-third of the national total (up from 8% in 1962).	34,419 (36%)	39.3%
Mechanical engineering	First complete car-making plant (Alfasud) in the South, with subsidiary productions. Aircraft engines and cells productions at Pomigliano (Alfa Romeo and Aeritalia). Production of electric locomotives near Naples (Italtrafo).	27,900 (31.6%)	7.3%
Telecommunications	Coverage of the entire Southern territory by STET's telephone company SIP. Satellites telecommunications at L'Aquila (Telespazio). Manufacturing of line accessories for telecommunications at Bari (Sirti).	16,789 (25.5%)	21.2%
Electronic engineering	Production of electronic systems (radars) at Bacoli (near Naples). Production of semiconductors at Catania. Electronic telecommunications equipment manufactured at L'Aquila, Santa Maria Capua Vetere and Palermo.	15,895 (37%)	1.2% (from 1967)
Shipbuilding	Shipyards in Castellamare di Stabia, Taranto and Palermo. Dry dock in the harbour of Naples.	7,839 (27.7%)	1.7%
Banks	Branches of the three IRI banks.	6,734 (16.7%)	-
Other manufacturing	Production of clay and kaolin refractory materials at Cagliari. Cellulose and paper production at Chieti.	5,475 (34.5%)	2%
Food	Cirio's manufacturing plants for processed tomatoes (around Salerno), legumes and vegetables (at Castellamare di Stabia), milk products (at Naples and near Caserta).	4,156 (21.9%)	0.5% (from 1965)
Infrastructure	Management of the Adriatic (Bologna-Bari) and Tyrrhenian (Milan-Naples) routes of the national motorways network. Minor railway infrastructures.	3,776 (18.5%)	13.9%
Radio and Television	Radio and TV coverage of the Southern territory.	1,335 (10.3%)	1.6%
Other non-manufacturing	Minor mining and tourism activities.	1,043 (18.6%)	2%
Cement	Approximately half of Cement production of Cementir (5.5% of total national production) from the Bagnoli and Taranto units.	949 (46%)	1.2%
Air Transport	Southern branches of national airline Alitalia.	880 (5.1%)	0.4% (Other services)
Maritime Transport	Headquarters of the shipping company Tirrenia located at Naples.	449 (3.4%)	0.4% (Other services)

IRI and financial holdings	IRI offices located in the South and SME's headquarters.	95 (6.5%)	-
Total		127,734 (27.2%)	

Table A6.5: IRI's sectoral involvement and main units in the South in 1973. *Sources:* Author's elaboration from 'Serie storica. Investimenti. Investimenti nel Mezzogiorno. Fatturato. Fatturato estero. Occupazione. Occupazione nel Mezzogiorno' (Archivio Storico IRI, Serie Nera, Busta STU/604), and from IRI's annual reports from 1958 to 1962 (for electric energy). *Notes:* Total shares for investments are lower than 100% as average investments figures include electric energy for the years 1958-1962 (averaging 34.9% over the period).

