

## WHY EAST GERMANY DID NOT BECOME A NEW *MEZZOGIORNO*

Andrea Boltho, Magdalen College, University of Oxford

Wendy Carlin, University College London and CEPR

Pasquale Scaramozzino, SOAS University of London  
and Università degli Studi di Roma “Tor Vergata”\*

### Abstract

Economic integration is generally thought to favour convergence in the economic performance of previously separated regions; but this is far from universally true, as the experience of the members of the Eurozone testifies. The paper considers the two sharply contrasting cases of East and West German convergence following reunification and the enduring poverty of the Italian *Mezzogiorno* since Italian unification a century and a half ago. In both countries, political integration delivers much higher consumption in the lagging relative to the leading region than of per capita GDP. Consumption convergence can be supported by transfers but ‘production’ convergence ultimately requires catch-up in the production of tradeables. The paper demonstrates the radically different performance of the tradeable sector in the two cases, and suggests that this may be the result of differences in labour market flexibility, in investment performance and in the social norms required for the production of complex manufacturing.

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## Introduction

The presence of both convergence and divergence among countries, and among regions within national boundaries poses a challenge for economists. In a unified political area, there are common national institutions, and labour and capital, as well as tradeable goods and services, can move freely: models of comparative advantage and of growth with diminishing returns technology would predict convergence in living standards. ‘New’ growth and international trade theory provide, however, mechanisms that can drive divergence. There is renewed urgency in understanding these processes because of the resurgence of populism associated with regionally differentiated winners and losers from globalization and technological change [Autor, *et. al.*, 2013].

This paper looks for lessons in a detailed case study of politically integrated areas. It shows that the experience of two regions – Southern Italy (or the *Mezzogiorno*, as it is known in Italian) and East Germany – has been radically different over the last two decades, and more modestly, provides a set of possible reasons for divergence in the Italian case and convergence in the German one that make sense conceptually and for which there is supporting evidence. Although the comparative case study setting is not conducive to nailing down a well-identified cause, there are features of this comparison that are helpful for interpreting the evidence. Italy and Germany were unified as nation states in 1861 and 1871, respectively. Both West Germany and Italy were founding members of the European Economic Community, the European Union, and in 1999 of the Eurozone. These arrangements define a common set of rules for the two countries in relation to cross-border trade and factor mobility as well as for the single market established in 1988. The regional economies of the *Mezzogiorno* and East Germany shared these ‘external’ rules of the game for the period of interest beginning with German reunification in 1991.

It was often argued, following this reunification, that the economic problems faced by East Germany resembled those that have long plagued the *Mezzogiorno*. Making explicit reference to the Italian experience, commentators feared that convergence in living standards between the Eastern and Western parts of the country might be very slow and that East Germany would for decades suffer from above average unemployment and relative poverty [e.g. Barro and Sala-i-Martin, 1991; Sinn and Westermann, 2000; Sinn, 2002; for dissenting points of view, see Boltho *et al.*, 1997, and Heilemann, 2005].

The Boltho *et al.* [1997] paper, in particular, gave three reasons for expecting more favourable developments in Germany than had occurred in Italy. First, public intervention stimulating machinery and equipment investment, which had generated some convergence in the 1960s in Italy, had fallen back in the *Mezzogiorno*. By contrast, early East German experience saw the government actively sustaining investment in the region. Second, the competitiveness of the backward area (endangered by wage equalization across the country as a whole), while changing little, or even worsening, in Southern Italy over several decades, had shown tentative early signs of improvement in Eastern Germany, thanks to greater wage and trade union flexibility at a decentralized level. Third, social capabilities were arguably very different between the two poorer regions. Southern Italy had fallen prey to rent-seeking and corruption in ways which, at the time at least, seemed virtually unknown in East Germany.

Section I looks at the macroeconomic picture and examines whether GDP and consumption per capita convergence have occurred or not in the two areas over the last two decades. Section II considers how the mechanisms highlighted by the ‘new’ trade literature and the empirical results found for international trade can shed light on convergence in the regional context. Section III quantifies the importance of trade for economic growth within Germany and Italy. The next section then considers trends in productive investment, the evolution of competitiveness (including an assessment of the importance of the tradeable sector in the two economies) and the complexity of the two areas’ exports. Section V assesses the presence (or absence) of social norms supportive of growth in the two regions that may help account for integration with divergence in Italy and with convergence in Germany.

## I. Stylized Facts

Figure 1 (left panel) presents data on constant price GDP per capita since the early 1990s in East Germany and in the *Mezzogiorno*, expressed as ratios of the GDP per capita of the two countries’ richer regions (West Germany and the Centre-North respectively).<sup>1</sup> The visual evidence points to two fairly clear conclusions: Italy has seen virtually no GDP per capita convergence between South and North;<sup>2</sup> Germany, by contrast, appears to have witnessed rapid convergence between East and West since unification.

A not dissimilar picture emerges for the gap in (constant price) consumption standards (Figure 1a, right panel). Since both countries are political unions, national taxes and transfers are able to decouple regional consumption from regional production. The equalizing effect of interregional transfers arising from fiscal policies can be clearly seen in Figure 1b: the gap in consumption between the richer and the poorer regions is much smaller throughout the period than is the per capita GDP gap. By 2015, per capita consumption in East Germany stood at 85 per cent of the Western level as against a 68 per cent ratio for per capita GDP. The Italian figures in 2014 were 68 and 56 per cent respectively. Interestingly, the trends in consumption broadly match (if more starkly) those of GDP: East German consumption has converged to that of the West whilst *Mezzogiorno* consumption has fallen further behind that of the rest of the country.

These broad-brush conclusions are confirmed by the econometric evidence presented in Table 1 for the GDP per capita gap. For Italy this table updates the results already shown in the authors’ earlier paper [Boltho *et al.*, 1997], results which conclusively rejected the hypothesis of convergence over the period 1950-90 (with the possible exception of the 1960s), in line with much of the literature on the subject [e.g. Mauro and Podrecca, 1994; Paci and Pigliaru, 1999]. Over the period 1990-2014 Italy did experience convergence, but only within the geographical areas and not between them. The estimated  $\beta$  coefficient is positive and significant, but the South dummy is negative and also significant, implying divergence of the Southern regions from the Centre-North. This result is entirely driven by the 1990s, when both coefficients were significant and relatively large in size, whilst the 2000s experienced neither within nor between regional convergence.

Fig.1. Germany and Italy: The Regional Problem

“Poor” regions’s GDP per capita (left panel) and consumption per capita (right panel) in percent of “rich” region’s; constant prices

Figure 1a  
GDP per capita

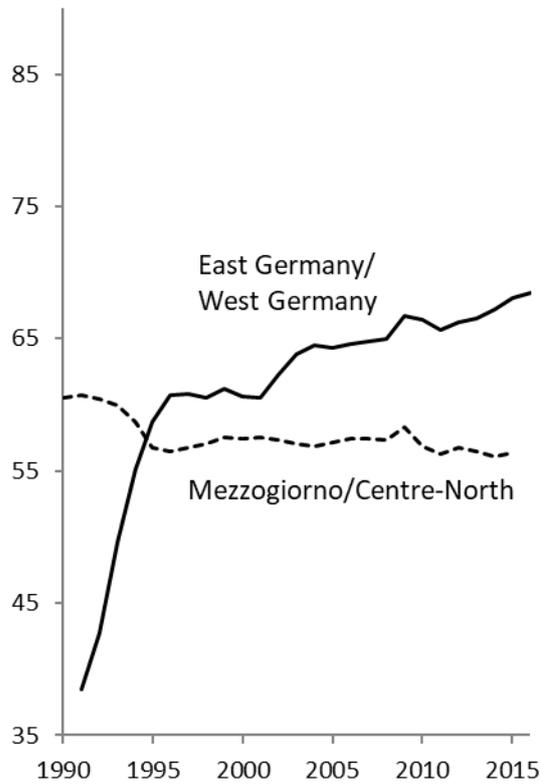
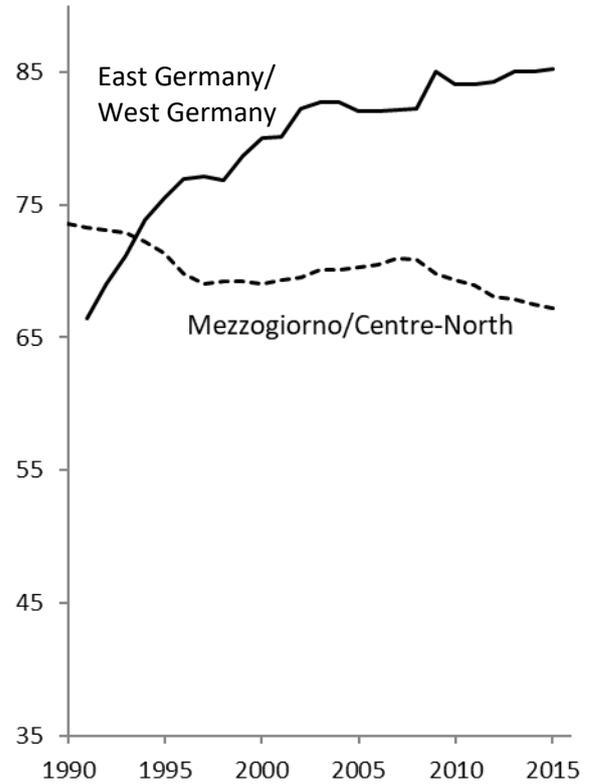


Figure 1b  
Consumption per capita



Sources: Statistische Ämter des Bundes und der Länder, Volkswirtschaftliche Gesamtrechnung der Länder; ISTAT, Conti e aggregati economici territoriali.

