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# Compositional Inequality: Measurement, Stylized Facts, and Theoretical Aspects

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## ABSTRACT

This paper explores the concept, measurement, principal stylized facts, and theoretical aspects of compositional inequality. Compositional inequality refers to how the shares of capital and labor income vary along the income distribution. This analysis is valuable for several reasons. From a macroeconomic perspective, it elucidates the link between functional and personal distributions of income, which is crucial for addressing the drivers of income inequality in a context of rising capital share. From a comparative economic perspective, it locates economic systems on the continuum between two extremes: *classical capitalism*, where the rich earn predominantly from capital and the poor from labor, and *new capitalism*, where the composition of capital and labor is uniform across the distribution. We refer to the entire range of systems along this continuum as the *distributional varieties of capitalism*. Recent empirical studies indicate that, in most countries, we are far from *classical capitalism*, though with notable exceptions, such as Latin American countries. This underscores the need to evaluate the benefits of compositional *equality*. The paper concludes that compositional equality is desirable for at least two reasons: it promotes fairness and supports an inclusive, profit-driven regime of accumulation and growth.

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## 1. Introduction

One of the central findings in Piketty's work is the positive association between the rise in the capital share of income and income inequality (Piketty 2014). Piketty argues that capital income tends to be concentrated at the upper end of the income distribution, leading to an increase in inter-personal income inequality as the overall share of capital relative to output grows. While Piketty posits a positive association between the functional – the composition of GDP in terms of profits and labor compensation – and personal distributions of income in his analysis, the strength of this relationship can vary significantly across countries and over time. Building upon a recent body of research on this topic, this paper argues that a precise assessment of the relationship

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between functional and personal income distributions necessitates the introduction of the concept of *compositional inequality*, as introduced in Ranaldi (2022). Moreover, examining this relationship offers valuable insights into different types of capitalist systems, contributing to and enriching the comparative political economy debate, as highlighted in the work of Milanovic (2017, 2019) and Ranaldi and Milanovic (2022).

Compositional inequality refers to how the shares of capital and labor income vary along the income distribution. When compositional inequality is high, income sources are distinct: the rich primarily derive their income from wealth, while the poor rely on income from labor. Conversely, under low compositional inequality, both the rich and the poor individuals earn income from capital and labor in similar proportions. In simpler terms, high compositional inequality results in a clear divide where the rich are *capitalists*, and the poor are *workers*, whereas low compositional inequality implies that *both* rich and poor individuals simultaneously hold the roles of capitalists and workers. In cases of high (low) compositional inequality, an increase in the capital share automatically leads to greater (or lesser) interpersonal income inequality. Thus, compositional inequality serves as a measure of the strength of the link between the functional and personal distributions of income. Furthermore, compositional inequality can shed light on different types of capitalist systems. High compositional inequality characterizes what we refer to as *classical capitalism*, where capital income is concentrated among a few affluent individuals, while the labor share of income is primarily associated with the impoverished majority. In contrast, low compositional inequality describes a *new capitalism* in which everyone benefits from capital accumulation while also suffering from capital destruction. We refer to the entire range of systems along this continuum as the *distributional varieties of capitalism*.

This article provides an overview of the key methodological tools and empirical findings related to compositional inequality, laying the foundation for future research in this area. It argues that the study of compositional inequality allows us to go beyond the unidimensional nature of income inequality (which informs us whether and to what extent there are rich and poor individuals in society) and explore who these individuals are, based on their income composition. Rather than directly addressing economic inequality, the concept of compositional inequality addresses political economy instead, insofar as it describes the existence of groups of individuals earning income from different sources. These groups of people are likely to have different policy preferences, as well as different political views. This paper concludes by addressing the desirability of achieving a state of compositional equality.

This paper is organized as follows. Section Two provides a brief review of the literature on the relationship between factor shares and income inequality. Section Three introduces the concept of compositional inequality, the main definitions of capital and labor incomes, and its measurement. Section Four describes the principal stylized facts regarding the dynamics of compositional inequality both between and within countries. Section Five discusses the desirability of compositional equality in light of recent stylized facts affecting modern capitalist economies. Section Six concludes the paper and discusses potential avenues for future research on the topic.

## 2. Literature

The study of the relationship between the functional and personal distribution of income can be traced back to the work of classical political economists, especially David Ricardo. Classical political economists implicitly assumed that the dynamics of aggregate factor shares determined income inequality, based on the simple observation that different income sources were earned by distinct groups of individuals occupying different segments of the total income distribution.<sup>1</sup> In his *Principles*, Ricardo stated that the functional distribution of national income between wages, profits, and rents was the central problem of political economy. However, it was only in the second half of the twentieth century that this topic took a prominent role in economic theory, particularly with the work of Kaldor (1961).

Kaldor, in the process of constructing a theoretical model of capital accumulation and economic growth, proposed a set of stylized facts that any model describing the development of capitalist societies should satisfy.<sup>2</sup> Among these, he emphasized the stability of the capital share of income, highlighting the strong correlation between the share of profits in income and the share of investment in output. This stylized fact was contextualized within an economic system where the investment-to-output ratio remained constant, with Kaldor using the United Kingdom as an example.

After a long period of silence, in his Presidential Address to the Royal Economic Society, T. Atkinson (1997) argued that income distribution should be brought back from the cold. He stressed that the study of the functional distribution of income is crucial for understanding the broader dynamics of income distribution among individuals.<sup>3</sup> In a similar vein, Brandolini (1992) contended that economic systems shape “entitlement rules”, which in turn influence the composition of income distribution. These entitlement rules can also generate political tensions between different income groups, particularly between capital-abundant and labor-abundant individuals.

Later, A. Atkinson (2009), building on Glyn (2011), stressed the importance of factor shares as a central issue in modern political economy. He identified three key reasons for their relevance: (i) linking macroeconomic-level incomes (national accounts) to individual incomes; (ii) improving our understanding of inequality in the personal distribution of income; (iii) addressing concerns of social justice by evaluating the fairness of different income sources.

Glyn (2011) also underscored that the study of the relationship between factor shares and inequality remains relevant today for at least two reasons: wealth (particularly high-yielding) remains highly concentrated, and employees’ sense of fairness is undermined when corporate profits rise significantly faster than wages, leading to demands for fairer income distribution. He further noted an ideological shift away from a class-based view of the economy, reflected in the expansion of capital-funded occupational pensions and homeownership. These arguments will be further explored in the final theoretical section of this paper, following the discussion on compositional equality.

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<sup>1</sup>See Milanovic (2023) for a historical perspective on this matter.

<sup>2</sup>A similar attempt to summarize recent stylized facts on the distribution of income and wealth was made by Stiglitz (2016).

<sup>3</sup>For a historical discussion of the reasons for the decline in the study of income distribution during this period, see Milanovic (2023).

In his important effort to identify a novel set of distributional stylized facts across the world, Piketty (2014) challenged Kaldor's assumption of a stable profit share, showing that since the 1980s, the share of profits in many modern economies has increased. This shift implies a gradual change in the composition of GDP. Additionally, Piketty highlighted a strong rise in top-income shares, suggesting a historical connection between functional and personal income distributions. As will be further discussed later in this article, this connection has only been assumed, highlighting the need for a thorough assessment of the relationship between these two distributions.

A series of empirical studies has since been devoted to examining this relationship, using econometric techniques and assembling databases across countries and years. However, the results have been conflicting. Bengtsson and Waldenstrom (2018), using a novel historical cross-country dataset, provided further evidence of a strong and growing link between functional and personal income distribution over the past century. However, they acknowledged that this relationship has likely evolved across different historical periods due to structural factors, including the role of institutions. Contrasting these findings, Francese and Mulas-Granados (2015) analyzed data from up to 93 countries between 1970 and 2013 and concluded that labor and capital income shares have not been a major factor in explaining income inequality.

Only recently, Milanovic (2017, 2019) proposed a framework for understanding this link using a Gini-like approach, arguing that the correlation between capital and total income provides valuable insights into the structure of economic systems. Milanovic argues that the positive link between functional and personal income inequality holds if and only if two conditions are satisfied: (i) the distribution of capital income is more unequal than the distribution of labor income, and (ii) there is a high rank-correlation between capital and total income. As will be discussed in the following section, compositional inequality offers an alternative, more general framework for analyzing the relationship between functional and personal distributions, carrying a strong political economy message.

### 3. Framework

#### 3.1. Concept

Compositional inequality describes differences between rich and poor in terms of their income typology. Two income sources are considered in this study: labor income, stemming from work, and capital income, arising from wealth.<sup>4</sup> When compositional inequality is high, the rich and the poor are earning their income from different sources: the rich mainly from wealth, the poor from labor.<sup>5</sup> When, by contrast, compositional inequality is minimal, the rich and poor are earning income from capital and labor in the same proportion: for example, the twenty percent from wealth and the remaining eighty percent from labor. The following definition formally describes the conditions underlying minimal compositional inequality:

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<sup>4</sup>Although this study concentrates on compositional inequality in terms of capital and labor income, the framework can be readily adapted to examine the composition of wealth in real and financial assets, or the division of income into savings and consumption, among other decompositions.

<sup>5</sup>In this paper, we adopt the convention where maximal compositional inequality is characterized by capital income at the top of the distribution and labor income at the bottom. A generalization of this definition, both conceptually and analytically, is discussed in Ranaldi (2022).

**Definition 3.1:** Compositional inequality is minimal across a population when each individual has the same population shares of capital,  $\pi$ , and labor,  $w$ . Formally, this happens when  $\frac{W_i}{\Pi_i} = \frac{w}{\pi} \forall i$ , with  $W_i$  and  $\Pi_i$  representing individual  $i$ 's labor and capital income, respectively.

Under minimal compositional inequality, individuals' income shares mirror the aggregate composition of GDP into capital and wages, assuming that the definitions of capital and labor are comparable (further discussion on this follows in subsequent paragraphs). The next definition formally describes instead the conditions underlying maximal compositional inequality:

**Definition 3.2:** Compositional inequality is maximal when the bottom  $p$  per cent of the income distribution has an income consisting only of the source  $z = \pi$ ,  $w$  and the top  $(1 - p)$  per cent of the income distribution has an income consisting only of the source  $z_-$ .

Different compositional inequality scenarios – high and low compositional inequality – can occur even at identical levels of income inequality. Such different scenarios can therefore both describe societies with rich and poor individuals. What makes them different lies in the income composition of these two groups of individuals. Compositional inequality can thus characterize various typologies of capitalist systems and inform discussions on comparative economic systems. High compositional inequality describes *classical capitalism* (Milanovic 2017, 2019), where capital income is concentrated in the hands of a few rich individuals, while the labor share of income is associated almost entirely with the poor majority. Low compositional inequality, by contrast, describes a *new capitalism* Milanovic (2017, 2019). While classical capitalism, characterized by the stark distinction between affluent capital owners and poor workers as depicted by classical political economists like Marx and Ricardo, dominated economies of past centuries, new capitalism represents a contemporary form of capitalist configuration. This recent trend will be further explored in the empirical section, where we will show how countries around the world range from high to low compositional inequality. We refer to this type of analysis as the study of distributional varieties of capitalism.

From a macroeconomic standpoint, compositional inequality in capital and labor income links the functional and personal distributions of income. The functional distribution of income describes how a nation's output is divided into capital and labor compensation. If individuals at the top of the total income distribution solely receive all the capital income (as characterized by a maximal level of compositional inequality), then any rise in the share of capital income will inevitably augment the incomes of those at the top, provided all other factors remain constant. This automatically implies an increase in inter-personal income inequality. Section 3.3.1 describes this relationship from a methodological standpoint.