Year	Sector		IRI's main operations in the South (1974-1991)
1974	Information systems	I	Establishment of Italdata, with a production site for medium- and large-scale information systems and electronic components.
1975	Maritime transport	R	Reorganisation of Tirrenia's maritime routes with the creation of two dedicated companies: Siremar for links with the Sicilian isles; Caremar for links with the Pontine and Phlegraean islands.
1977	Electronics	I	Selenia's new production site at Giugliano (Naples), with 900 employees in 1980.
1978	Civil engineering	I	Establishment of the civil engineering company Infracrud to design and build the bypass of Naples.
1978	Research	I	SME established its R&D centre on food processes, Centro di Ricerca Agro-Industriale (CRAI), at Piana di Monte Verna (Caserta).
1978	Food	I	SIDALM established a new plant for bakery and sugar-based products at Caivano (Naples).
1978	Diesel engines	A	Acquisition from the state holding company EFIM of Isotta Fraschini, a diesel engine manufacturer with its production plant at Bari.
1979	Plant engineering	I	Establishment of Tecnal, a plant engineering company specialised in food production systems with headquarters in Naples.
1979	Research	I	Establishment of the Italian aerospace research centre (<i>Centro Italiano Ricerche Aerospaziali</i>), linked to the Aeritalia production sites at Pomigliano d'Arco.
1980	Railway engineering	R	Establishment of Ansaldo Trasporti from Italtrafo, with headquarters and plant at Naples.
1980	Research	I	Establishment of a national research centre on transport studies (<i>Centro Studi e Ricerche sui Sistemi di Trasporto Collettivi</i>), linked to Ansaldo Trasporti at Naples.
1980	Informatics	I	Establishment of Informatica Campania at Naples, for the design, installation and management of data processing systems and other types of software.
1981	Energy engineering	I	Construction of EURELIOS, the world's first concentrated solar power plant at Adrano (Catania), commissioned to Ansaldo.
1981	Aircraft	A	Acquisition of the aircraft manufacturer Partenavia, with production plant at Casoria (Naples).
1981	Aircraft	I	Production of the regional airliner ATR (joint-venture between Aeritalia and the French Aérospatiale) at Pomigliano d'Arco.
1981	Air transport	A	Bailout of the airline company Itavia, with routes prevalently in the Mediterranean, and incorporation in Alitalia.
1981	Electronics	I	Inauguration of the Vitroselenia plant for military electronic systems at Macchiareddu-Assemini near Cagliari.
1982	Food processing	I	Establishment of Cirio's new production plant at Caivano (Naples), specialising in food processing of tomatoes, legumes, vinegar.
1982	Optical fibre	I	Joint-venture Sirti-Pirelli establishing Fibre Ottiche Sud (FOS), the first European manufacturer of optical fibre cables (Corning Glass technology) at Battipaglia (Salerno).
1982	Aircraft	I	Establishment of Aeritalia's new plant at Foggia to produce large components (fuselage and wings) for the Boeing 767 aircraft.
1982	Steelmaking	R	Completion of the restructuring project at Bagnoli's steelworks, with the introduction of two continuous casting machines and a new rolling mill.
1982	Aerospace	I	Establishment of Selenia Spazio, dedicated to space technologies (design and manufacturing of systems and equipment for satellites and space telecommunications), with Southern plants at L'Aquila and Misterbianco (Catania).
1982	Steelmaking	R	Restructuring of the fifth blast furnace at Taranto steelworks and introduction of a fourth continuous casting machine.

1982	Electronic systems	E	Expansion of Selenia's production unit at Bacoli.
1982	Electronic systems	I	Establishment of Elsag's production unit at Bacoli (Naples) for underwater and electronic equipment.
1983	Car making	I	Joint-venture Alfa Romeo-Nissan to establish a new car-making plant at Pratola Serra (Avellino) to produce the Arna model.
1983	Mechanical vehicles	R	Restructuring of the Italttractor ITM plant at Potenza producing track-laying tractors, excavators and earthmover undercarriages.
1983	Informatics	I	Establishment of Finsiel's research centre for informatics (Tecsiel) at Naples.
1984	Telecommunications	E	New intercontinental operative centre of Italcable at Palermo.
1986	Electronics	I	Establishment of Optimes (joint-venture between STET and Philips) at L'Aquila, the first manufacturing unit for optical reading supports in Italy.
1987	Maritime transport	R	Reorganisation of Tirrenia's maritime routes with the creation of Saremar (links with Sardinia).
1988	Informatics	I	Establishment of the software development company Netsiel at Bari.
1989	Steelmaking	R	Renovation of Taranto's steelworks (and closure of the Bagnoli plant) a new cycle of investments from Ilva in the years 1990-1992.
1989	Energy engineering	I	Establishment of Ansaldo's research centre on combustion technologies at Gioia del Colle (Puglia).
1989	Telecommunications	E	Launch of SIP's 1989-1992 600 billion lire 'extraordinary plan' for the infrastructural development of the telecommunications network in the South.
1989	Informatics	I	Launch of IRI's 1,030 billion lire Calabria plan (' <i>Piano Calabria</i> ') to build information systems for public administrations in the Region.
1989	Steelmaking	R	Elaboration of the IRI 'Plan for the reindustrialisation of areas hit by the steelmaking crisis', with planned investments of 2,300 billion lire in the South to create 6.900 jobs.
1989	Telecommunications and electronics	R	Signing of the four-year planning agreement (' <i>Contratto di Programma</i> ') between IRI and the Ministry for the South to invest 1,560 billion lire in the technological expansion and renovation of existing sites and in new research projects by IRI's main electronics and telecommunications manufacturing companies in the South.
1991	Maritime Transport	I	Establishment of the Finmare's subsidiary Viamare, operating North-South routes on the Tyrrhenian sea.

Table A6.6: IRI's main operations in the South (1974-1991). Source: Author's elaboration. Notes: E = Expansion; A = Acquisition; I = New initiative; R = Restructuring.