Table 1

## Regressions for per capita output growth, 1990-2016

	Germany			Italy		
	1991-2000	2000-16	1991-2016	1990-2000	2000-15	1990-2015
Dependent variable: $[\ln(Y_{i,t+T}) - \ln(Y_{i,t})]/T$						
Const.	-0.027 (0.059)	0.064* (0.027)	0.040 (0.029)	0.422*** (0.106)	-0.037 (0.054)	0.180** (0.060)
$\beta$	-0.003 (0.005)	0.006 <sup>+</sup> (0.003)	0.003 (0.003)	0.051** (0.017)	-0.003 (0.005)	0.023* (0.010)
East	0.054*** (0.006)	0.005* (0.002)	0.020*** (0.003)			
Centre				-0.003 (0.002)	0.002 (0.002)	-0.003 (0.002)
South				-0.020** (0.006)	0.006 (0.003)	-0.009** (0.003)
No. obs.	16	16	16	20	20	20
Root MSE	0.0047	0.0026	0.0026	0.0057	0.0029	0.0034
$\bar{R}^2$	0.964	0.684	0.947	0.451	-0.047	0.260

Note: Heteroskedasticity-robust standard errors in brackets.

Estimated equations:

$$\frac{1}{T} \cdot [\ln(y_{i,t+T}) - \ln(y_{i,t})] = A - [(1 - e^{-\beta T})/T] \cdot \ln(y_{i,t}) + \gamma \cdot D_j + u_{i,t,t+T}$$

where  $i$  denotes the region and  $D_j$  denotes dummies for the poor regions ( $j = \text{East}$  for Germany, and  $j = \text{Centre}$  and  $\text{South}$  for Italy).

Germany:

West: Baden-Württemberg, Bavaria, Berlin, Bremen, Hamburg, Hessen, Lower Saxony, North Rhine-Westphalia, Rhineland-Palatinate, Saarland, Schleswig-Holstein.

East: Brandenburg, Mecklenburg-Vorpommern, Saxony, Saxony-Anhalt, Thuringia.

Italy:

North: Piedmont, Aosta Valley, Liguria, Lombardy, Trentino-Alto Adige, Veneto, Friuli-Venezia Giulia, Emilia-Romagna.

Centre: Tuscany, Marche, Umbria, Lazio.

South: Abruzzo, Molise, Campania, Apulia, Basilicata, Calabria, Sicily, Sardinia.

\* Significant at 5%.

\*\* Significant at 1%.

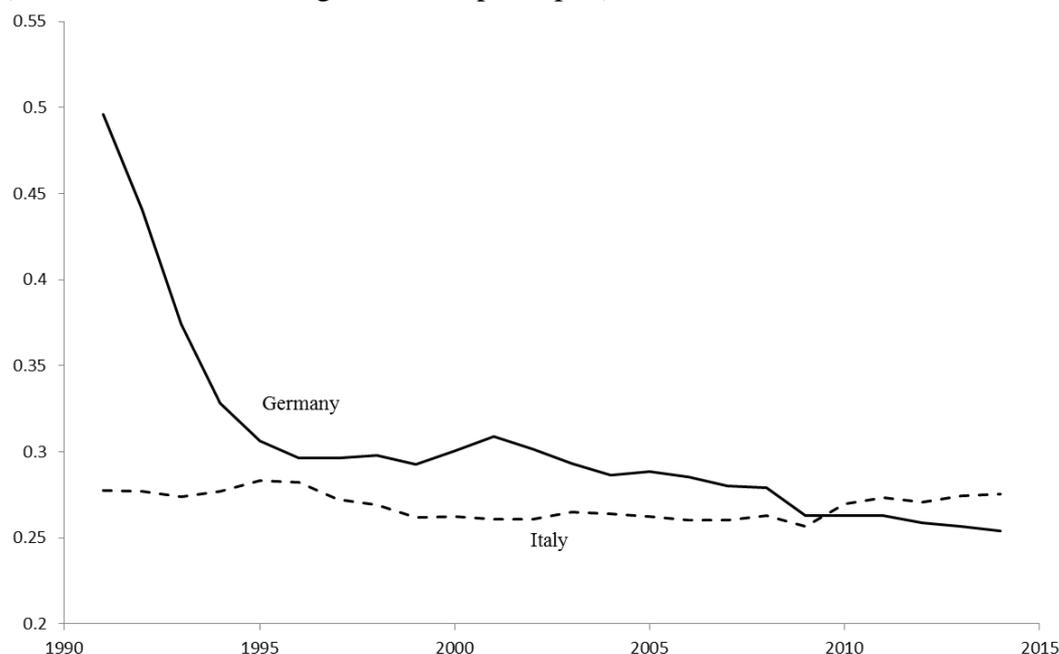
\*\*\* Significant at 0.1%.

The German picture is quite different. The very small and barely significant values of the  $\beta$  coefficient (negative during the first decade 1991-2000 and positive during 2000-16), suggest that there was no overall convergence in the country. This matches the Italian results and clearly does not fit the 2 per cent “convergence rule” proposed by Barro and Sala-i-Martin [1991]. The East dummy, however, is positive throughout the period, and particularly large during the 1990s. The Eastern *Länder* therefore grew faster than the Western ones (by 5½ percentage points per year on average during the period). The subsequent decade or so witnessed, however, much slower catch-up between East and West with convergence of Eastern *Länder* barely more rapid than that among those in the rest of the country. An alternative periodization for East Germany, excluding the years of very rapid convergence between 1991 and 1995, finds similar results: convergence for the East in the period 1995-2004, absence of East-specific convergence during 2005-2016, and convergence for the period as a whole. Analysis of so-called  $\sigma$ -convergence – the standard deviation of regional GDP per capita as shown in Figure 2 – broadly confirms these results. GDP dispersion remained virtually unchanged in Italy since 1990, whereas it fell sharply in Germany during the first half of the 1990s and, following some stabilization over the next decade, resumed a gentle and steady downward trend since then.

Very similar results emerge for consumption (not shown separately, but available from the authors). There is statistically significant convergence in per capita consumption between East and West Germany in the 1991-2000 period, but not over 2001-15, and there is highly statistically significant divergence between the Centre-North of Italy and the *Mezzogiorno* in both sub-periods.

Figure 2. GDP per capita Dispersion

(standard deviation of regional GDP per capita)



Sources: Statistische Ämter des Bundes und der Länder, Volkswirtschaftliche Gesamtrechnung der Länder; ISTAT, Conti e aggregati economici territoriali.

## II. Theories of Regional Integration and Convergence

Table 1 above has shown results for absolute convergence equations in GDP per capita. This method follows the earlier work of Barro and Sala-i-Martin [1991, 2004], who, when surveying within-country convergence of states for the USA and prefectures for Japan used the same formulation with dummy variables for larger regions (respectively north, south, east and west for the US and districts for Japan). Unlike the Italian and German cases, these authors report similar rates of convergence within and between regions.

An alternative approach within the neoclassical growth model tradition is to estimate conditional convergence equations following Mankiw *et al.* [1992]. Abstracting from common exogenous technological progress, steady state regional differences in GDP per capita arise from persistent differences in a few key variables (e.g., the saving rate or the population growth rate). For Italy, Di Liberto *et al.* [2008] show evidence of total factor productivity (TFP) and factor-intensity convergence among Italian regions between the mid-1960s and mid-1970s, but not since. Byrne *et al.* [2009] find significant differences in TFP levels between the Centre-North and the South, and confirm that there was no convergence in TFP across regions over the period 1970-2001. For Germany, Burda and Hunt [2001] found that productivity growth rose rapidly at first in the East following unification, but then stalled after about 1995. Burda and Severgnini [2015] confirm a significant TFP gap in the East, which they attribute to a lower density of managers and to insufficient R&D expenditure. Keller [2000] on the other hand, very plausibly points to rapid imports of both embodied and disembodied West German technology into East Germany as a major reason for the area's success.