### 3.2. Definitions of Capital and Labor Incomes

One of the key challenges in empirically studying the relationship between the functional and personal distribution of income lies in harmonizing the definitions of capital and labor at the macro and micro levels. As Flores (2021) points out, household surveys

tend to underestimate the total stock of capital income reported in national accounts. This discrepancy arises not only from the limitations of survey data in capturing capital income due to under-reporting or missing units,<sup>6</sup> but also from the fact that while survey data reflect household-sector income, national accounts include additional components that do not directly appear in household balance sheets, such as undistributed corporate profits. While one could assume that undistributed corporate profits are distributed proportionally to individuals based on their capital income, this is a strong assumption, given that such profits are typically reinvested in the company rather than directly accruing to individuals.

Given these challenges, studies of compositional inequality have so far relied on definitions of capital and labor income confined to household-sector income. This means that, within the context of the studies discussed in this paper, the relationship between functional and personal income distribution must be understood through the household-sector capital and labor shares. These shares tend to systematically underestimate both the overall capital share of income and the labor share, as shown by Flores (2021).

The primary objective of compositional inequality studies have been so far to construct measures of *market income* to better capture the dynamics between capital and labor before accounting for taxes and transfers. Specifically, *capital income* is typically defined as the sum of *interest*, *dividends*, and *rental income*,<sup>7</sup> while *labor income* consists of *wages* and *salaries*. However, the classification of two additional sources of income—*self-employment income* and *pensions*—requires further discussion.

*Self-employment income* embodies both labor and capital components. However, there is no precise approach for decomposing this source into capital and labor. For this reason, some studies have treated self-employment income as purely labor income, while others have split it under specific assumptions. A common approach is the 30–70 split, where 30 per cent of self-employment income is attributed to capital and 70 per cent to labor. However, other studies have opted to allocate this income based on the aggregate share of capital and labor in output.<sup>8</sup>

Turning to *pensions*, most studies consider them as deferred labor income, given that they result from past labor. However, in many countries, pensions also stem from past investments. For this reason, they may need to be divided into capital and labor components. As will be shown in the following section, splitting pensions into capital and labor components can significantly impact the level of compositional inequality, especially in the context of Scandinavian countries.

Finally, two additional remarks should be made. First, it is important to note that additional sources of income, such as capital gains, could potentially be included in the definition of capital. However, identifying this source can be challenging, particularly when relying on survey data and conducting comparative analyses. Overall, as will become evident in the stylized facts section, different definitions of capital and labor have significant implications for the level of compositional inequality, as well as for its trends, albeit to a lesser extent. Second, the definition of capital and labor income

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<sup>6</sup>See Lustig (2020) for a taxonomy of issues associated with survey data.

<sup>7</sup>Rental income can also include imputed rent, which represents the income an individual would earn if they rented out their owned property.

<sup>8</sup>See Iacono and Ranaldi (2023) for an evaluation of the impact of different self-employment splits on compositional inequality in Italy.



could be informed by a more thorough assessment of economic classes. In a recent article, Giangregorio and Villani (2024) propose a new estimation of the laborers' and capitalists' share of income on the basis of a class analysis that hinges on both economic and sociological considerations. The authors employ a separate treatment of managers, who are considered more as capital than labor earners, in contrast with the recent literature that has treated CEO compensations as wages.

### 3.3. Measurement

This section introduces the main statistical measures used to study compositional inequality. It differentiates between measures of this inequality dimension across the entire distribution (Section 3.3.1), and within specific sections of the distribution, such as the top 10 per cent (Section 3.3.2). Finally, it presents some methodological results that underpin the primary mechanisms connecting compositional and income inequality, from a technical perspective (Section 3.3.3).

#### 3.3.1. Compositional Inequality across the Distribution

To measure compositional inequality across the entire distribution, we utilize the Income-Factor Concentration (IFC) index as proposed by Ranaldi (2022). Before introducing the IFC indicator, let us recall the notion of concentration curve. If we rank individuals according to their total income,  $Y$ , and define the cumulative share of income source  $S_j$ , for each  $j = 1, \dots, n$ , such that  $Y = S_1 + \dots + S_n$ , of the bottom  $p$  per cent of the *total income* distribution as  $\mathcal{L}(S_j, p) = \sum_{i=1}^{p=\frac{i}{n}} \frac{S_{ji}}{S_j}$ , then the pairs  $(p, \mathcal{L}(S_j, p))$  describe the concentration curve for income source  $S_j$  (Kakwani 1977). Concentration curves are therefore statistical tools useful for determining whether and to what extent income sources are positively, or negatively, correlated with total income.

The construction of the IFC index involves three distinct concentration curves: (i) the *actual-concentration curve*, which illustrates the actual distribution of capital income across different income levels; (ii) the *zero-concentration curve*, representing a hypothetical scenario where all individuals have an identical composition of capital and labor income; and (iii) the *maximum-concentration curve*, depicting a situation where the poorest individuals earn exclusively labor income, and the wealthiest earn solely capital income (Figure 1 displays the three concentration curves for Italy in 1989). Drawing an analogy to the Gini coefficient, the actual-concentration curve corresponds to the Lorenz curve, the zero-concentration curve to the equality line (i.e., the bisector), and the maximum-concentration curve to the axes  $x$  and  $y$ .<sup>9</sup>

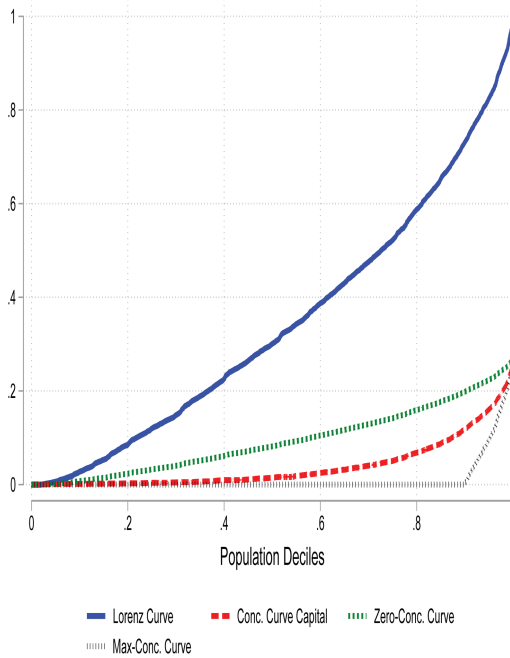
The IFC index is defined by the following equation:

$$I = \frac{\mathcal{A}}{\mathcal{B}}, \quad (1)$$

where  $\mathcal{A}$  represents the area between the zero-concentration and the actual-concentration curves, and  $\mathcal{B}$  denotes the area between the zero-concentration and the maximum-

<sup>9</sup>See Appendix for a formal description of the three concentration curves used to measure compositional inequality via the IFC index.





**Figure 1.** Concentration Curves — Italy 1989. Source: Iacono and Ranaldi (2023).

Note: The concentration curve for capital (red line), the zero-concentration curve (green line), the Lorenz curve for income (blue line) and the maximum-concentration curve (black line) for Italy in 1989 are presented using data from the 1989 Survey on Household Income and Wealth (SHIW) carried out by the Bank of Italy. Capital income is defined as the sum of property income and the capital component of net self-employment income. Labor income is defined as the sum of payroll income and the labor component of mixed income. Both the capital and labor components of self-employment income are imputed following Glyn (2011). Pensioners are excluded from the analysis.

concentration curves.<sup>10</sup> The IFC index values range from 1 to  $-1$ , where  $I = 1$  implies that capital income is concentrated at the top and labor income at the bottom of the total income distribution (*classical capitalism*), while  $I = 0$  represents a situation in which all individuals have the same shares of capital and labor in their total income (*new capitalism*).<sup>11</sup> It can be easily shown that the elasticity of the personal income Gini coefficient ( $\mathcal{G}$ ) to changes in the factor share  $z = \pi$ ,  $w$  is a function of the difference between the areas of the two concentration curves, which are the main components of the numerator of the IFC index. Formally:<sup>12</sup>

$$\frac{\partial \mathcal{G}}{\partial z} \approx \mathcal{A}. \quad (2)$$

equation 2 shows that the IFC index, whose sign is determined by the indicator  $\mathcal{A}$ , can be regarded as a measure linking the functional with the personal income distributions.

<sup>10</sup>For an alternative formulation of the IFC index that involves pseudo-Gini coefficients, specifically the areas under concentration curves, refer to Ranaldi (2022).

<sup>11</sup>A negative value of the indicator implies a distribution where individuals at the bottom of the total income distribution predominantly earn income from capital, while individuals at the top primarily earn income from labor. Although theoretically possible, this scenario is far removed from real-world distributions.

<sup>12</sup>More details on this result can be found in Ranaldi (2022).

Other methodological approaches focusing on the measurement of such a link can, for instance, be found in A. Atkinson and Bourguignon (2000).<sup>13</sup>

Among the properties of the IFC, it is worth mentioning that it can be decomposed into between and within components, as described by Monroy-Gómez-Franco and Ranaldi (2024):

$$\mathcal{I}_f = \kappa \left( \underbrace{\mathcal{L}}_{\text{between}} + \underbrace{\mathcal{M}}_{\text{within}} + \underbrace{\mathcal{C}}_{\text{residual}} \right), \quad (3)$$

where  $\mathcal{L} = \mathcal{R}_\pi \mathcal{G}_\pi^B - \mathcal{R}_w \mathcal{G}_w^B$ ,  $\mathcal{M} = \mathcal{R}_\pi \mathcal{G}_\pi^W - \mathcal{R}_w \mathcal{G}_w^W$ ,  $\mathcal{C} = \epsilon_\pi - \epsilon_w$  and  $\kappa = \frac{\pi w}{2\beta}$ . The superscripts W and B, respectively, refer to the within and between Gini coefficients of the specific income source. This decomposition elucidates the extent to which the dynamics of compositional inequality at global or regional scales are influenced by movements in the functional distribution across countries (*between-compositional inequality*) or within countries and across individuals (*within-compositional inequality*).

While the IFC index will serve as the principal indicator in this paper, an alternative measure of compositional inequality across the entire distribution can also be considered: the rank-correlation coefficient between capital and total income. This metric is employed by Milanovic (2017) in his analysis of various typologies of capitalism. Formally, this is defined as follows:

$$\mathcal{R}_\pi = \frac{\text{cov}(r(y), \pi)}{\text{cov}(r(\pi), \pi)}, \quad (4)$$

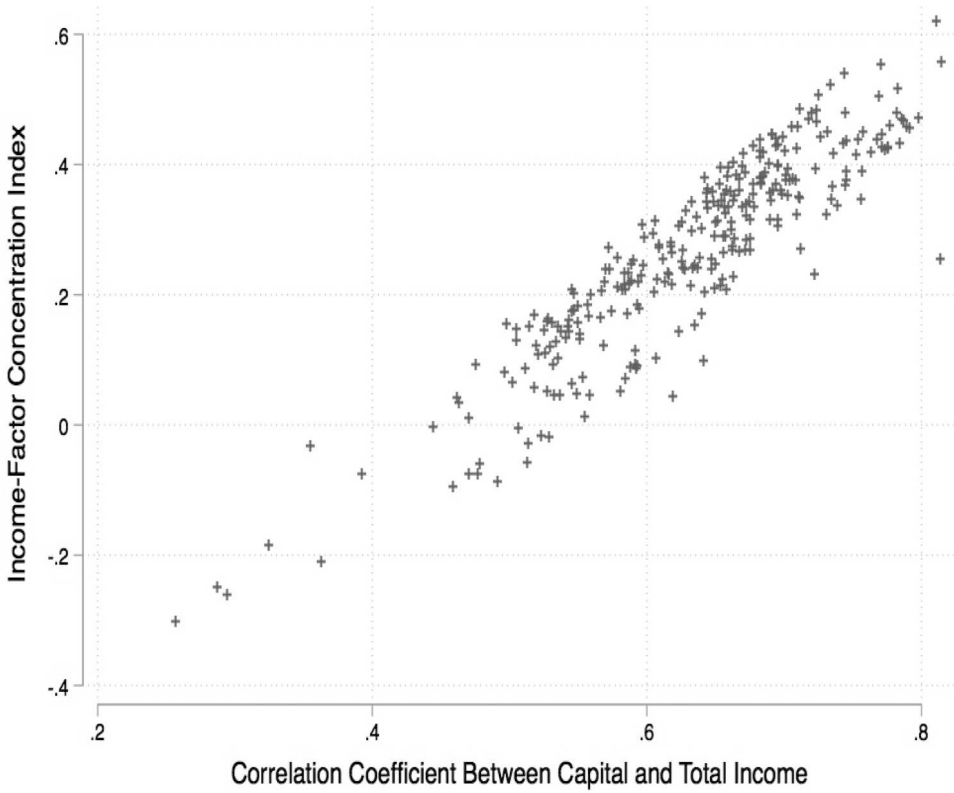
where  $r(y)$  and  $r(\pi)$  represent the rankings according to  $y$  (total income) and  $\pi$  (capital), respectively.<sup>14</sup> Figure 2 illustrates the correlation between the IFC index and Milanovic's metric across a selection of EU-SILC countries (0.88). The reason for such a high correlation between these two metrics is related to the fact that, within the context of the IFC, it is constructed through concentration curves. These curves relate the cumulative share of a given income source, such as capital income, to the total income ranking. This exercise is therefore similar to studying the correlation between the ranking of  $y$  and capital income, as captured by Milanovic's metric.