1990	Main units	Employees (% of IRI)	Investments (% of IRI in the South)
Cementir (Cement)	3 of the company's 6 plants located in the South: Maddaloni, Napoli, Taranto	796 (46%)	0.6%
Finmeccanica (Aerospace, Energy, Transport, Industry, Electronics)	<ul style="list-style-type: none"> - Aeritalia: 3 civil aircraft plants (Pomigliano d'Arco, Naples, Foggia) - Ansaldo Trasporti: railway engineering plant (Naples) - Ansaldo Componenti: components for power plants (Gioia del Colle) - Elsag: electronic engineering plant (Bacoli) - Italttractor: mechanical components for industrial machines (Potenza) - Selenia: 4 of the company's 6 electronic engineering plants (Fusaro, Giugliano in Campania, L'Aquila, Palermo) - Selenia Spazio: 2 of the company's 4 plants producing satellite systems for space technologies (Misterbianco, L'Aquila) - SGS-Thomson: semiconductor plant at Catania (2nd largest in Italy) 	16,374 (29.7%)	4.3%
Ilva (Steelmaking)	<ul style="list-style-type: none"> - Ilva: Largest steelworks of the group at Taranto (Bagnoli steelworks closed at the end of 1989) - ICROT: steelmaking auxiliary engineering and services (Taranto, Naples) - Nuova Sanac: 2 of the company's 5 plants producing refractory materials for transformation processes (Taranto, Cagliari) - Dalmine: 2 plants producing electro-welded pipes and gas pipes (Taranto, Torre Annunziata). 	20,275 (40.8%)	8.9%
STET (Telecommunications, Electronics)	<ul style="list-style-type: none"> - SIP: complete coverage of the southern territory (31.3 over 100 subscribers in the South compared to the national value of 38.7) - Italdata: plant manufacturing information systems and electronic equipment (Avellino) - Italtel: 2 of the company's 3 plants producing electronic telecommunications equipment (Carini, L'Aquila) - Italtel Tecnoelettronica: microelectronic components (L'Aquila) - Sirti: 2 of the company's 4 plants producing components for telecommunications infrastructures and systems (Bari, Sestu) - Telespazio: 2 of the company's 3 plants for telecommunications satellites (Avezzano, Piana degli Albanesi) 	37,151 (29.5%)	77.6%
Italimpianti (Plant engineering)	<ul style="list-style-type: none"> - CMF Sud: 2 of the company's 3 plants (Naples, Pignataro Maggiore) - FMI: plant in Naples - Morteo: steel containers plant (Sessa Aurunca) - Nuova Mecfond: only plant in Naples - Ponteggi Dalmine: 1 of the company's 2 plants producing steel tubes for scaffoldings (Potenza) 	1,383 (25.5%)	0.2%
Italstat (Infrastructures and motorways)	- Operation of southern motorways under franchise (southern part of Milan-Naples and	5,341 (22.5%)	5.2%

	Bari-Bologna, the Naples-Salerno and the Naples bypass)		
	- Civil engineering companies specifically involved in Southern projects (Infrasud progetti, Italter, Mededil)		
	- Southern branches of national civil engineering companies (Italstrade, Condotte)		
Fincantieri (Shipbuilding)	- Merchant shipbuilding: shipyard at Castellamare di Stabia	4,554 (22.3%)	0.1%
	- Ship repairing: shipyards at Naples, Taranto, Palermo		
	- Diesel engines: plant at Bari		
Banks	Southern branches of IRI's banks with headquarters in Milan and Rome	9,716 (18.4%)	0.0%
SME (Food processing, Retail)	Headquarters in Naples and group's research centre at Piana di Monte Verna	3,452 (15.5%)	1.2%
	- Food processing: plants at Caivano (Alivar); Pagani, Piana di Monteverna, Sezze Romano, Caivano (Cirio-Bertolli-De Rica); Benevento, San Benedetto del Tronto (Italgel)		
	- Retail: registered office of GS Supermercati		
Finsiel (Informatics)	- Companies with operative centres in the South: IC Soft (Naples); Intersiel (Roges di Rende), Italsiel (Taranto), Netsiel (Bari), SISPI (Palermo).	762 (12.8%)	0.2%
	- Group's research centre at Naples (Tecsiel)		
RAI (Radio and Television)	Regional offices of the public broadcasting network.	1,928 (12.1%)	1.5%
Others	Various holdings and promotional activities of re-industrialisation (SPI), training and environmental projects.	231 (8.5%)	0.1%
Alitalia (Air transport)	- ATI: Alitalia's subsidiary dedicated on domestic flights, registered in Naples	2,097 (7.1%)	0.3%
	- Regional offices of Alitalia		
	- Flight school at Alghero and Naples (Capodichino)		
Finmare (Maritime transport)	Operating companies registered in the South: Caremar (Naples), Saremar (Cagliari), Tirrenia (Naples)	524 (6.4%)	0.0%
Total		104,584 (24.9%)	

Table A6.7: Main units of IRI's sectoral subsidiaries in the South in 1990. Sources: Author's elaboration from IRI (1991) and from IRI's 1991 annual report.