The contrasting experiences of East Germany and Southern Italy suggest that a somewhat different approach may help to uncover the mechanisms at work that explain why a poor region remains poor despite low barriers to factor mobility and trade. International trade theory provides a possible anchor. In its traditional form, this theory argues that trade is driven by differences in endowments (Heckscher-Ohlin) or in productivity (Ricardo) across countries (or regions). Regional integration, by extending the size of the market and increasing opportunities for specialization according to comparative advantage, would raise productivity across all regions. In the presence of diminishing returns, this, in turn, would promote convergence.

“New” trade theory suggests, however, that countervailing forces due to positive feedbacks such as economies of scale are also possible, with integration leading to rising, rather than declining, differences between regions (or nations) [Matsuyama, 2004]. In other words, trade itself can be the cause of divergences across geographic areas. Even regions that were initially identical could evolve to different steady states if affected by different shocks. Moreover, if sectors differ in ways that interact with country- or region-specific market imperfections, institutions or culture, specialization under integration can sustain multiple equilibria. Evidence of the independent role of a number of such sources of comparative advantage – in addition to standard Heckscher-Ohlin endowment effects – is found for a large cross country dataset and reported by Chor [2010]. The method applies to comparative advantage the technique introduced by Rajan and Zingales [1998] to investigate growth in which a measure of industry performance in a sample of countries is regressed on the interaction of a variable

capturing industry characteristics estimated from a single country (usually the US) with individual country characteristics, such as, for instance, the presence of the rule of law. As applied to trade, the dependent variable is bilateral exports.

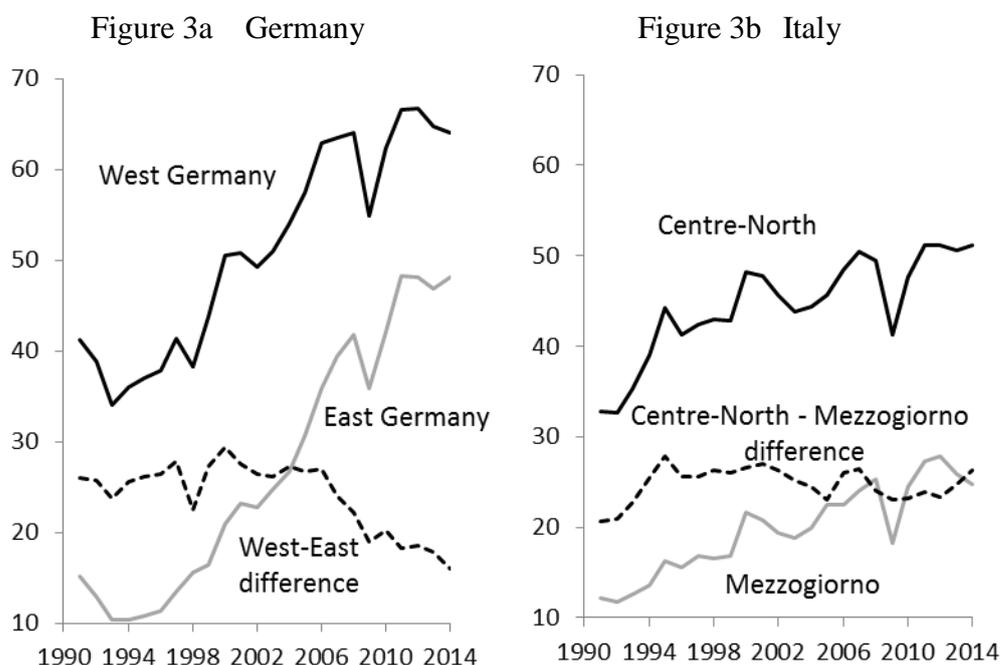
One aspect, in particular, that has been shown in such cross-country research to drive comparative advantage, is the complexity of tradeable goods produced. Chor [2010] reports the independent significance of three different channels through which complexity of exports interacts with the rule of law. Levchenko [2007] measures complexity by the number of input suppliers, Nunn [2007] by the relationship-specificity of goods as indicated by the share of their inputs not traded on organized exchanges (such as commodity exchanges) or with reference prices (e.g. published in catalogues), and Costinot [2009] by job complexity, which requires that firms and workers enter contracts inducing high effort in the absence of monitoring. In a separate literature on exports and growth, Hausmann *et al.* [2013] rank manufactured products by the amount of know-how required to produce them.

The presence of complex exports, in turn, is a function of institutional features characterizing countries (or regions). The evidence points to the role of formal and informal institutions, such as the *de jure* and *de facto* rule of law, and culture. Trust can substitute for formal legal enforcement and Tabellini [2008] finds that there is a tendency for countries with higher trust among its citizens to specialize in the production of relationship-intensive goods (the same could be expected for countries able to enforce the rule of law). Similarly, countries (or regions) where trust between employers and employees exists have a comparative advantage in goods that require many tasks for which monitoring of quality is not possible [Costinot, 2009]. As Belloc and Bowles [2013, 2017] show in a theoretical model, trust can play a role in sustaining divergence under integration. Complex goods require quality labour inputs and can only be produced where there is an “institutions-culture convention” in which managers offer a partnership contract and workers respond reciprocally by exerting unmonitored effort. If such a “convention” or social norm is present in one region/country, but not in the other, trade enhances the persistence of existing cultures and institutions. The lagging region benefits from gains from trade; this reinforces its specialization in the production of simple goods, and thus raises the cost of switching away from its “hierarchical-management convention” that cannot produce the complex good. The opposite happens in the high trust region.

### **III. Trade and Growth**

The previous section has argued that the ability of a region to specialize in complex tradeable products could be a crucial variable for explaining persistent GDP per capita differences across geographic areas even when there are low barriers to factor mobility and trade. As a first step in the argument, Figure 3 compares the share of total trade in output for the two cases. In both countries, the richer region shows higher tradeable shares than the poorer one, but East Germany exhibits a sharply rising share in recent years and seems to be closing the gap with the West, in contrast to the more modest evolution in the *Mezzogiorno*. East Germany’s openness in the early to mid-1990s was similar to that of the *Mezzogiorno* at the time; today it is almost twice as high and converging to that of the Centre-North of Italy.

Figure 3. Foreign Trade Share  
(Merchandise exports plus imports in % of GDP)



Sources: Statistisches Bundesamt, Aussenhandel, Jahresdaten ab 1970; ISTAT, Commercio estero, serie storiche.

This suggestion is tested more precisely in Table 2, which shows the results of an econometric exercise regressing regional GDP per capita on trade shares in 2012, following an instrumental variables (IV) approach (full details are provided in the Statistical Annex). The methodology adopted here was originally developed by Frankel and Romer [1999] who used the geographic network of trade as an exogenous instrument to investigate the issue of causality and concluded that it was trade that generated high income. The results shown in the Table (which replicates the Frankel and Romer approach) confirm the role of foreign trade in differentiating regional incomes in both Germany and Italy, in line with earlier work along these lines [Buch and Toubal, 2009; Buch and Monti, 2010]. Interestingly, in the cross-section results the role of foreign trade seems to be more important in Italy than it is in Germany, as shown by the much larger coefficients on the trade share. This suggests that the *Mezzogiorno's* income per capita is held back by the region's limited involvement in international trade much more so than is the case in East Germany.

Table 3 adds to these regressions a dummy variable for the two “poor” regions.<sup>3</sup> This variable is not significant in the case of East Germany, but for Italy it is highly significant in the OLS version and marginally significant in the IV version. Including the dummy variable greatly improves the explanatory power of the IV model in the case of Italy. One possible (and plausible) interpretation of these results is that East Germany’s lower per capita GDP is well accounted for by its lower propensity to trade relative to West Germany, while Southern Italy’s income gap is due not only to this factor, but also to other unfavourable, and possibly non-economic, features associated with the *Mezzogiorno*.

Table 2

## Regressions for trade and GDP per capita - 1

	Germany		Italy	
	OLS	IV	OLS	IV
Dependent variable: $\ln(Y/Population)$				
Const.	2.459*** (0.277)	2.455*** (0.237)	4.735*** (0.855)	5.327*** (1.116)
Trade share	0.608*** (0.064)	0.612*** (0.088)	1.269*** (0.270)	2.228*** (0.356)
Ln population	0.183*** (0.040)	0.183*** (0.035)	-0.020 (0.101)	-0.072 (0.097)
Ln area	-0.100*** (0.015)	-0.100*** (0.014)	-0.196 (0.144)	-0.255 (0.187)
No. obs.	16	16	20	20
Root MSE	0.112	0.097	0.197	0.222
$\bar{R}^2$	0.804	0.805	0.428	0.093

*Note:* Estimation methods: ordinary least square (OLS) for Columns 1 and 3; instrumental variables (IV) for Columns 2 and 4. Endogeneous variable: trade share. Heteroskedasticity-robust standard errors in brackets.