### 3.3.2. Compositional Inequality at the Top

Similar to the analogy drawn between the Gini coefficient, which measures income inequality across the entire distribution, and top income shares, which solely address the upper part of the distribution, compositional inequality can also be analysed in

<sup>13</sup>The authors approach the measurement of this link by decomposing the squared coefficient of variation of income, where there are two types of income: wage income and capital income. Specifically, the coefficient of variation of income  $V^2$  can be written as a function of the capital share of income  $\pi$ , the inequality of wage income  $V_w$ , the inequality of capital income  $V_k$ , and the correlation  $\rho$  between wage income and capital income:  $V^2 = (1 - \pi)^2 V_w^2 + \pi^2 V_k^2 + 2\pi(1 - \pi)\rho V_w V_k$ . Now, if we define  $\lambda$  as the relationship between wage income dispersion and capital income dispersion, then a rise in the capital share of income is transmitted into personal income inequality only when the following condition is satisfied:  $\pi > \frac{1 - \lambda\rho}{1 + \lambda^2 - 2\lambda\rho}$ . In this way, they manage to show the condition under which an increase in the capital income share is transmitted into an increase in overall income inequality, as measured by the standard deviation of income.

<sup>14</sup>For further development of this measure, especially in relation to demand regimes, consult Tonni (2023).



**Figure 2.** The scatter plot of the income-factor concentration index  $\mathcal{I}_f(\pi)$  and the rank-correlation (Milanovic's metric)  $\mathcal{R}_\pi$ . The correlation coefficient between the two metrics is **0.88**. Source: Ranaldi (2019).

specific sections of the distribution. Several indicators have for instance been developed to study the composition of income at the top of the distributions.

Berman and Milanovic (2023) construct an indicator to measure the phenomenon of *homoploutia*. Homoploutia, as defined by the authors, represents the proportion of individuals who simultaneously belong to the top 10 per cent in both labor and capital income distributions. Formally, this can be expressed as follows:

$$H_{10,10} \equiv \frac{10}{n} \sum_{i=1}^N \mathbb{I}_{\text{top}10\%_\pi}(i) \times \mathbb{I}_{\text{top}10\%_w}(i) = 10 \times \Pr(\text{top}10\%_w \cap \text{top}10\%_\pi), \quad (5)$$

which is equivalent to the following expression:<sup>15</sup>

$$H_{10,10} = \Pr(\text{top}10\%_\pi | \text{top}10\%_w) = \Pr(\text{top}10\%_w | \text{top}10\%_\pi). \quad (6)$$

equation 6 describes the probability of being in the top decile of capital (labor)-income recipients conditional on being in the top decile of labor (capital)-income earners.

<sup>15</sup>This result immediately follows from the properties of conditional probability.

Another measure suitable for examining compositional inequality at the top is the *alignment coefficient*, introduced by A. Atkinson (2007) and further extended by Lakner and Atkinson (2021). This metric assesses the degree of concordance between rankings based on income from factor  $m$  and total income. It is defined as follows:

$$A_{i,m} = \frac{\tilde{S}_{i,m}}{S_{i,m}}, \quad (7)$$

where  $\tilde{S}_{i,m} = \frac{X_{i,m}}{X_m}$  represents the share of total income from factor  $m$  received by the top quantile  $i$  of total income recipients.

### 3.3.3. Income and Compositional Inequality

In this section, we describe the technical relationship between income and compositional inequality by illustrating several results on this matter. Let us start from the decomposition of the Gini coefficient proposed by Lerman and Yitzhaki (1985) for two income sources, notably capital ( $\pi$ ) and labor ( $w$ ):

$$\mathcal{G} = \pi \mathcal{R}_\pi \mathcal{G}_\pi + w \mathcal{R}_w \mathcal{G}_w, \quad (8)$$

where  $\mathcal{G}$  is the Gini coefficient for total income,  $\mathcal{G}_\pi$  is the Gini coefficient for capital,  $\mathcal{G}_w$  is the Gini coefficient for labor and, finally,  $\mathcal{R}_\pi$  and  $\mathcal{R}_w$  are the correlation ratios between the respective source and total income. As described in the previous section, these two correlation ratios can be considered as elasticities of personal income Gini to changes in the functional income distribution (Milanovic 2017).

Through the same decomposition, it is possible to write the Gini coefficient for total income,  $\mathcal{G}$ , similarly to a *Cobb-Douglas production function*, as follows (Ranaldi and Milanovic 2022):

$$\mathcal{G} = \mathcal{G}_\pi^\alpha \mathcal{G}_w^\beta, \quad (9)$$

where  $\alpha = \frac{\mathcal{G}_\pi \mathcal{R}_\pi \pi}{\mathcal{G}}$  and  $\beta = 1 - \alpha = \frac{\mathcal{G}_w \mathcal{R}_w w}{\mathcal{G}}$  are the relative contributions of capital and labor inequality to overall income inequality, respectively. This reformulation allows us to establish an analytical link between income and compositional inequality, as measured by the IFC index, as follows:

$$\frac{I}{\mathcal{G}} = \frac{\alpha - \pi}{2\beta}. \quad (10)$$

When therefore  $\alpha = \pi$  the ratio tends to zero.

As discussed by Ranaldi (2019), another approach to analyzing the joint dynamics of income and compositional inequality is to decompose the variations in the level of income inequality, as measured by the Gini coefficient, into three main components: movements in the functional income distribution, movements in the income-factor concentration, and movements in the income-factor inequality. For each of these three movements to affect income inequality, a specific transmission condition can be derived. This decomposition follows from the Gini decomposition previously considered Lerman and Yitzhaki (1985). Equation 8 can in fact be further rearranged to obtain:

$$\mathcal{G} = w(\mathcal{R}_w \mathcal{G}_w - \mathcal{R}_\pi \mathcal{G}_\pi) + \mathcal{R}_\pi \mathcal{G}_\pi, \quad (11)$$

and by further development, one can write:

$$2(\tilde{\mu}_\pi - \tilde{\mu}_w) = \mathcal{R}_w \mathcal{G}_w - \mathcal{R}_\pi \mathcal{G}_\pi, \quad (12)$$

where  $\tilde{\mu}_\pi$  and  $\tilde{\mu}_w$  are the areas of the concentration curves for capital and labor, respectively. We can then write:

$$\mathcal{G} = 2w(\tilde{\mu}_\pi - \tilde{\mu}_w) + \mathcal{R}_\pi \mathcal{G}_\pi. \quad (13)$$

Let us now consider the income Gini coefficient as a function of time. As a consequence, all the elements of the decomposition are also functions of time; hence we can write equation 8 as:

$$\mathcal{G}(t) = \mathcal{G}(\pi(t), \mathcal{R}_\pi(t), \mathcal{G}_\pi(t), w(t), \mathcal{R}_w(t), \mathcal{G}_w(t)).$$

If we now take the total derivative of  $\mathcal{G}(t)$  with respect to time, from equation 13, we obtain:

$$\frac{\partial \mathcal{G}}{\partial t} = 2(\tilde{\mu}_\pi - \tilde{\mu}_w) \frac{\partial w}{\partial t} + 2w \frac{\partial(\tilde{\mu}_\pi - \tilde{\mu}_w)}{\partial t} + \mathcal{R}_\pi \frac{\partial \mathcal{G}_\pi}{\partial t} + \mathcal{G}_\pi \frac{\partial \mathcal{R}_\pi}{\partial t}. \quad (14)$$

Let us now assume as follows:

$$\frac{\partial \mathcal{R}_\pi}{\partial t} = -\epsilon \frac{\partial(\tilde{\mu}_\pi - \tilde{\mu}_w)}{\partial t}, \quad (15)$$

with  $\epsilon \in \mathbb{R}$ . At this point of the analysis, we can observe that the term  $(\tilde{\mu}_\pi - \tilde{\mu}_w)$  is one of the components of the numerator of the IFC index. As the term  $(\tilde{\mu}_\pi - \tilde{\mu}_w)$  is the key driver of changes in income-factor concentration, we can further rearrange equation 14 to get the following relationship:

$$\dot{\mathcal{G}} \approx 2\tilde{\mathcal{J}}_f(w) \times \dot{w} + (2w - \mathcal{G}_\pi \epsilon) \times \dot{\mathcal{J}}_f(w) + \mathcal{R}_\pi \times \dot{\mathcal{G}}_\pi, \quad (16)$$

where  $\tilde{\mathcal{J}}_f(w) = \tilde{\mu}_\pi - \tilde{\mu}_w = \frac{\mathcal{J}_f(w)}{\mathcal{R}(w)\pi w}$  is the *non-normalized* income-factor concentration index, and the dots indicate derivatives with respect to time. The expression  $\mathcal{J}_f(w)$  denotes the specification of the IFC index that measures the extent to which labor income is distributed at the *top* of the total income distribution, and capital income at the *bottom*, distinct from the previous specification. Note that, by construction, we can write  $\mathcal{J}_f(w) = -\mathcal{J}_f(\pi)$  (and, therefore,  $\dot{\mathcal{J}}_f(w) = -\dot{\mathcal{J}}_f(\pi)$ ). In other words, the higher the concentration of labor at the top (and capital at the bottom), the lower the concentration of capital at the top (and labor at the bottom). Equation 16 thus illustrates the relationship between variations in income and compositional inequality over time.

Finally, one can study the relationship between income and compositional inequality by decomposing the sources of growth across the distribution. Specifically, we can decompose growth rates as a function of changes in capital and labor income inequality, as follows. If we assume that the overall growth rates of total, capital, and labor income are equal to zero, and therefore focus exclusively on distributional changes, the following can be shown (Ranaldi 2025):

$$g_i = \dot{G}_\pi \left( \frac{\Pi_i - \bar{\Pi}}{Y_i} \right) + \dot{G}_w \left( \frac{W_i - \bar{W}}{Y_i} \right), \quad (17)$$

where  $\dot{G}_\pi$  and  $\dot{G}_w$  are the pseudo-Gini coefficients of capital and labor income changes.<sup>16</sup> According to equation 17, the two terms  $(\frac{\Pi_i - \bar{\Pi}}{Y_i})$  and  $(\frac{W_i - \bar{W}}{Y_i})$  determine the differential growth rates,  $g_i$ , across the income distribution under two specific tax and transfer schemes for capital and labor income, as measured by the two pseudo-Gini coefficients.<sup>17</sup> For example, a 1 per cent reduction in the pseudo-Gini coefficient of capital income implies a positive income growth rate for the percentiles of the income distribution where capital income is below the average.