1991	Main centres	Research employees (% of IRI)	R&D In billions lire [in billions euros in 2018 prices] (% of IRI)
Finmeccanica (Aerospace, Energy, Transport, Industry, Electronics)	13 corporate labs (10 aerospace, 2 industrial automation, 1 railway engineering)	962 (15.7%)	174.2 [162.4] (15.2%)
SGS-Thomson (Semiconductors)	Corporate lab of SGS-Thomson's plant at Catania	Est. 300	Est. 25 [20]
STET (Telecommunications)	4 corporate labs (3 telecommunication electronics, 1 information systems)	970 (22.4%)	72.9 [68.0] (11.1%)
Finsiel (Informatics)	4 corporate labs and 1 branch of specialised R&D centre in information systems	127 (31.8%)	16.5 [15.4] (26.2%)
SME (Food processing, Retail)	1 specialised R&D centre, 1 corporate lab in food processing technologies	71 (69.6%)	14.7 [13.7] (74.9%)
Ilva (Steelmaking)	2 branches of specialised R&D centre in metal material technologies	35 (6.1%)	4.2 [3.9] (3.6%)
Iritecna (Civil and industrial engineering)	2 corporate labs on civil engineering, 1 corporate lab in plant engineering	11 (8.9%)	0.8 [0.7] (3.4%)
Fincantieri (Shipbuilding)	None	0 (0%)	0 (0%)
RAI (Radio and Television)	None	0 (0%)	0 (0%)
Total (Without SGS-Thomson)		2,176	283.2 [264.1]
IRI Mezzogiorno / IRI Italy		17.4%	13.4%
Non-IRI Mezzogiorno / Non-IRI Italy		5.3%	5.0%
IRI Mezzogiorno / Total Mezzogiorno		40.9%	41.8%

Table A6.8 IRI's R&D effort in the South by sectoral subsidiary. Source: Author's elaboration from 'Ricerca e sviluppo Serie storica 1984-1991. Dati aziendali', 'La ricerca scientifica nelle regioni italiane 1991' (Archivio Storico IRI, Serie Nera, Busta STU/307); Istat (1994).

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Patenting company	Sectoral Subsidiary	USPTO patents	Share of IRI's total
CSELT	STET	178	34.2%
SIT-Siemens/Italtel	STET	123	23.6%
CSM	Finsider	49	9.4%
Selenia	STET	39	7.4%
INNSE	Finsider	20	3.8%
Aeritalia	Finmeccanica	19	3.6%
Italimpianti	Finsider	15	2.9%
Italsider	Finsider	13	2.5%
Italtractor	Finmeccanica	11	2.1%
DEA	STET	10	1.9%
SIP	STET	9	1.7%
Elsag	STET	7	1.3%
Terni	Finsider	7	1.3%
Autostrade	Italstat	4	0.8%
Ansaldo	Finmeccanica	4	0.8%
ATB	Finsider	3	0.6%
Sanac	Finsider	2	0.4%
RAI	RAI	2	0.4%
Dalmine	Finsider	1	0.2%
FMI-Mecfond	Finsider	1	0.2%
Alitalia	Alitalia	1	0.2%
Telespazio	STET	1	0.2%
Others		2	0.4%
Total		521	100%

Table A6.9: IRI's USPTO patents by company (1975-1987). Source: Author's elaboration on Archibugi (1990).