\*\*\* Significant at 0.1%.

Table 3

Regressions for trade and GDP per capita - 2

	Germany		Italy	
	OLS	IV	OLS	IV
Dependent variable: $\ln(Y/\text{Population})$				
Const.	2.677*** (0.370)	2.732*** (0.265)	3.474*** (0.855)	4.442*** (0.718)
Trade share	0.570*** (0.074)	0.535*** (0.090)	0.360 (0.222)	1.386** (0.436)
Ln population	0.147* (0.062)	0.145*** (0.051)	-0.066 (0.035)	-0.076 (0.061)
Ln area	-0.086** (0.026)	-0.088*** (0.025)	0.027 (0.064)	-0.116 (0.119)
Dummy for "poor" region	-0.083 (0.085)	-0.090 (0.066)	-0.417*** (0.081)	-0.217+ (0.119)
No. obs.	16	16	20	20
Root MSE	0.111	0.093	0.109	0.144
$\bar{R}^2$	0.805	0.804	0.825	0.590

*Note:* Estimation methods: ordinary least square (OLS) for Columns 1 and 3; instrumental variables (IV) for Columns 2 and 4. Endogeneous variable: trade share. Heteroskedasticity-robust standard errors in brackets.

+ Significant at 10%.

\* Significant at 5%.

\*\* Significant at 1%.

\*\*\* Significant at 0.1%.

Having established some support for a causal role for foreign trade at a moment of time, a more elaborate attempt was made to search for a driving role for foreign trade through time. This is presented in Table 4 which shows the results of linking the evolution of the GDP per capita gap over the last decade (data availability limits the time span to the years 2004-14) to the same geographic network of trade data already used to obtain the results shown in Tables 2 and 3. The model was estimated by pooled panel regression, both by OLS and by instrumental variable (the constructed trade share was obtained

using a similar two-step procedure as for Tables 2 and 3). The results broadly confirm those of Tables 2 and 3. The trade share is positive and statistically significant for Germany, and only weakly significant for Italy when estimated by OLS. The dummy for the poor region is only weakly significant with OLS, but ceases to be significant when the trade share is instrumented. It is interesting to look at the role of the trade share interacted with the dummy for the poor region. For Germany, the interaction is negative but less than the coefficient on the trade share. The role of trade for East German regions is thus lower than for West German regions for the decade from 2004, but remains positive: the estimated coefficient is 0.051 for OLS and 0.026 with IV, and is statistically significant for both (the test statistics are  $F = 95.22$  for OLS and  $Chi2 = 10.75$  for the IV estimation). The trade coefficients are however not significant for Italy, neither for the whole country nor for the southern regions. These findings suggest that trade has played an important role in driving GDP per capita growth through time in East Germany, but has not done so in the *Mezzogiorno*.

Table 4

Regressions for trade and GDP per capita – Panel data, 2004-2014

	Germany		Italy	
	OLS	IV	OLS	IV
Dependent variable: ln(Y/Population)				
Const.	8.528 (7.565)	12.510 (8.153)	7.307 (29.558)	1506.7 (6228.0)
Trade share	0.073*** (0.004)	0.083*** (0.007)	0.510+ (0.278)	-77.18 (303.8)
Ln population	0.161*** (0.017)	0.170*** (0.016)	-0.675*** (0.078)	1.368 (8.653)
Ln area	-0.105** (0.008)	-0.110*** (0.008)	0.873*** (0.124)	0.804 (5.562)
Dummy for “poor” region	-16.450+ (9.865)	-30.970 (11.320)	19.830+ (39.184)	-2417.8 (10438.1)
Trade share × Dummy for “poor” region	-0.022*** (0.006)	-0.057*** (0.011)	-0.746+ (0.391)	180.0 (765.3)
Year	-0.004 (0.004)	-0.006 (0.004)	-0.004 (0.015)	-0.744 (3.066)
Year × Dummy for “poor” region	0.008+ (0.005)	0.016** (0.006)	-0.010 (0.020)	1.180 (5.098)
No. obs.	176	176	220	220
Trade variables	95.22***	10.75***	0.65	0.05
“Poor” region vars.	15.08***	44.62***	22.03***	0.11
Root MSE	0.109	0.111	0.469	12.84
$\bar{R}^2$	0.833	0.819	0.611	-

*Note:* Estimation methods: ordinary least square (OLS) for Columns 1 and 3; instrumental variables (IV) for Columns 2 and 4. Endogenous variable: trade share. Heteroskedasticity-robust standard errors in brackets.

Trade variables: test on the sum of the coefficients on the trade variables ( $F$  test for OLS,  $Chi2$  for IV):

(Trade share) + (Trade share  $\times$  Dummy for “poor region).

“Poor” region variables: test on the sum of the coefficients on the trade variables ( $F$  test for OLS,  $Chi2$  for IV):

(Dummy for “poor” region) + (Trade share  $\times$  Dummy for “poor” region) + (Year  $\times$  Dummy for “poor” region).

+ Significant at 10%.

\* Significant at 5%.

\*\* Significant at 1%.

\*\*\* Significant at 0.1%.

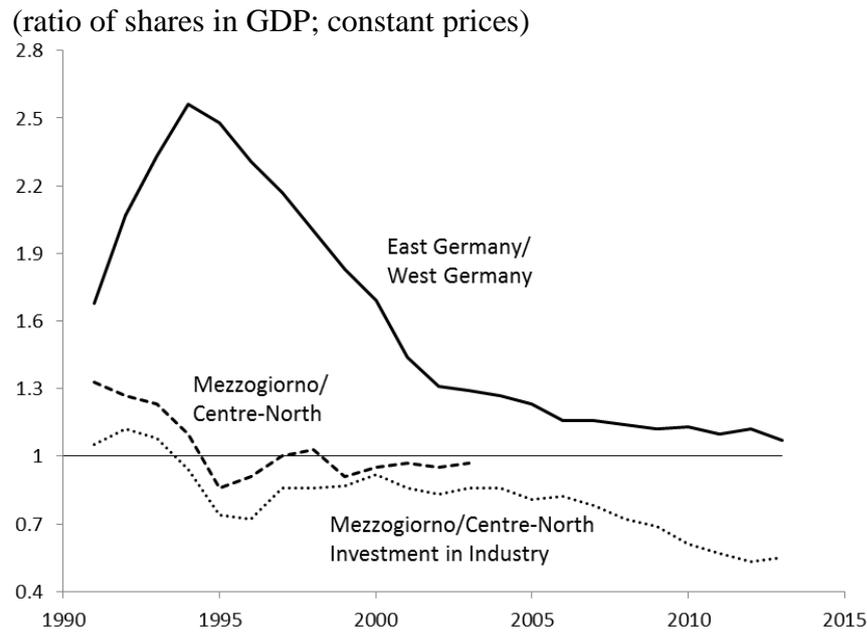
#### **IV. Investment, comparative costs and complex exports**

The previous section contrasted the scale and evolution of the tradeable sector in Italy and Germany, and confirmed at the regional level the Frankel-Romer result that success in trade is important for raising GDP per capita. The models in Section II provide some overall guidance about the mechanisms that may, or may not, drive integration, through which regions in a country can benefit differentially. The following will focus on three of these: investment, competitiveness and the complexity of exports.

##### ***Investment***

Italy’s post-war experience suggests that high levels of investment in machinery and equipment in the *Mezzogiorno* relative to the Centre-North were an important reason for the short-lived convergence that the country experienced in the decade from the mid-1960s, and that subsequent subdued productive investment trends in the South share much of the blame for the lack of convergence in the 1970s and 1980s [Boltho *et al.*, 1997]. The same story seems to apply in more recent times. Relative to the North of the country, investment in machinery and equipment weakened further in the 1990s and in the early 2000s [Figure 4]. Since 2003 data on this variable are no longer available, but use of an imperfect proxy (fixed investment in the manufacturing sector) suggests that relative decline has, if anything, accelerated over the last decade or so.

Figure 4. Germany and Italy: Investment in Machinery and Equipment



Sources: Statistische Ämter des Bundes und der Länder, Volkswirtschaftliche Gesamtrechnung der Länder; ISTAT, Conti e aggregati economici territoriali.