## 4. Stylized Facts

This section documents the main stylized facts regarding the level and dynamics of compositional inequality. It begins with a comparative analysis of countries worldwide before delving into specific case studies. In particular, it examines Italy, where compositional inequality has exhibited a decreasing trend over the past three decades. It then explores the Czech Republic and Slovakia, highlighting their divergent trajectories of compositional inequality following their split. Next, it discusses the exceptional case of Scandinavian countries, which combine low levels of income inequality with high levels of compositional inequality. Finally, it presents the first estimates of global compositional inequality. While this selection of countries does not provide a comprehensive global picture, it aims to guide future research in this area, encouraging further studies to complement the analysis and address key unresolved puzzles. Moreover, this section aims to highlight how different definitions of capital and labor income affect both the level and trends of compositional inequality.

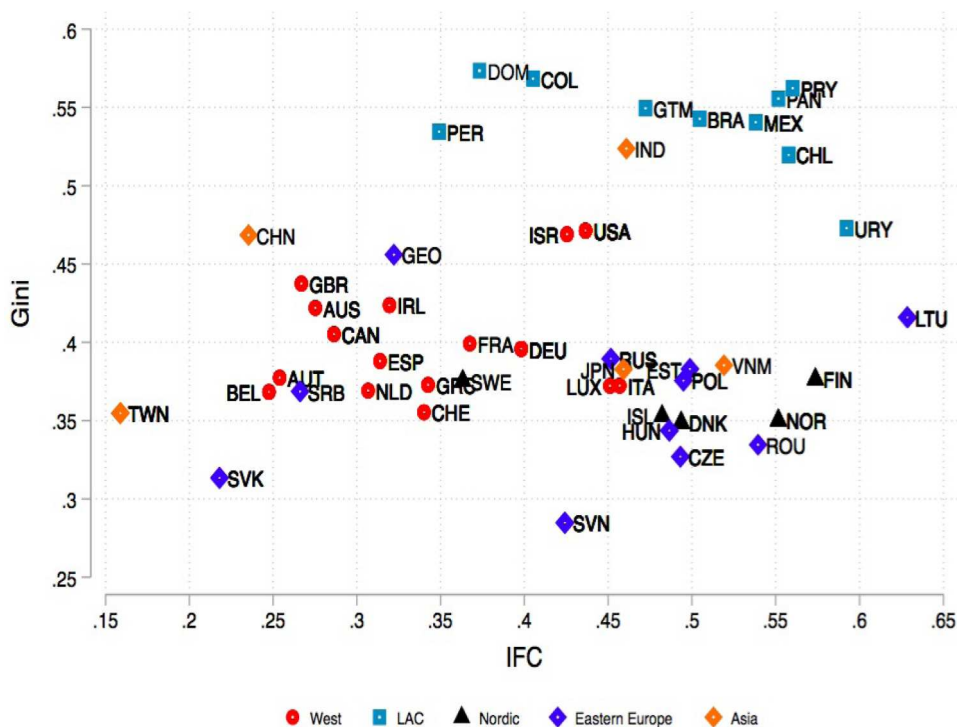
### 4.1. Compositional Inequality across the World

Let us start with an overview of compositional inequality across several countries around the world, reporting the main results from Ranaldi and Milanovic (2022). The authors construct a comprehensive database for the study of compositional inequality from a comparative perspective. Data is taken from the Luxembourg Income Study (LIS) Database, and has a coverage of 47 countries from Europe, North America, Oceania, Asia and Latin America ( $\approx 80$  per cent world output), including 302 country-representative household surveys between 1995 and 2018. The income concept adopted is market income plus pensions. Specifically, capital income is defined as the sum of interest incomes, dividends, and rental incomes, while labor income is the sum of wages, self-employment income and pensions, here considered as deferred labor income. A second definition of income splits pensions into a private (capital) and public (labor) components. Finally, the unit considered is that of the individual.

Figure 3 plots the level of income inequality against compositional inequality for all countries in the sample. Three main results emerge from this graph. *First*, the higher the compositional inequality, the higher the income inequality. In other words, classical

<sup>16</sup>Pseudo-Gini coefficients are Gini-like indicators, which are constructed from concentration curves, rather than Lorenz curves.

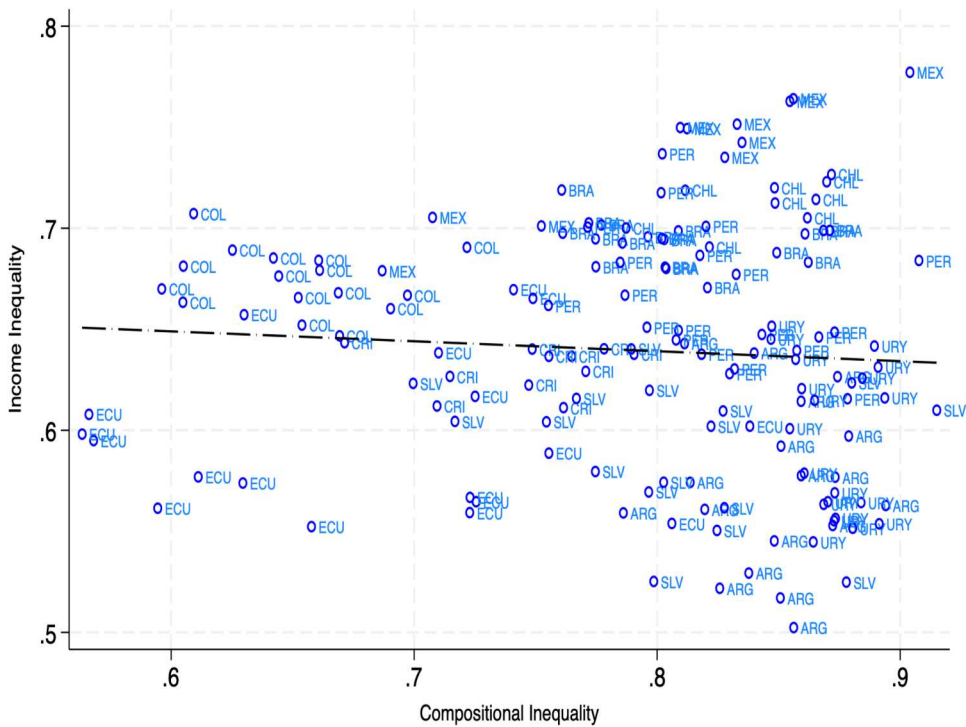
<sup>17</sup>This approach follows from the decomposition proposed by Lakner et al. (2020), which relies on the tax and transfer scheme firstly introduced by Kakwani (1993), and then further extended by Ferreira and Leite (2003).



**Figure 3.** Relationship between compositional and inter-personal inequality. The graph shows on the horizontal axis compositional inequality (as measured by the IFC Index) and on the vertical axis the standard measure of inter-personal income inequality (Gini coefficient). Each dot is the unweighted average for a country. Source: Ranaldi and Milanovic (2022).

capitalism displays higher interpersonal income inequality than new capitalism. *Second*, three world clusters emerge from this analysis. The first cluster includes Latin American countries, which are, on average, characterized by high levels of both compositional and income inequality. These countries can, therefore, be considered classical capitalist economies with extremely high interpersonal inequality. This result is further confirmed by Monroy-Gómez-Franco and Ranaldi (2024), who focus on compositional inequality in Latin America (Figure 4). Their confirmation comes through the use of a more comprehensive database that combines fiscal data, survey data, and national accounts recently produced by De Rosa, Flores, and Morgan (2023). The second cluster is composed of western countries including the US, Canada and the UK. This cluster is characterized by mild levels of both inequality dimensions. Finally, the third cluster is the Nordic countries, which surprisingly combine high levels of compositional inequality with low levels of income inequality. *Third*, the final result emerging from this graph is actually a non-result: there seems not to be evidence of any countries combining both low compositional inequality and extremely high income inequality. In other words, new capitalism seems to be characterized by moderate levels of interpersonal inequality. This result sheds light on the desirability of achieving compositional *equality*, which will be further discussed in Section Five.





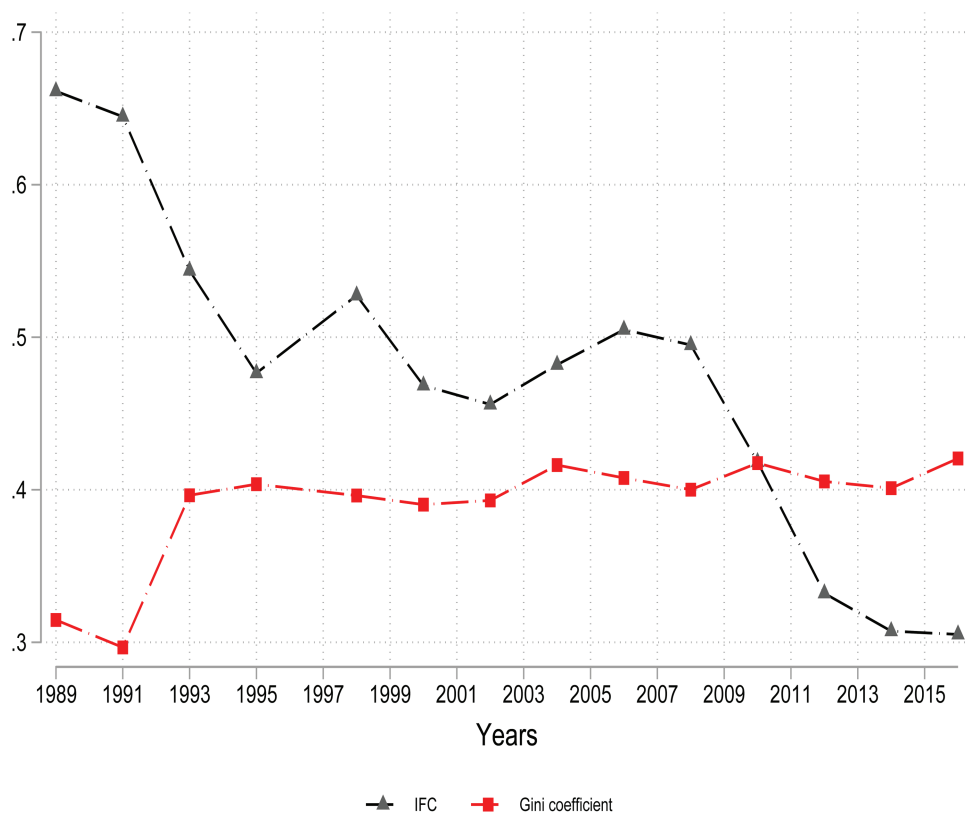
**Figure 4.** Relationship between compositional and inter-personal inequality in Latin American countries. The graph shows on the horizontal axis compositional inequality (as measured by the IFC Index) and on the vertical axis the standard measure of inter-personal income inequality (Gini coefficient). Source: Monroy-Gómez-Franco and Ranaldi (2024) based on data from De Rosa, Flores, and Morgan (2023).

#### 4.2. Italy

Italy experienced a steady decline in compositional inequality over the last three decades, as evidenced by Iacono and Ranaldi (2023) exploiting data from the Italian Survey of Household Income and Wealth (SHIW) (see Figure 5). In other words, Italy is moving from classical to new capitalism, with labor income flowing towards individuals at the top of the distribution, given the surge in high-skilled jobs, and capital income, especially in the form of imputed rent, which increases the capital share of the middle class.<sup>18</sup> Actual rent has, however, led to higher concentration of capital incomes at the top in the decade preceding the outbreak of the financial crisis.