	Citing company	Country	Number of IRI's USPTO patents cited
1	Bell Labs	US	50
2	Siemens	W. Germany	32
3	<i>CSELT</i>	<i>Italy</i>	29
4	Motorola	US	25
5	Northern Telecom	Canada	21
6	US Philips	US	21
7	Nippon Steel	Japan	20
8	IBM	US	20
9	Nippon Electric	Japan	18
10	<i>SIT-Siemens/Italtel</i>	<i>Italy</i>	17
11	Hitachi	Japan	15
12	AT&T	US	15
13	Boeing	US	14
14	RCA	US	14
15	General Electric	US	13
16	Honeywell	US	12
17	United Technologies	US	12
18	International Standard Electric	US	11
19	IT&T	US	11
20	Thomson-CSF	France	11
21	US Secretary of the Navy	US	11
22	Rockwell International	US	11
23	NEC	Japan	10
24	CIT	France	9
25	Sperry Corporation	US	9
26	Burroughs	US	9
27	Westinghouse Electric	US	9
28	Texas Instruments	US	9
29	Harris Corporation	US	8
30	Kokusai Denshin Denwa	Japan	8
31	Communications Satellite	US	7
32	Caterpillar	US	7
33	Tokyo Shibaura Electric	Japan	7
34	Kawasaki Steel	Japan	6
35	Toshiba	Japan	6
36	Olin Hunt Speciality Products	US	5
37	Plessey	UK	5
38	Ford	US	5
39	US Secretary of the Army	US	5
40	US Secretary of the Air Force	US	5

Table A6.10: Most cited IRI's USPTO patents by company (1975-1987). Source: Author's elaboration on Archibugi (1990). Notes: IRI's companies are highlighted in italics.

	Company (Sectoral subsidiary)	R&D expenditure (Constant 2018 euros)	R&D expenditure over revenues	R&D employees	Share of R&D employees
1	Alenia Group (Finmeccanica)	909.8 (848.6)	24.6%	4,289	19.6%
2	Italtel Group (STET)	337.0 (314.3)	14.1%	2,682	15.8%
3	SGS-Thomson ¹ (Finmeccanica)	304.6 (284.1)	17.9%	900	25.7%
4	SIP Group (STET)	148.1 (138.2)	0.7%	428	0.5%
5	<i>CSELT</i> (STET)	<i>115.2</i> (107.4)	<i>104.1%</i>	<i>842</i>	<i>100.0%</i>
6	<i>CSM</i> (Ilva)	<i>114.3</i> (106.6)	<i>102.1%</i>	<i>556</i>	<i>100.0%</i>
7	Ansaldo Group (Finmeccanica)	104.6 (97.5)	2.5%	609	3.1%
8	FIAR (Finmeccanica)	47.9 (44.7)	22.8%	352	36.4%
9	Fincantieri (Fincantieri)	42.4 (39.5)	1.6%	454	2.3%
10	Elsag Bailey Group (Finmeccanica)	39.9 (37.2)	3.1%	539	7.1%
11	<i>Diesel Ricerche</i> (Fincantieri)	<i>27.9</i> (26.0)	<i>68.9%</i>	<i>182</i>	<i>100.0%</i>
12	RAI (RAI)	18.1 (16.9)	0.8%	110	0.7%
13	Sirti (STET)	18.1 (16.8)	1.3%	133	1.5%
14	Italsiel (Finsiel)	15.0 (14.0)	3.5%	38	1.7%
15	NECSY (STET)	14.9 (13.9)	13.1%	126	26.8%
16	ESAOTE Biomedica (Finmeccanica)	13.1 (12.2)	7.7%	98	19.3%
17	AET Telecomunicazioni (STET)	12.6 (11.8)	3.2%	85	3.5%
18	<i>SME Ricerche</i> (SME)	<i>10.0</i> (9.3)	<i>88.1%</i>	<i>70</i>	<i>100.0%</i>
19	<i>Tecsiel</i> (Finsiel)	<i>9.9</i> (9.3)	<i>29.5%</i>	<i>250</i>	<i>100.0%</i>
20	Autostrade (Iritecna)	9.3 (8.7)	0.4%	46	0.5%
21	Informatica Campania (Finsiel)	8.6 (8.0)	15.7%	60	17.1%
22	Insiel (Finsiel)	7.7 (7.2)	9.9%	63	11.2%
23	<i>CETENA</i> (Fincantieri)	<i>7.5</i> (7.0)	<i>64.7%</i>	<i>90</i>	<i>100.0%</i>
24	<i>RTM</i> (Finmeccanica)	<i>6.6</i> (6.1)	<i>101.6%</i>	<i>49</i>	<i>100.0%</i>
25	Sogei (Finsiel)	5.9 (5.5)	1.4%	16	1.1%

Table A6.11: IRI's companies ranked by R&D expenditure. Source: Author's elaboration on IRI Database. Note: Inter-companies R&D centres are highlighted in italics; ¹Estimated figures.