The evidence available for East Germany shows a different evolution. In the early years of unification (1991-2000), when the West poured resources into the East of the country primarily in infrastructure provisions, the ratio of investment in machinery and equipment to GDP was, in East Germany, well above that of West Germany [Figure 4]. These happened to be years of extremely rapid GDP per capita convergence. Since then, as investment subsidies were phased out and the quality of East Germany's infrastructure reached best practice levels, the difference in investment performance between the two regions has gradually diminished (and convergence has also slowed down).

Over the last twenty years, the contrast between Italy and Germany in this area is striking and fits well with the contrast in convergence shown in Figure 1. And the picture fits also with what is known about public involvement in investment. The Italian government actively promoted investment in the South in the 1960s, both directly through State-owned enterprises and indirectly via help to the private sector, but then gradually abandoned such efforts in subsequent decades, shifting the focus of aid policies towards the creation of public sector jobs and income maintenance transfers. Policy-driven success in raising investment appears to have achieved a temporary halt to the relative decline of the *Mezzogiorno*. But the positive feedbacks of increasing returns and agglomeration effects in industry associated with the episode were insufficient to produce a lasting change in industrial structure in the South.

There are some similarities with the concentrated phase of public involvement in investment in East Germany that immediately followed reunification. Most public efforts to sustain machinery and equipment investment were in the early years of

unification; expenditure in more recent times saw a shift towards social welfare transfer payments. That this, however, has not translated into a halt to the GDP per capita convergence process between East and West, as happened in Italy, is almost certainly linked to the much more successful performance of the East German private sector and, in particular, of its tradeable industries.

### *Competitiveness and the Tradeable Sector*

As was rightly argued [Sinn and Westermann, 2000], one of the main obstacles that Italy has had to face in its attempts to develop the South has been the near equalization of wage levels between richer and poorer areas of the country despite the continuing existence of significant gaps in productivity levels. This has had predictable consequences on the competitiveness of the backward regions and, as was argued in the authors' earlier paper, clearly held back Southern Italian growth [Boltho *et al.*, 1997]. For Germany a similar danger was feared in the light of early proposals to transfer West Germany's wage bargaining structures and welfare system to the East, with an aim of raising Eastern wage levels to 85 per cent of those in the West. Indeed, for the crucial engineering sector, wage parity was expected to occur as early as in 1994. In the event, these dangers have not materialized. Already in the early years of unification the available evidence was suggesting that wage level convergence was much slower and less widespread than had been feared at the outset.

Developments in Germany since then have broadly confirmed that the East German labour market has adapted with a surprising degree of flexibility to unification, a flexibility that has, so far at least, escaped the labour market of Southern Italy. It is true that compensation levels have not risen in either region relative to their richer counterparts. Throughout the last two decades they stood at some 80 per cent of the Centre-North level in the *Mezzogiorno*, and, from the mid-1990s, at some 70 per cent, of the West's level in East Germany. But labour productivity in industry fell in Southern Italy relative to the Centre-North, while it rose very rapidly in East Germany from the low point of 1991, going from merely one quarter of the West German level to three quarters by 2004. It is true, however, that this convergence has stalled since the outbreak of the "Great Recession".

These developments are combined into a measure of unit labour costs in manufacturing shown in the left panel of Figure 5. The chart speaks for itself. Italy's South has, over the last two decades, had a real exchange rate that seems too high. Admittedly, the gap between North and South is not huge (and, if a proper allowance could be made for underground economic activities, which are much more widespread in the *Mezzogiorno*, the gap might even disappear altogether). But German developments are of a different order of magnitude. Over the last twenty years unit labour costs have nearly halved in East Germany compared to what was happening in West Germany. No doubt, East Germany's real exchange rate in 1991 must have been hopelessly uncompetitive, but this no longer seems to be the case today. This being said, the last few years have seen the downward trend in the East's real exchange rate interrupted as productivity growth recovered more slowly in the new *Länder* after the "Great Recession" than it did in West Germany.

The right panel of Figure 5 shows the external trade position of the two poor regions. Taking the deficit on goods and non-factor services as a proxy for the net absorption of

real resources,<sup>4</sup> yields figures for the two areas that are very similar for the period 2000-14 (21 and 22 per cent of GDP for East Germany and the *Mezzogiorno* respectively), but while there is virtually no trend in the Italian data, the East German figure decreases rapidly through time (falling to 13 per cent in 2014<sup>5</sup> as against Italy's 19 per cent in that year).

Figure 5. Germany and Italy: Relative Unit Labour Costs in Industry and External Balance

Figure 5a  
Relative Unit Labour Cost, 1990 or 1991=100

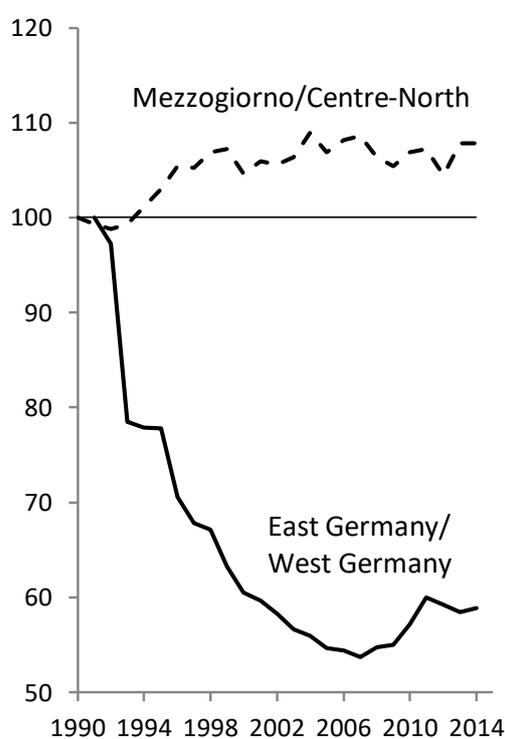
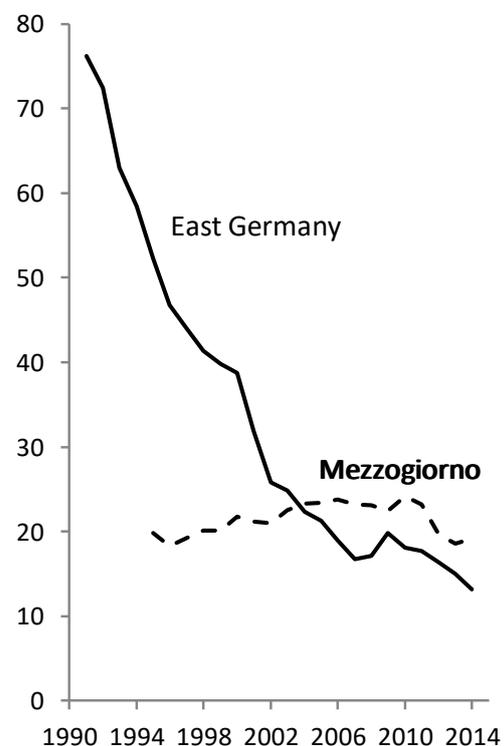


Figure 5b  
Deficit on Goods and Non-Factor Services (in per cent of GDP)



Sources: Statistische Ämter des Bundes und der Länder, Volkswirtschaftliche Gesamtrechnung der Länder; ISTAT, Conti e aggregati economici territoriali.

A test of the proximate importance of investment and competitiveness for trends in GDP per capita is investigated in Table 5 which presents econometric results based on a specification almost identical to the one used in the authors' earlier paper to throw light on developments in the Italian *Mezzogiorno*/Centre-North GDP per capita gap for the period 1957-1993 [Boltho *et al.*, 1997].<sup>6</sup> The major difference with the approach followed in that paper is the addition of migration as a further variable following the work by Burda and Hunt [2001] and Hunt [2006] on the role of migration in the factor mobility channel for convergence.<sup>7</sup> During the estimation process it was found that a statistically significant structural break could be observed in 2002 in Germany.<sup>8</sup> Hence a dummy variable from 2002 was also introduced into the specification. The results for

Germany show that the three variables, investment, competitiveness and migration, are statistically highly significant, with the regression accounting for virtually the total variance in the East/West GDP per capita evolution. Despite the limited variation in the dependent and independent variables over the estimation period in Italy, reflected in the lack of significance of the lagged dependent variable, the results for Italy are similar, although migration is not significant. Taking account of the lagged dependent variable in Germany, the size of the coefficient on competitiveness, measured by relative unit labour cost, is virtually the same in both countries.

The standardized coefficients show that the investment gap and unit labour costs are the most important variables for Germany, with long-run standardized elasticities at the means of 0.24 and -0.27 respectively, whereas for Italy the unit labour cost variable is the most important factor in influencing the output gap, with a long-run standardized elasticity of -0.53.