Giangregorio and Villani (2024) estimate the IFC index for Italy based on their own class-based classification of laborers and capitalists. As previously mentioned, this classification aims to better incorporate sociological considerations of class into the composition of individual incomes. For example, managers are directly treated as capitalists instead of wage earners, as is typically done in the literature. Their results show that while IFC trends remain unaffected by the different categorizations of capital and

<sup>18</sup>Focusing exclusively on wealth, housing constitutes the primary component of wealth for the middle classes, while financial assets are more concentrated at the top of the wealth distribution, as evidenced by Acciari, Alvaredo, and Morelli (2024).

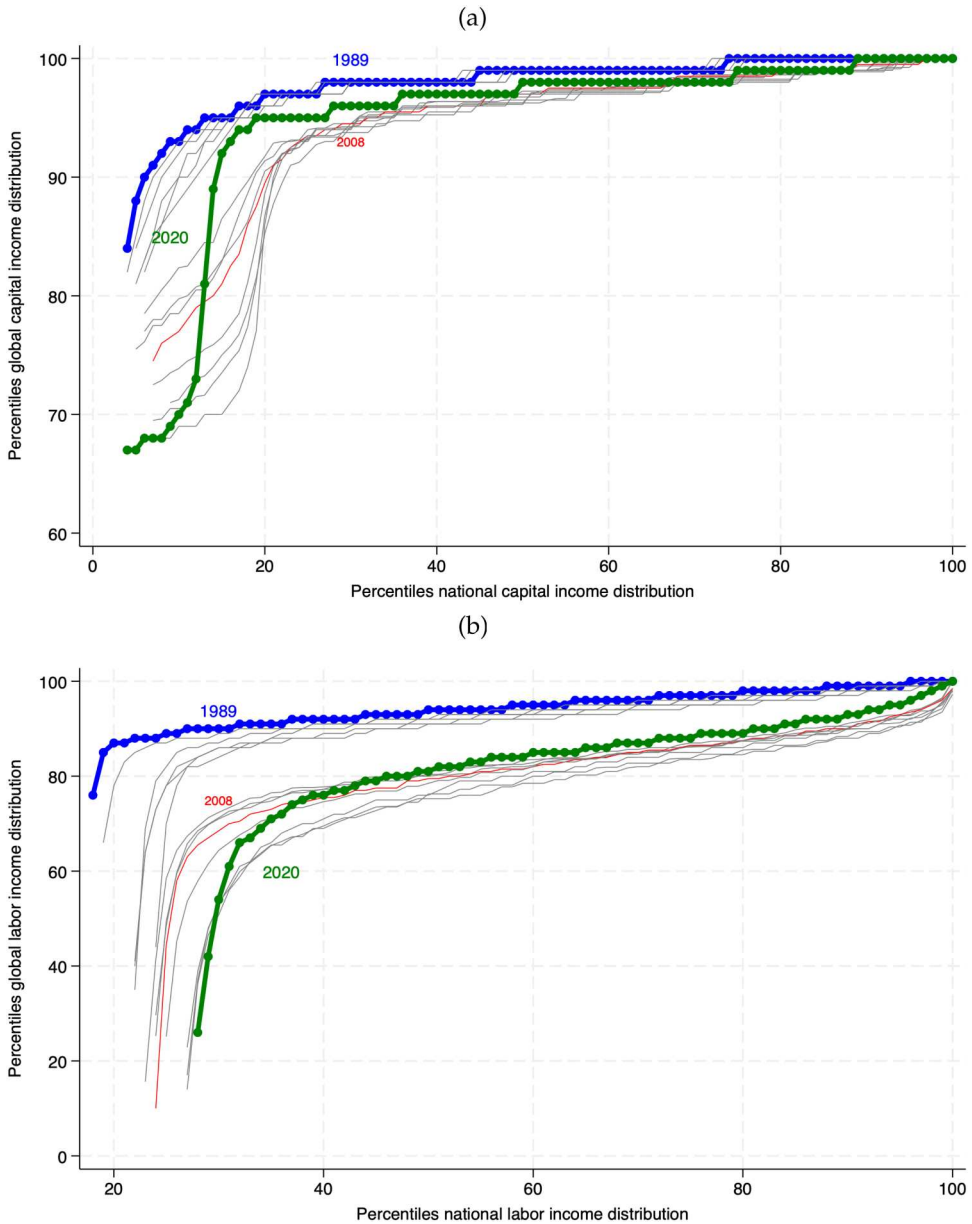


**Figure 5.** Income and compositional inequality in Italy. Source: Iacono and Ranaldi (2023).

Note: Series of the IFC index and the Gini coefficient constructed using the SHIW data. Capital income is defined as the sum of property income and the capital component of net self-employment income. Labor income is defined as the sum of payroll income and the labor component of mixed income. Total income is the sum of capital and labor income. Both the capital and labor components of self-employment income are imputed following Glyn (2011). Pensioners are excluded from the analysis.

labor across individuals, the level is significantly higher in their class-based formulation of the IFC. This also shows how different definitions of capital and labor can impact the level of compositional inequality as measured by the IFC.

Lastly, the capitalization process in Italy does not seem to have kept pace with global developments. As recently shown by Ranaldi (2024), which examines the association between national and global distributions of capital and labor income in Italy over the last three decades, Italians have lost ground in global rankings for both capital and labor income up until 2016 (Figure 6). However, there have been signs of recovery since then, though not to the levels seen three decades ago. This decline in global standing has been uneven across Italian regions; for example, the South and Centre of Italy have experienced a drop of up to 40 positions in the global labor income distribution. Finally, while transfer incomes elevated the bottom half of the distribution to global middle-class standards in the early 1990s, this is no longer the case today.

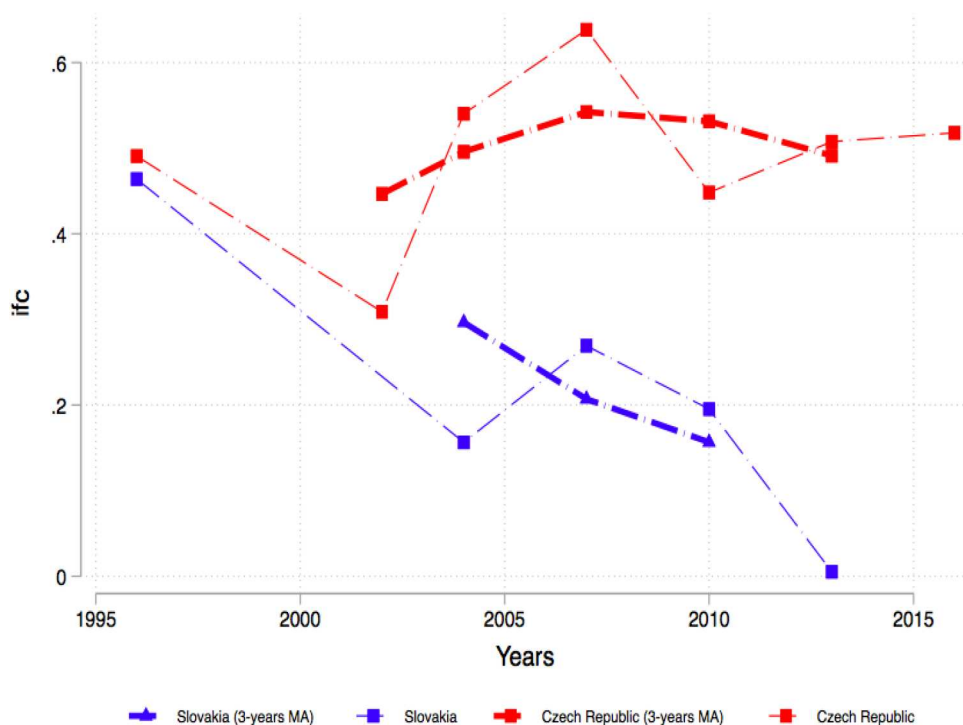


**Figure 6.** (a) Capital and (b) Labor. Source: Ranaldi (2024).

Note: National rankings in capital (above) and labor (below) income distribution (x-axis) versus their global counterparts (y-axis) for Italy, 1989–2020. Only percentiles with non-zero capital and labor incomes are considered.

#### 4.3. Czech Republic and Slovakia

We now examine the dynamics of compositional inequality in the Czech Republic and Slovakia from 1996 to 2015, reporting a novel stylized fact based on data from Ranaldi and Milanovic (2022). The analysis of these two countries is highly relevant, considering that during the period in question, they were initially part of the same state,



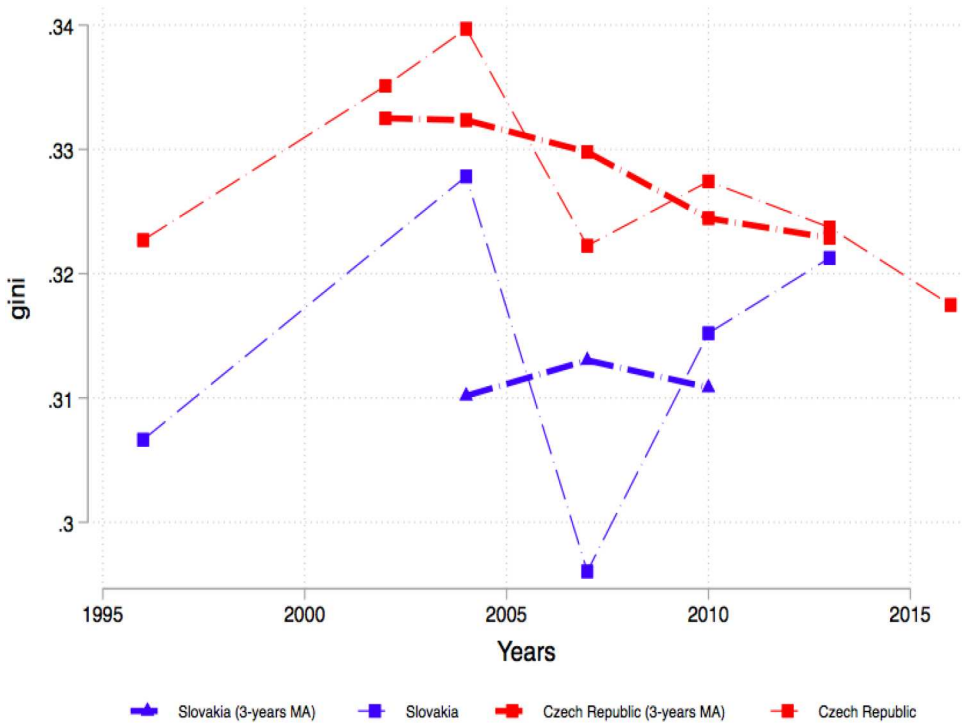
**Figure 7.** Compositional inequality in Czech Republic and Slovakia. Source: Ranaldi and Milanovic Database.

Note: The IFC (income-factor concentration) index measures the degree of compositional inequality in terms of capital and labor income. Capital and labor incomes are defined as in Ranaldi and Milanovic (2022): capital income is the sum of rent, interests and dividends, whilst labor income the sum of wages, self-employment income and pensions, considered as deferred labor income.

Czechoslovakia, before splitting in 1993 following the collapse of the former Soviet Union. Subsequently, the two countries pursued relatively different economic transitions: while the Czech Republic rapidly implemented neoliberal market reforms, Slovakia adopted a more gradual approach. This situation changed in the late 1990s when Slovakia accelerated its economic reforms under a new administration, aiming to secure admission to the EU.<sup>19</sup>

Compositional inequality was the same in the two countries between 1996 and 2003 and, then, substantially diverged following their entrance into the European Union: Czech Republic settled at a high compositional inequality regime, whilst Slovakia at a low compositional inequality regime (see Figure 7). Currently, their difference is striking: Czech Republic displays a level of compositional inequality similar to those of Latina American countries, which represent the most compositionally unequal region of the world, whilst Slovakia one of the lowest level of compositional inequality in the world (Figure 3). The level and trend of income inequality in the two countries is, instead, almost the same (Figure 8). Hence, while displaying the same level and trend of total

<sup>19</sup>For a comprehensive overview of the economic development of the two countries, refer to Stolarik (2016).