Table 5

Regressions for evolution of per capita output gap between the “poor” and the “rich” region

	Germany (1992-2014)	Italy (1991-2014)
Dependent variable: GDP per capita (“poor”)/GDP per capita (“rich”) (in const. prices)		
Const.	34.796*** (4.541)	67.696** (18.980)
GDPgap <sub>t-1</sub>	0.445*** <i>0.578</i> (0.044)	0.175 <i>0.190</i> (0.239)
Invgap <sub>t-1</sub>	7.042*** <i>0.292</i> (1.467)	2.607* <i>0.305</i> (1.235)
ULC	-0.144*** <i>-0.269</i> (0.027)	-0.242* <i>-0.536</i> (0.088)
Migration from East/South <sub>t-1</sub>	0.00003*** <i>0.157</i> (0.000006)	-0.00005 <i>-0.146</i> (0.00004)
Dummy 2002	4.152*** <i>0.365</i> (0.667)	
No. obs.	23	24
SE of regression	0.621	0.592
$\bar{R}^2$	0.988	0.804

*Note:* Standardized regression coefficients in italics. Heteroskedasticity-robust standard errors in brackets.

GDPgap = Ratio of “poor” region’s GDP per capita to “rich” region’s GDP per capita.

Invgap = Ratio of investment in machinery and equipment/GDP in “poor” region to investment in machinery and equipment/GDP in “rich” region.

ULC = Ratio of manufacturing unit labour costs in “poor” region to manufacturing labour costs in “rich” region.

A Chow test on a structural break in the coefficients in 2002 for Germany gives  $F = 5.402$ ,  $p=0.0066$ .

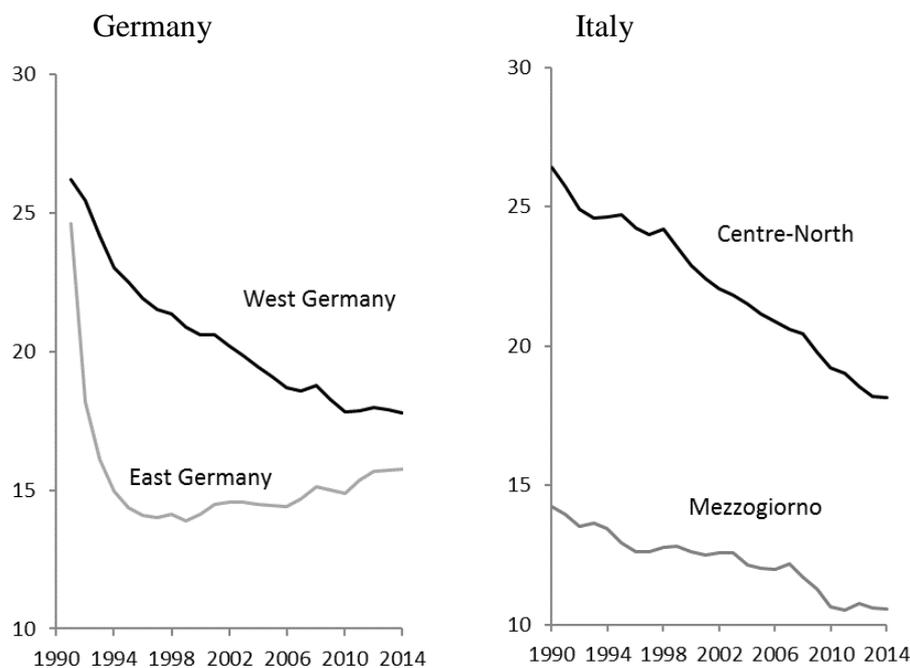
\* Significant at 5%.

\*\* Significant at 1%.

\*\*\* Significant at 0.1%.

An alternative illustration of diverging competitiveness trends is provided in Figure 6 which looks at the evolution of employment in the manufacturing sector. Not surprisingly perhaps, manufacturing employment declines over the last two decades in both the richer and the poorer regions of the two countries (the results for employment in a much broader measure of the tradeable sector are very similar).<sup>9</sup> The drop is particularly noticeable in East Germany which, in 1991, had inherited an overly developed industrial sector from its Communist past. De-industrialization, accelerated by a totally uncompetitive exchange rate and by the often destructive operation of the *Treuhandanstalt* (the organization charged with privatizing Eastern enterprises), was thus extremely rapid in the early years of unification. From the mid-1990s, however, while de-industrialization continued in West Germany, it was slowly reversed in the East, in stark contrast to what was happening in Southern Italy. Here, the already low share of manufacturing employment went on declining, and at a somewhat faster rate than was recorded in the Centre-North of the country. While such employment in West Germany is still higher than it is in East Germany, the latter region has been closing the gap in recent years, no doubt reflecting the trends in relative competitiveness shown in Figure 5a. In Italy, by contrast, relative de-industrialization has continued.

Figure 6. Employment in Manufacturing (in per cent of total employment)



Source: Oxford Economics Data Bank.

### ***Export complexity***

It is noteworthy that the share in total exports accounted for by the most advanced and complex manufacturing sector (machinery and transport equipment), is very similar in East and West Germany (48 and 52 per cent respectively), while it is much lower in both absolute and relative terms in the *Mezzogiorno* (27 per cent, as against the 39 per cent of the Centre-North). And this share has declined dramatically since the late 1990s, in contrast to the rough stability recorded elsewhere in Italy. Regional commodity trade

data for Germany are only available since 1995. Between that date and 2014, this share has risen somewhat in East Germany (bar the sharp drops experienced in both parts of the country during the “Great Recession” of 2009-10). Indeed, the share of such high-tech industries as pharmaceutical and electronic machinery in total exports has been higher in the East than in the West in every single year since 2002 (the Italian data do not provide a similarly detailed breakdown).

The reason for concentrating attention on such lines of activity is that recent research has shown that “specializing in some products will bring higher growth than specializing in others” [Hausmann *et al.*, 2007, p.1]. And the goods that are conducive to growth are complex ones (i.e. requiring numerous and diverse capabilities). A rough attempt was made to estimate the “complexity” of the two poorer regions’ export bundles by applying the “product complexity indices” shown in Hausmann *et al.* [2013], to the commodity trade data.<sup>10</sup> In 2014, for instance (but also in 2000) these indices were much higher in East Germany than they were in the *Mezzogiorno* (Table 6). The apparent greater production complexity of East Germany would thus seem to benefit the region (relatively to Southern Italy) in two main ways. First, it is bound to stimulate growth along the lines explored by Hausmann *et al.* [2007]. Second, it suggests that the area enjoys relatively high institutional quality (on which more below), in line with the new approaches to international trade that link export performance in complex sectors to a country’s quality of institutions and levels of trust and that were already mentioned in Section II above [Levchenko, 2007; Costinot, 2009].<sup>11</sup>

This proposition is very simply tested by regressing the 2010 “economic complexity indices” shown in Hausmann *et al.*, [2013] for 128 countries on the World Bank’s “Rule of Law” index, or on Transparency International’s “Perception of Corruption” indices for 2010. Results show that these governance indicators are, indeed, positively correlated with export complexity (and with statistically highly significant coefficients). Controlling for GDP per capita, whether expressed in current dollars or in purchasing power parities, adds virtually nothing to the outcome.<sup>12</sup> These findings apply to countries, not regions, but the available evidence strongly suggests that German regions are fairly uniformly endowed with similar levels of both the rule of law and the relative absence of corruption, while this is hardly the case of Italy [Charron, 2013]. Using the survey evidence presented in Charron *et al.*, [2014] on these two indicators for 2010 and 2013, shows the *Mezzogiorno* falling short of Centre-North standards by very large margins in both areas, while East Germany either lags West Germany by relatively small margins (rule of law in 2013 and corruption in 2010), or actually outperforms West Germany (rule of law in 2010 or corruption in 2013).

The overall conclusions of this and of the previous sub-sections are clear: tradeables seem to be a crucial variable in explaining regional income differences. In East Germany the share of tradeables in output is higher than it is in the *Mezzogiorno*; it has also risen much more rapidly and the export bundle the region sells on world markets is made up of much more complex products than those sold by Southern Italy. There are numerous reasons for these differences, some of which (such as investment efforts or labour market flexibility) have been discussed above. One further reason may well lie in the different formal and informal institutions that characterize the two regions.

Table 6

## Export complexity indices

	Germany	West	East
2010	1.96		
2000	1.87	1.90	1.70
2014	1.70	1.75	1.68

	Italy	Centre-North	<i>Mezzogiorno</i>
2010	1.40		
2000	1.42	1.44	1.26
2014	1.42	1.45	1.27

*Sources:* Hausmann *et al.* , 2013 for 2010 data; authors' calculations for 2000 and 2014. For further detail see text.

## V. Institutions (formal and informal) and regional growth

Much of the literature that has looked at the economic problems of Southern Italy has stressed the importance of historically rooted social factors in holding back the *Mezzogiorno*'s development, and, in particular, the relative absence of pro-growth social norms when compared to the situation of the Centre-North. Social norms, defined as shared understandings about behavior and attitudes, include trust, and underpin the accumulation of social or civic capital.<sup>13</sup>

The origins of these gaps in Italy have, in turn, been traced back to differences in the longer-run evolution of political institutions [Tabellini, 2010] and to the legacy stemming from the existence for several centuries of relatively free city states in the North in contrast to the absolutist regimes in the South [Putnam, 1993; Guiso *et al.*, 2008]. The latter authors, in particular, estimate that up to 50 per cent of the gap in social capital between the North and the South of Italy could be attributed to the early independent city state experience of Central-Northern Italy. In a similar vein, it has been recently argued that different social norms in the *Mezzogiorno* could be indirectly responsible for more than half of the labour productivity gap between the two parts of the country. This conclusion is based on a regional comparison of a very simple task (the time taken in vote counting at national elections) which reveals startling differences in labour efficiency across Italian regions, differences which, it is (plausibly) suggested, could be linked to the presence or absence of social norms of work ethic and trust [Ilzetzki and Simonelli, 2017]

There is no similar literature on Germany possibly because there was no similar contrast in the country's historical development (barring the important interlude of the forty plus years of Communist rule in the East). While Germany was subdivided for centuries into countless small states, many run in absolutist ways [De Long and Shleifer, 1993], there seem to have been relatively few large differences between what are today the West and the East of the country.<sup>14</sup> So-called "free and imperial cities" existed in both areas [Jacob, 2010]. The Hanseatic League was just as active in Hamburg and Bremen as it was in Rostock and Magdeburg. The grid of fluvial and land routes that criss-crossed Germany covered the whole country from the early Middle Ages onwards [Deutsch, 1953] and Leipzig was the seat of a renowned fair since roughly the same time [Bairoch, 1985]. Looking at early human capital formation, while by 1500 Central-Northern Italy had at least a dozen universities, as against the *Mezzogiorno*'s three, what is today Eastern Germany boasted five universities, as against the seven of the much larger West [Verger, 2003].

Turning to more recent times, Germany's industrialization was spearheaded by Saxony in the East. Rough estimates of the share of employment accounted for by industry suggest that in 1861 this stood at perhaps 35 per cent in what is today East Germany, as against some 20 per cent in the Western part of the country. By 1907, these shares had reached 51 and 34 per cent respectively [Tipton, 1976]. In Italy, by contrast, the *Mezzogiorno*'s industrial employment in 1911 stood at 9 per cent of the total population, as against the Centre-North's 13 per cent [Ciccarelli and Missiaia, 2013]. And incomes per capita were almost certainly higher at the end of the 19<sup>th</sup> century in what is today East Germany than they were in the West [Borchardt, 1966]; the most recent Italian estimates indicate, conversely, that at the same time Central-Northern Italians were some 10 to 20 per cent richer than their Southern counterparts [SVIMEZ, 2011].

All this shows that prior to the communist period, there was no west-east gap in economic development in Germany unlike the north-south one that had opened up in Italy by that time. None of it, however, proves that trust and social capital are today more evenly distributed across Germany than they are across Italy. Indeed, there have been suggestions that the forty years of Communist rule in the East might well have destroyed much of the area's pre-existing social capital [Howard, 2003]. In particular, the hugely oppressive presence of the former GDR's security and spying apparatus could have been expected to have significantly reduced trust within the region. This seems confirmed by empirical investigations: the more state surveillance any particular East German district had suffered from in GDR days, the lower were, in the mid-2000s, its electoral participation, sports club membership and organ donations, all indicators often deemed to represent the presence, or absence, of trust [Jacob and Tyrell, 2010; Lichter *et al.*, 2016]. And this absence may well be a contributory factor to these districts' below average per capita incomes and above average unemployment rates [*ibid.*].

Such results are confirmed by research exploring the relative presence of trust in East and West Germany. Evidence using survey data shows that East Germans displayed significantly less trusting attitudes than West Germans not only shortly after unification, but also a decade later [Rainer and Siedler, 2009]. And while some convergence with the West is present, it is very slow: "Individuals who experienced the GDR system still [in 2008] show a relatively higher level of social distrust and skepticism" [Heineck and Süßmuth, 2013, p.798]. Nor can trust have been helped by the ruthless way West

Germany de facto colonized the Eastern *Länder* [Giacché, 2013].<sup>15</sup> Similarly, evidence based on games played by both Eastern and Western citizens has shown that the former exhibit less solidarity than the latter [Ockenfels and Weimann, 1999; Brosig-Koch *et al.*, 2011] and are also more likely to cheat than their Western compatriots [Ariely *et al.*, 2014].<sup>16</sup> All this suggests that an erosion of the stock of social capital took place under a completely different set of political and economic rules and that it persisted after those rules were replaced.

Yet, more direct (and harder) evidence does not indicate that trust and cooperation are now less present *relative to* the West of the country, than they are in the *Mezzogiorno*, relative to the Centre-North of Italy (Table 7). A proxy used to look at the presence or absence of social capital is the extent of underground economic activities. The available comparable estimates of the weight of the shadow economy give a picture that suggests that East Germany is a relatively more law-abiding society than is Southern Italy [Tafenu *et al.*, 2010].<sup>17</sup> Several other trust-related indicators would seem to support the conclusion that trust is more present in relative terms in today's East Germany than it is in Southern Italy. One is the extent of voluntary work that is supplied in the two areas. Another is the presence of non-profit organizations per head of the population (measured following uniform international guidelines). And that most untainted indicator of all, often used to proxy social trust, organ donations, shows that these too are more frequent in East Germany than they are in West Germany, in total contrast to the picture for Italy. There, over the years 2000-14, organ donations per million people averaged 26 per year in the Centre-North and only 11 in the *Mezzogiorno* [Centro nazionale trapianti]. In Germany, over the years 2005-14, the equivalent East German figure (including Berlin) was 17.5, the West German one 13.2 [Deutsche Stiftung Organtransplantation].<sup>18</sup>

Table 7

Some Indicators of Social Capital  
("poor region" in per cent of "rich region")

	Germany	Italy
Presence of underground economy (in % of GDP, 2004)	1.29	1.32
Incidence of voluntary work (population aged 15-64)	0.82 <sup>a</sup>	0.52 <sup>b</sup>
Presence of non-profit organizations (per head of popul.)	1.05 <sup>c</sup>	0.68 <sup>d</sup>
Number of organ donations (per million people)	1.32 <sup>e</sup>	0.43 <sup>f</sup>
EU assessment of government quality (deviations from national average, 2010)	0.21	-0.97

a. Average of 1999, 2004 and 2009.    b. 1995-2014.    c. 2008.    d. 2011.  
e. 2005-14.    f. 2000-14.

*Sources:* Charron *et al.*, 2012; Tafenau *et al.*, 2010; Bundesministerium für Familie, 2010; ISTAT, 2016; Tamm *et al.*, 2011; ISTAT, Censimento dell'industria e dei servizi, primi risultati, 2011; Deutsche Stiftung Organtransplantation; Centro nazionale trapianti

Further indirect evidence on this issue comes from a large comparative exercise, carried out for the European Commission, which attempts to quantify the quality of government in some 170 regions across Europe [Charron *et al.*, 2012; Charron, 2013]. Government quality in this work encompasses a low level of corruption, presence of the rule of law as well as government effectiveness and accountability in areas such as public education, public health and law enforcement. Indices of quality were derived combining national governance data (coming from the World Bank) with regional evidence obtained from a survey of 34,000 EU citizens. Relative to the European average, overall government quality so defined was well below in Italy and well above in Germany in both 2010 and 2013. This may not be very surprising. What is particularly striking, however, is that at the regional level, the government quality of the *Mezzogiorno* was some three times worse than that of the country's Centre-North, while East Germany's regional governments, by contrast, had a score that in 2010 was, on average, actually superior to that of the West German *Länder*, while in 2013 it was only marginally inferior.

More broadly, it is difficult to find any evidence in East Germany of the widespread corruption and rent-seeking which have been endemic in much of Southern Italy over the last few decades. Nor is there any evidence showing the presence of large criminal organizations, such as the well-known *mafia*, *camorra* and *'ndragheta* which have plagued, in particular, Sicily, the Naples area and Calabria. In other words, the legacy of several centuries of relatively advanced institutions and of a relatively successful history (at least in comparison with the *Mezzogiorno*) seems to have left traces in terms of the presence of social capital, trust and institutional quality, despite the destructive experience of four decades of Communism.