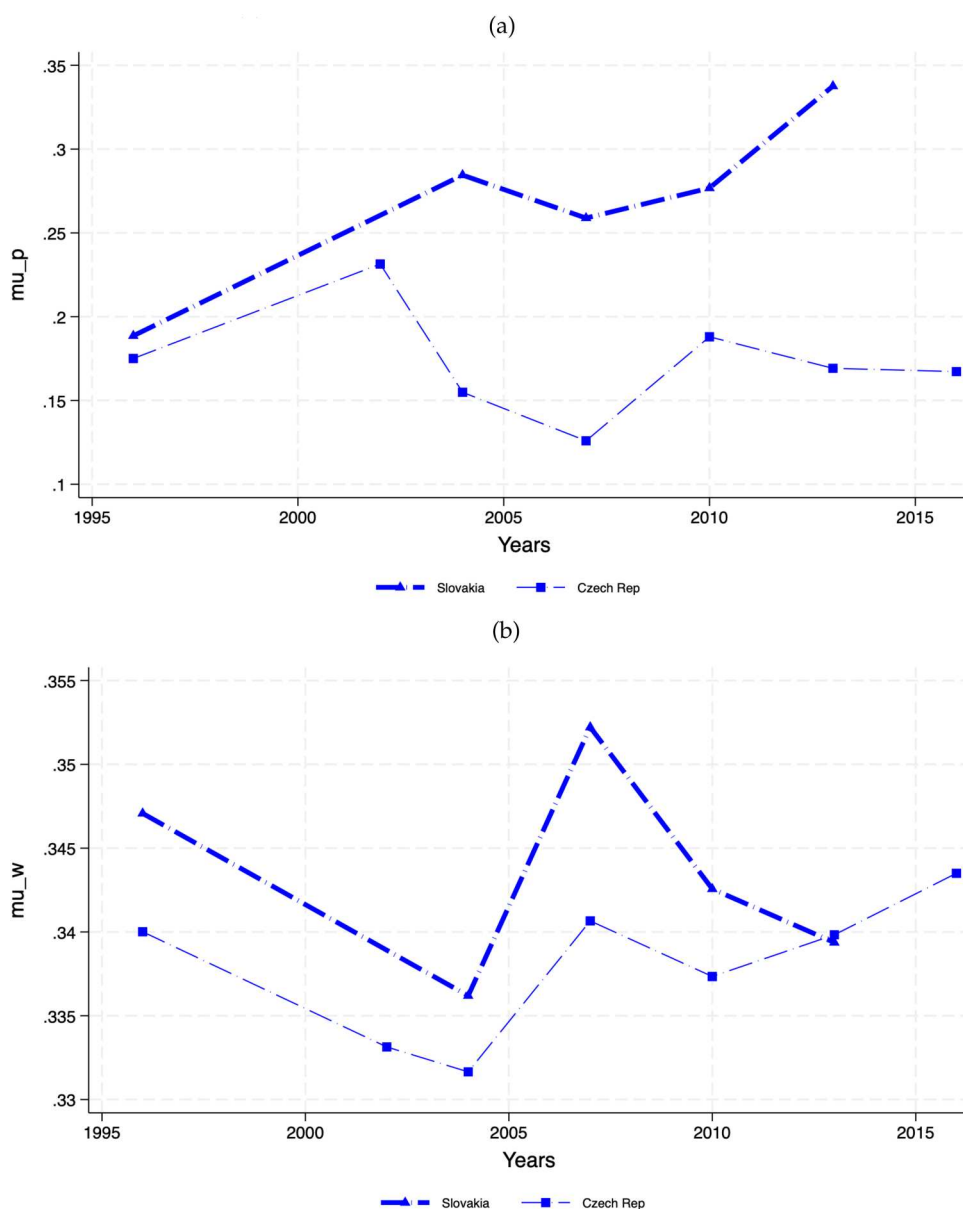


**Figure 8.** Income inequality in Czech Republic and Slovakia. Source: Ranaldi and Milanovic Database. Note: The income definition adopted is market income (before-tax capital plus labor income) plus pensions, considered as deferred labor income.

income inequality, Czech Republic and Slovakia are moving towards two, distinct forms of capitalist systems.

While exploring the determinants of these two diverging trends is beyond the scope of this study, one can argue that the differing paces of privatization processes—slow in Slovakia and rapid in the Czech Republic—may have contributed to this divergence. A similar dynamic is observable in the analysis of capital concentration in China and Russia as these countries transitioned to market economies at the beginning of the 1990s. With a gradual strategy, China slowed the pace of capital concentration at the top, unlike Russia, which adopted a shock therapy approach (Novokmet, Piketty, and Zucman 2018; Yang, Novokmet, and Milanovic 2019). Labor income dynamics across the distribution may also have been a significant factor in explaining the diverging trends between the two countries, as observed in many countries in transition (Estrin et al. 2009). However, when analyzing the dynamics of the IFC index by separating movements in capital and labor income, as measured by the areas of the concentration curves for each,<sup>20</sup> it is evident that capital income dynamics have played the largest role in shaping the divergence in compositional inequality between the two countries. Figure 9 illustrates that although labor income dynamics have been

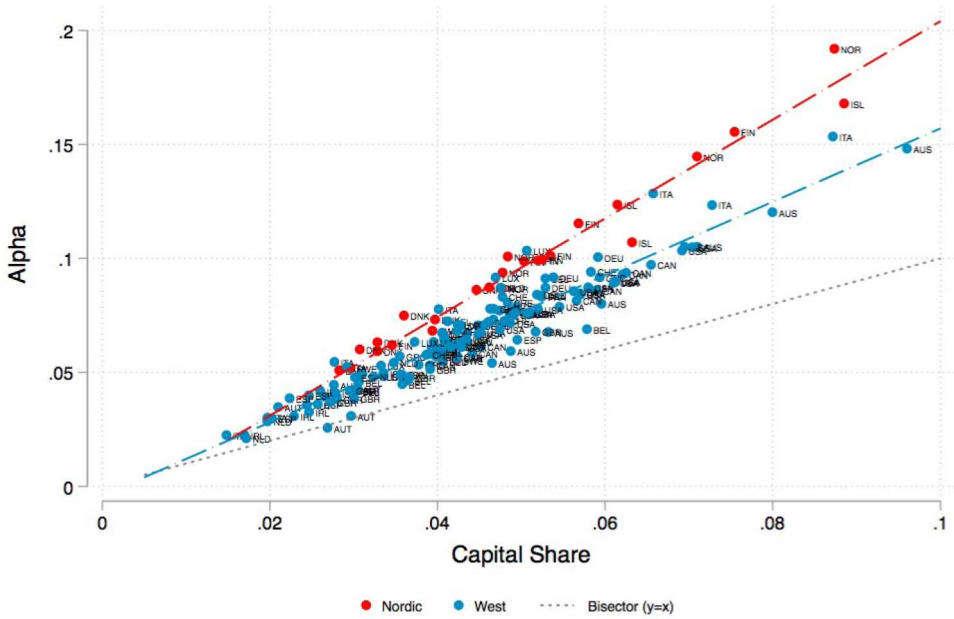
<sup>20</sup>More on the determinants of compositional inequality in Section Five.



**Figure 9.** (a) Area of the Concentration Curves for Capital and (b) Area of the Concentration Curves for Labor. Source: Ranaldi and Milanovic Database.

Note: The areas under the concentration curves for capital (above) and labor (below) describe the distribution of capital and labor incomes across the total income distribution, respectively. A higher (lower) value of these areas implies that the income source is predominantly distributed at the bottom (top) of the total income distributions.

similar across the two countries, capital income dynamics have differed significantly: it shifted towards the top of the income distribution in the Czech Republic, while moving towards the bottom in Slovakia, particularly starting from 2003. As previously mentioned, while this result does not shed any light on the causal mechanisms behind



**Figure 10.** Capital share and capital contribution to Gini in Nordic and other advanced economies. Note: The horizontal axis shows the share of capital in total income and the vertical axis the contribution of capital to total inequality. If capital income were distributed like overall income, the two shares would be the same. The fact that capital income tends to be more important among the rich explains that the capital's inequality contribution share is always greater than capital income share. Source: Ranaldi and Milanovic Database.

the divergence in compositional inequality between the two countries, it sets the stage for future research on the topic.

#### 4.4. Scandinavian Countries

Scandinavian countries, as already mentioned in Section 4.1, are exceptional as they combine high compositional inequality with low interpersonal income inequality (Figure 10). The Scandinavian model of economic governance, notably established through a significant compromise between capital and labor in the 1930s, has facilitated a unique form of capital accumulation and income distribution. According to Rojas (1991) and Esping-Andersen (1990), this model preserves the rights to capitalist accumulation while implementing centralized bargaining of wages, creating a balance that supports economic stability and growth. Moene and Wallerstein (2003) and Moene (2003) further explain that this Nordic model harmoniously combines wage compression with a “socially acceptable” high return on capital. This distinctive arrangement results in a notably low inequality of earnings, as highlighted by Fochesato and Bowles (2015), yet it paradoxically coexists with high wealth inequality, as documented by Davies, Lluberas, and Shorrocks (2012). Furthermore, the region’s high social mobility contributes to what is often referred to as Nordic exceptionalism in socio-economic terms. Recent shifts in policy, such as the implementation of Dual Income Tax reforms and the abolition of



inheritance taxes in Sweden and Norway in 2004 and 2014, respectively, have however begun to alter the traditional composition of income.

As noted by Iacono and Palagi (2022), the dual income taxation system significantly influences the dynamics of compositional inequality in these countries. The authors document a recent increase in compositional inequality in the Nordic countries, attributing this rise to the introduction of Dual Income Tax reforms in the early 1990s, characterized by a flat tax on capital incomes. Moreover, as shown by Ranaldi and Milanovic (2022), the distinction between public and private pensions also plays a critical role in shaping the level of compositional inequality. The authors show that, when pensions are categorized into private and public, the cluster of Nordic countries shifts towards Western countries in the income versus compositional inequality diagram. This shift is explained by the compositionally equalizing effect of private pensions, which distribute capital incomes towards the ends of the middle class. These developments indicate a dynamic evolution in the Scandinavian economic model, reflecting changes in global economic conditions and domestic policy choices.

#### 4.5. Global Compositional Inequality

Let us now turn our focus to *global compositional inequality*. Similar to global inequality, global compositional inequality describes variations in the composition of income in terms of capital and labor among individuals worldwide. This involves considering a *world social welfare function* (A. Atkinson and Brandolini 2010), which is symmetric, meaning each individual is counted as one unit of analysis (after adjustments for different purchasing powers and inflation). As observed by Ranaldi (2025) through the construction of the Global Capital and Labor (GCL) Database, this measure has decreased significantly in the 21st century. The world has transitioned from levels of compositional inequality akin to those in Latin America to levels comparable to Western countries. This reduction is attributed to two major factors. First, there has been a significant individual-level capitalization process: the percentage of individuals worldwide with positive capital income increased from 20 per cent to 32 per cent. Second, the global middle class, particularly in China, has benefited most from this process. China, in particular, has experienced an exceptionally high average growth rate of capital income across its entire distribution at the start of the 21st century, in contrast to mature economies, which have seen stagnation in this income source due to global financial crises (see Figures 11 and 12). Having said that, labor income remains a more critical determinant of global income status than capital income (Figure 13). These results nicely complement our understanding of global inequality dynamics. The extensive literature on this topic has consistently shown that global income inequality has decreased over the past three decades. A significant factor in this trend is the reduction in between-country inequality components, as highlighted in studies by Lakner and Milanovic (2015), Chancel and Piketty (2021), and Milanovic (2021a). This reduction is largely attributed to the significant growth of the global middle class, primarily consisting of Chinese and Indian populations, compared to the growth rates of the upper middle class. Our finding of a decreasing trend in global compositional



**Figure 11.** Pseudo-growth incidence curves for capital and labor. Source: Ranaldi (2025).

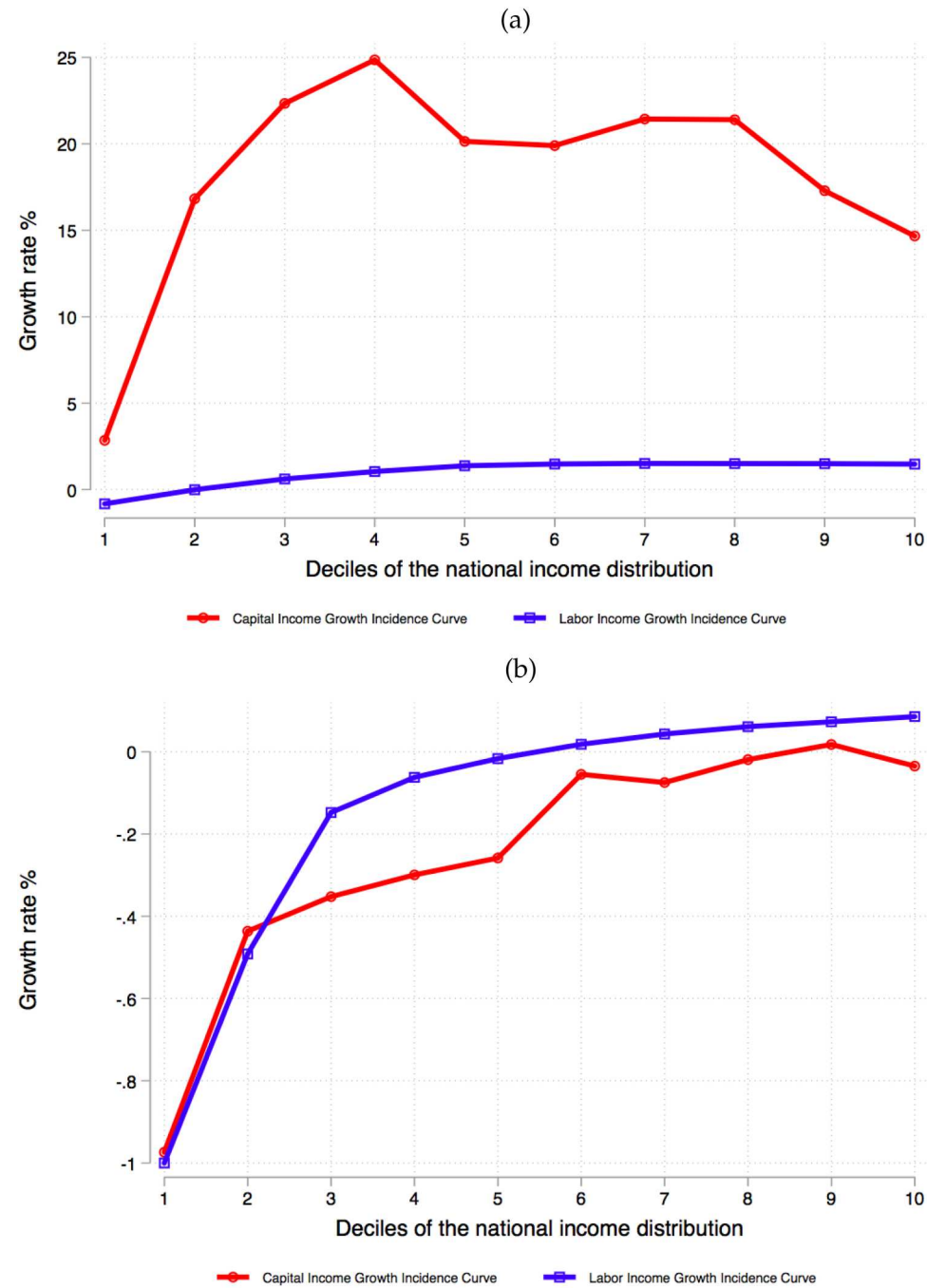
Note: Y-axis displays the growth rate of the decile average income source, weighted by population. Growth rates are quantified as the multiple by which the corresponding income increases. For example, a value of 1 signifies a doubling, or 100 per cent increase, of the income in the relevant decile. Growth incidence is evaluated at decile groups of total income. Capital income is the sum of interests, dividends and rental income. Labor income includes wage income and self-employment income. Total income is, hence, the sum of labor and capital income.

inequality therefore aligns well with previous studies, further emphasizing the role that different sources of income growth play in shaping global economic imbalances.

## 5. Theoretical Aspects of Compositional Equality

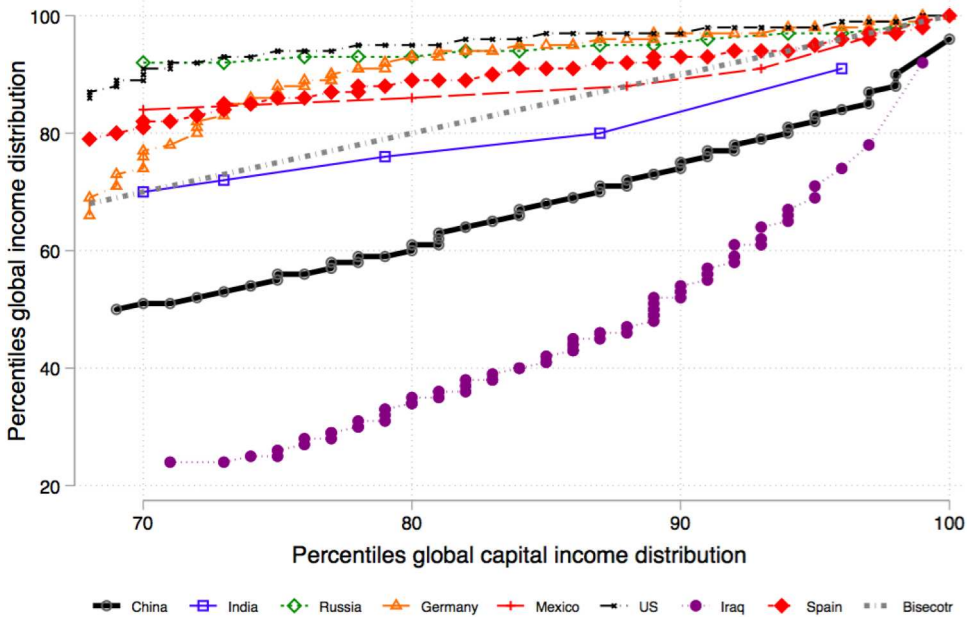
In discussions about income inequality, it is generally accepted that extremely high inequality is worse than extremely low inequality. Although there is no consensus on the ideal level of income inequality in society—whether it should be zero or slightly more—we can agree that a society where a single individual owns all available resources is undesirable. However, with compositional inequality, the implications are less clear. Is a high level of compositional inequality detrimental or beneficial for society? Is compositional *equality* inherently desirable to achieve inclusive and sustainable growth? While these questions would require the construction of a normative framework of analysis, which is beyond the scope of this article, this section begins discussing the desirability of compositional *equality* in light of recent stylized facts affecting modern capitalist economies.

We begin with some technical considerations. It can be demonstrated that through a straightforward tax and transfer scheme—wherein everyone's income is taxed at a rate  $\tau$



**Figure 12.** Regional Pseudo-growth incidence curves for capital. (a) China and (b) US. Source: Ranaldi (2025).

Note: Y-axis displays the growth rate of the decile average capital (red) and labor (blue) income. Growth rates are quantified as the multiple by which the corresponding income increases. For example, a value of 1 signifies a doubling, or 100 per cent increase, of the income in the relevant decile. Growth incidence is evaluated at decile groups of total income. Capital income is the sum of interests, dividends and rental income. Labor income includes wage income and self-employment income.



**Figure 13.** Global capital and total income positions - 2016. Source: Ranaldi (2025).

Note: Only percentiles with non-zero capital incomes are considered.

and everyone receives an equal absolute transfer—the following result emerges (Ranaldi 2022):

$$\hat{\mathcal{J}} \approx -\tau, \quad (18)$$

where the hat denotes percentage changes. Thus, a one percent increase in  $\tau$  results in a one percent decrease in the IFC index, a behavior similar to that of the Gini coefficient under the same tax and transfer scheme. This outcome, which arises from the assumption that income components are redistributed proportional to the population's share of capital and labor income, suggests a movement toward a steady state where income sources are equally composed across the population. Having said that, it should be noted that taxation of capital and labor income is typically asymmetrical, with a more pronounced burden on labor income than on capital. This disparity implies that current taxation policies tend to increase, rather than decrease, compositional inequality, as evidenced by several studies, including Iacono and Palagi (2022).

When discussing the dynamics of compositional inequality—whether it is diminishing or increasing—it is important to address the direction of change. Theoretically, compositional inequality can be reduced in four distinct ways: (i) deconcentrating capital at the top of the income distribution, (ii) increasing labor income at the top, (iii) decreasing labor income at the bottom, and (iv) increasing capital income at the bottom. Let us explore each of these scenarios in detail, highlighting the pros and cons of each.

*Scenario (i)* offers the benefit of reducing the concentration of capital income across the total income distribution, which is particularly desirable given the extremely high levels of capital income inequality compared to labor income inequality (Milanovic

2017; Piketty 2014, among others), a feature that characterizes both the developed and developing world.<sup>21</sup> This reduction could be achieved by increasing capital income taxation at the top, or through wealth taxation, such as inheritance taxes.<sup>22</sup> *Scenarios (ii) and (iii)* typically result from structural changes in the labor market. The increase in earning inequalities over recent decades is primarily attributed to skill-biased technological change, which has widened the gap between high and low earnings across the total income distribution. While this likely reduces compositional inequality initially, it increases total income inequality which, in turn, can fuel compositional inequality in the long run by enlarging a high-skill elite who not only earn from high wages but can also accumulate significant wealth (Milanovic 2021b). This could reduce the mobility of income sources. Evidence for *Scenario (ii)* can already be seen in the US with the rise in homoploutia (Berman and Milanovic 2023), which refers, as previously discussed, to the increasing concentration of individuals at the top of both the labor and capital income distributions (see Figure 14). Lastly, *Scenario (iv)* would imply a process of capitalization occurring at the bottom of the distribution. An example of a policy aiming at going in that direction is the idea of a capital endowment, also called *minimum inheritance*, paid to all at adulthood, as proposed by T. Atkinson (2015), with the assumption that this would then generate capital incomes.

Let us now turn to some macroeconomic considerations of compositional *equality*. As previously discussed, compositional inequality links functional and personal income distributions. This suggests that if the capital share of income continues to rise, personal income inequality would also be impacted—a rise in the capital share has been a well-established stylized fact over the past four decades. To better understand this aspect, let us relate compositional inequality to Piketty's simple model of capitalism.

Piketty constructs a simple 'machine' that encapsulates the essential features of a capitalist economy (Milanovic 2014). According to Milanovic, this machine consists of four key components. First, the definition  $\frac{K}{Y} = \beta$ , where  $K$  represents the capital stock and  $Y$  denotes the total income of the economy. Second, the *first law of capitalism*, expressed as the identity  $\frac{\Pi}{Y} = \alpha = r \times \beta$ , where  $\Pi$  is capital income and  $r$  represents the rate of return on wealth. Third, the *second law of capitalism*, which establishes an equilibrium condition given by  $\bar{\beta} = \frac{s}{g}$ , where  $s$  is the savings rate,  $g$  is the economic growth rate, and the bar indicates a steady-state variable. This law relies on the assumption that, in a closed economy, investment equals savings. Finally, Piketty highlights a fundamental inequality relationship:  $r > g$ , which suggests that when the rate of return on capital exceeds the economy's growth rate, wealth concentration increases over time.

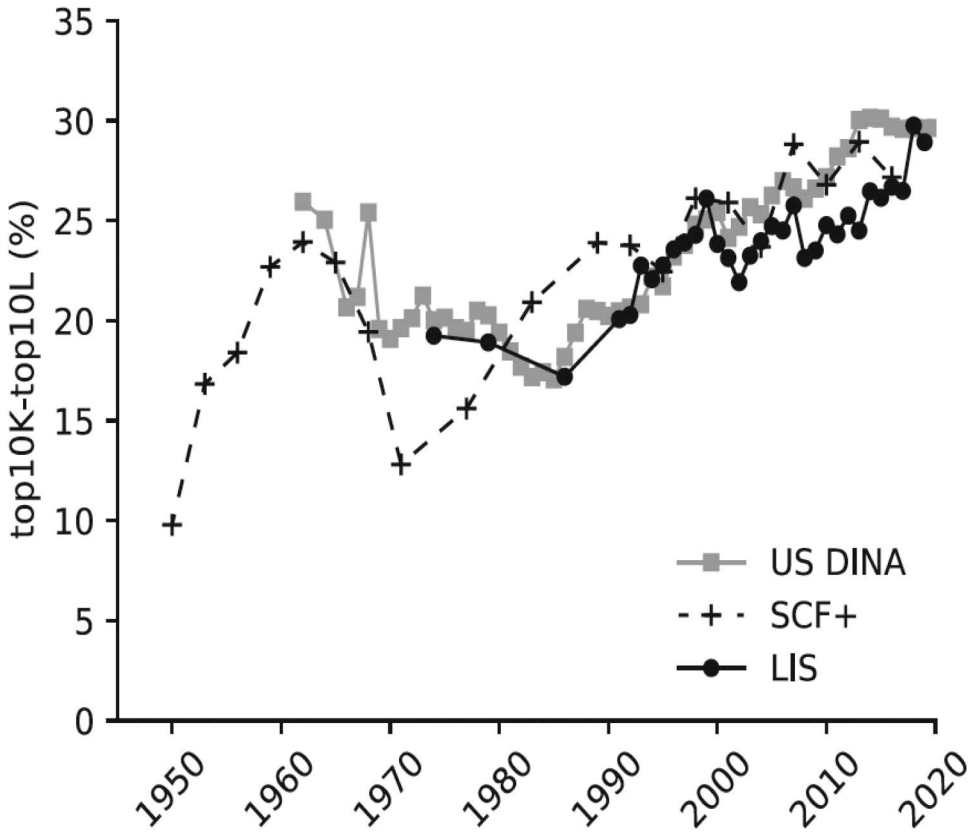
Formally, Piketty's model in steady state can be summarized by the following equation:

$$\alpha = \bar{\beta}r = s\frac{r}{g} \quad \text{with } \frac{r}{g} > 1. \quad (19)$$

An additional equation can be included to relate the functional and personal

<sup>21</sup>The situation differs, however, when viewing the world as a single nation (global inequality), where the levels of capital and labor income inequality are relatively similar, as shown by Ranaldi (2025).

<sup>22</sup>See Bastani and Waldenström (2023) for an analysis of the relative merits of wealth and capital income taxes as instruments for taxing individuals at the top of the distribution.



**Figure 14.** Evolution of Homoploutia in the US. Source: Berman and Milanovic (2023).

Note: The figure shows top10K–top10L, the share of top decile capital-income earners in the top decile of labor-income earners, based on three data sources: US DINA, SCF+, and Luxembourg Income Study.

distributions of income through compositional inequality, as follows:<sup>23</sup>

$$\frac{\partial \mathcal{G}}{\partial \alpha} \approx \mathcal{I}, \quad (20)$$

where  $\mathcal{G}$  is a measure of income inequality, and  $\mathcal{I}$  is a measure of compositional inequality. Equation 19 captures the drivers of the capital share, and equation 20 explores how this translates into an increase or decrease in income inequality within society.

There are compelling arguments to suggest that the capital share will continue to rise, one of which is the role of technological and particularly AI development. The relationship between factor shares and AI technological development is already generating a rich scholarly debate.<sup>24</sup> A reduction in compositional inequality under *Scenarios (i)* and (iv)

<sup>23</sup>Equation 20 implicitly assumes that the macroeconomic drivers of economic inequality,  $\mathcal{G}$ , can be expressed as a set of variables  $X_1, \dots, X_n$ , which include the capital share. These variables are multiplied by a set of elasticities,  $\epsilon_1, \dots, \epsilon_n$ , and are assumed to be orthogonal to each other.

<sup>24</sup>See Acemoglu (2010) for a discussion on an economy transitioning from labor- to capital-augmenting technical change, Acemoglu and Restrepo (2018) for the implication of capital-augmenting technological development on the factor shares, Acemoglu (2024) for a study on the relationship between capital accumulation and demand for labor in a

would, therefore, imply not only a more equitable distribution of assets but also a more favorable view towards the technologically-driven increase in the capital share of income.

To conclude this section, I would argue that compositional *equality* is desirable for at least two reasons. First, from a fairness perspective, given the extreme concentration of wealth—and thus capital income relative to labor income—a reduction in such concentration would lead to a more equitable distribution of asset-derived rewards. Second, from a macroeconomic standpoint, achieving compositional equality would mean that, should the capital share continue to rise due to, for instance, new waves of technological development (among other factors), individuals would not perceive this trend as a threat to their economic well-being, but rather as an opportunity for growth. In fact, under compositional equality (or even negative compositional inequality), an increase in the share of capital relative to overall GDP would imply either equal or pro-poor (under negative compositional inequality) growth along the income distribution.

## 6. Conclusion

This paper has provided an overview of recent research on compositional inequality. This research is positioned within recent scholarly advances in inequality studies, particularly highlighting the recent contributions by Thomas Piketty in unveiling novel stylized facts on the dynamics of factor shares and inter-personal income inequality. It begins by reviewing the literature on the link between factor shares and income inequality. While the study of this relationship can be traced back to classical political economists like David Ricardo, a general framework for analyzing this relationship has been missing. The paper then introduced the concept and the principal methodological tools for its measurement. This discussion included indicators of compositional inequality across and at the top of the distribution, drawing an analogy between measures like the Gini coefficient and top factorial income shares within the context of income inequality analysis. The paper presented major stylized facts related to compositional inequality, both between and within countries. It showed that compositional inequality is currently far from maximal, unlike in the past when there was a stark distinction between income-rich capital earners and income-poor laborers. Countries like Slovakia and Taiwan, for instance, display extremely low levels of compositional inequality, depicting alternative types of capitalist systems where both rich and poor individuals have similar compositions of their incomes in terms of capital and labor. These findings are important for contextualizing the long-run stylized facts unveiled by Thomas Piketty regarding the joint evolution of the rising capital share and increasing income inequality. While the empirical evidence presented in this article does not establish causality, it suggests that the strength of this link is not fixed and depends on the extent of compositional inequality, which varies across countries and over time. Finally, the paper discussed the desirability of compositional equality, arguing that it should be pursued for at least two reasons: fairness and enhancing an inclusive, profit-driven regime of accumulation and growth.

Notwithstanding recent advances in studies of compositional inequality in terms of capital and labor incomes, much more research is needed to enrich our understanding



of world dynamics in this dimension and its normative implications. Several critical elements should be highlighted. First, data on compositional inequality need improvement. While much emphasis has been placed on perfecting income distribution measures, especially at the top, more research is needed to refine our estimates of income composition in terms of capital and labor across the entire distribution, and particularly at the top. Second, the geographical coverage of compositional inequality studies is predominantly focused on the developed world, with a notable lack of comprehensive data for African countries. This issue stems from the absence of reliable data on income composition across the distribution in this region of the world.<sup>25</sup> Third, a better understanding of the determinants of compositional inequality is necessary. Petrova and Ranaldi (2024) recently showed that left-wing parties tend to reduce, rather than increase, compositional inequality across the distribution within the context of Europe. However, evidence for the rest of the world is scarce, where different dynamics are certainly at play. Fourth, a normative economic theory of compositional equality is needed to better grasp the extent to which it is desirable and, if so, under which conditions. Fifth, the overall compositional inequality framework can be adapted to study other types of compositions, such as the composition of wealth in terms of real and financial assets, or the composition of income into savings and consumption, or into taxes and market income.

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<sup>25</sup>This is particularly problematic when studying global compositional inequality, as it results in overlooking a significant portion of a rapidly growing population (see Milanovic 2024 for a discussion on this matter). While global inequality studies may use consumption data to supplement missing income distribution information, this approach is not feasible for studies on the distributions of capital and labor income across the population.

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## Appendix. Concentration Curves

In this Section, we formally describe the concentration curves used to measure compositional inequality via the IFC index. We primarily focus on the concentration curve for capital, although the formalization could account for additional sources of income.<sup>26</sup> The actual concentration curve is defined as follows:

$$\mathcal{L}(\boldsymbol{\pi}, p) = \pi \sum_{j=1}^{p=\frac{i}{n}} \alpha_j, \quad (\text{A1})$$

where  $\alpha = \frac{\Pi_i}{\Pi}$  represents the relative share of capital income for individual  $i$ . The zero-concentration curve for capital income, denoted as  $\mathcal{L}^e(\pi, p)$ , is defined by:

$$\mathcal{L}^e(\pi, p) = \pi \sum_{j=1}^i y_j \quad \forall i = 1, \dots, n. \quad (\text{A2})$$

This curve is analogous to the Lorenz curve for total income, multiplied by the capital share,  $\pi$ . It is a function of both the Lorenz curve for income and the capital share. Unlike the egalitarian line used to construct the Gini coefficient, which is identical across all distributions, this curve is *specific* to each distribution. The maximum-concentration curve for capital income,  $\mathcal{L}^{\max}(\pi, p)$ , varies depending on whether the concentration curve for capital income lies below or above the zero-concentration curve. In the former case, it is defined as:

$$\mathcal{L}^{\max}(\pi, p) = \mathcal{L}^m(\pi, p) = \begin{cases} 0 & \text{for } p \leq p'' \\ \mathcal{L}(y, p) - z_- & \text{for } p > p'', \end{cases} \quad (\text{A3})$$

and in the latter case, as follows:

$$\mathcal{L}^{\max}(\pi, p) = \mathcal{L}^M(\pi, p) = \begin{cases} \mathcal{L}(y, p) & \text{for } p \leq p' \\ z & \text{for } p > p', \end{cases} \quad (\text{A4})$$

where  $p'$  and  $p''$  are such that  $\mathcal{L}(y, p') = \pi$  and  $\mathcal{L}(y, p'') = 1 - \pi$ , respectively. Under this scenario, the maximum-concentration curve remains zero up to a certain income percentile  $p''$ , after which it follows the shape of the Lorenz curve. Conversely, in the second case, the maximum-concentration curve follows the Lorenz curve up to the percentile  $p'$ , after which it becomes constant. The choice of  $p'$  and  $p''$  depends on the shape of the Lorenz curve and the capital share. A graphical illustration of these three curves for the case of Italy in 1989 can be found in [Figure 1](#).

<sup>26</sup>For more information on the general framework, consult (Ranaldi 2022).