This, in turn, is bound to have had significant economic effects. As has convincingly been argued, both trust and social capital are essential elements for the successful workings of a market economy [Arrow, 1972]. More recent empirical research has also shown that the presence of social capital favours economic prosperity and economic growth [Knack and Keefer, 1997; Horváth, 2013]. It is perhaps no great wonder after all that East Germany has, so far at least, managed a relatively successful convergence path, while Southern Italy has dismally failed.

## **Conclusions**

This paper has concentrated on the evolution of regional gaps within Germany and Italy since 1991 when German reunification took place. East Germany has not become a new *Mezzogiorno*, even if the way unification was initially managed could have led (and did lead) many observers to fear such an outcome. While the area has not fully closed the gap in per capita GDP vis-à-vis the Western part of the country, this gap has shrunk from two-thirds in 1991 to less than one-third in 2016. In Italy, over the same period, the gap (at over 40 per cent) has remained virtually unchanged.

The paper draws attention, in particular, to the relative performance of the two regions' tradeable sectors. The rapid rise in the trade/output share of East Germany seems to have been a powerful contributor to the closing of the East-West income gap. The *Mezzogiorno*'s tradeable sector, by contrast, has remained both small and underdeveloped.

Behind the differences in the tradeable performances of East Germany and Southern Italy lie other features such as economic policy, labour market behaviour and, especially, historically based social norms. German economic policy concentrated on infrastructure provision; Italian policies maintained their emphasis on (often debilitating) transfer payments. Labour market behaviour differed, with East German workers accepting compensation levels below those of their West German counterparts, despite earlier union promises of wage equalization. There was no similar moderation in the *Mezzogiorno*.

Trying to compare, let alone measure, the relative contributions of these various factors is virtually impossible. There are clearly mutual interactions at work. The presence of trust encourages private investment, its absence has the opposite effect; trust and norms of hard work also facilitate technology transfers and the social relations needed for producing complex manufactures; these various factors, in turn, may also ease potential labour market conflicts and (in a virtuous circle) contribute to trust building; corruption and rent seeking, on the other hand, stifle productive activity thus reinforcing underdevelopment and, in the process, undermining what little social capital there may be.

The differential experience on the production side also explains the different consumption patterns that have emerged. Convergence in GDP per capita has made it easier for Germany to close the consumption gap between East and West. Absence of this convergence in Italy has meant that transfers have had to shoulder all the burden of keeping up living standards in the *Mezzogiorno*. Given the pressures on the Italian budget, it is no surprise that the country's consumption gap has risen over the last 20 years. Using the deficit in trade and non-factor services (Figure 5) as a proxy for this net absorption, Southern Italy has seen virtually no change in its (large) net absorption of real resources from the rest of the world, East Germany, by contrast has witnessed a sharp drop.

It is not implausible to think that this differing performance, particularly noticeable in the area of advanced and complex manufactured products is, at least in part, linked to the two regions' different histories. East Germany seems clearly endowed with higher levels of trust and social capital than the *Mezzogiorno*, and has not fallen prey to the corruption and rent-seeking that characterize that region today. Much of this difference almost certainly reflects the persistence of social norms and informal institutions. And the higher institutional quality has, in turn, facilitated the production of complex tradeable products in East Germany. The exports this generated have been an important contributor to the per capita GDP convergence the region has seen since unification.

## Footnotes

1. The compositions of the two “poorer” and “richer” regions are shown in the footnotes to Table 1. Berlin, following common usage, is considered as part of West Germany. It could be argued that the transfer of virtually all government activity from Bonn to Berlin might have benefited the neighbouring Brandenburg *Land* and thus given a boost to the economy of East Germany that was absent in Italy. It should be borne in mind, however, that the move created a non-tradeable sector that might have absorbed talent and promoted rent-seeking activities. This is almost certainly what happened in Italy when regions were given significantly greater powers in 2001.
2. This, by the way, has been the case for the better part of a century. Since the 1920s, bar a short period of convergence in the 1960s (which was subsequently undone), Southern Italian GDP per capita has drifted away from that of the Centre-North of the country.
3. Interaction terms between the dummy variable and trade shares were found not to be significant.
4. Net absorption data are available in the Italian regional accounts, but not in the German ones because of the absence of data on stock-building for the 16 *Länder*. To approximate this variable, it was assumed that stock-building at the regional level was the same as at the national one. It is highly unlikely that this simplification can greatly distort the results obtained. It should also be noted that these deficits are vis-à-vis the whole world, not just the rest of the country.
5. And well over 50 per cent in the years 1991-95.
6. At the time a parallel investigation for West/East Germany could not be done since the time series was too short.
7. Data on internal migration for Italy were kindly provided by Dr Frank Heins of the Istituto di Ricerche sulla Popolazione e le Politiche Sociali.
8. Economic explanations for why this break occurs are not easy to find.
9. This wider definition of tradeables encompasses several other activities that are potentially exportable. Employment in “broad” tradeables, as here defined, includes not only the goods-producing sectors (agriculture, mining and manufacturing), but also tourism and a rough estimate of the element of financial services that might potentially be tradeable. To obtain this, it was assumed that a certain share of employment in finance would be devoted to supplying demand internal to the region, while any excess over this minimum level could be considered tradeable employment. The minimum level itself was assumed to be the share achieved by financial service employment in total employment in the German *Land* or Italian region with the lowest such share (usually Brandenburg or Sachsen-Anhalt in Germany and Calabria in Italy).
10. The attempt is rough because the source quoted only shows a limited number of “product complexity” indices, not all of which closely fit the commodity composition of German and Italian exports here used. The overall indices obtained in 2000 and in 2014

(1.87 and 1.74 for Germany, 1.42 and 1.42 for Italy) are not, however, very different from the Hausman *et al.* results for 2010: 1.96 and 1.40 for the two countries respectively. If anything, this suggests that the East German result here shown may well be an underestimate.

11. Further evidence corroborating East Germany's greater relative competitiveness compared to that of Southern Italy comes from a very broad estimate of regional competitiveness produced by the European Commission [Annoni and Kozovska, 2010; Annoni and Dijkstra, 2013]. Some 70 indicators were used to construct an index that covers variables ranging from macroeconomics to educational and infrastructure provisions, from innovation to labour market efficiency, etc. In the first year for which this index is available (2010), the *Mezzogiorno* is shown as lagging Central-North Italy by a much wider margin than the lag between Eastern and Western Germany. By 2013, Southern Italy's relative position had worsened further while East Germany's position had improved.

12. Inserting a dummy for the 11 observations for the OPEC countries, which have relatively high per capita incomes but very low export complexity indices, does not greatly change these results. The governance indicators remain statistically highly significant. Details are available from the authors. As an example, linking export complexity to the presence of the rule of law and to per capita incomes expressed in purchasing power parity in 2010 gives the following result:

$$\text{Export complex.} = -0.19 + 0.52^{***} \text{Rule of Law} + 0.0002 \text{GDP per cap.} - 0.77^{***} \text{OPEC} \\ (0.14) \quad (0.13) \qquad (0.00) \qquad (0.23) \\ R^2 = 0.52.$$

13. Fafchamps [2011] provides a useful framework (based on the way people are allocated to tasks) that links structural change over the course of economic development to changes in social norms.

14. There were, of course, significant differences between East and West before the second world war because of the presence of the, largely agricultural, territories of Pomerania and East Prussia. These, however, were ceded in 1945 and are no longer part of East Germany.

15. Surprising as it may sound, the de-nazification process of the German civil service after the second world war was not only very short-lived but also much milder than the fury with which the East German elites were chased from their jobs, whether they had had a Communist past or not, and this not just in the civil service but also in the scientific, educational and even cultural fields [Giacché, 2013].

16. There is, however, also survey evidence showing that East Germans feel that avoiding taxes is more reprehensible than do West Germans [Torgler, 2003].

17. Indeed, an earlier estimate of the shadow economy in Germany for 1999 (based, however, solely on survey data) had even come to the conclusion that this represented a smaller component of GDP in the East than in the West [Mummert and Schneider, 2002].

18. As for electoral participation, this is lower in East Germany than in West Germany, but the gap for federal elections is of the order of 3 to 8 percentage points [DIW, 2015], as against a gap between the Centre-North and the *Mezzogiorno* of some of 8 to 12 percentage points in Italian legislative (or *politiche*) elections [Regione Emilia-Romagna, 2013].

## Statistical Annex: Instrumental Variables Estimation of Trade and GDP per Capita

The instrumental variables estimation of the effects of trade on GDP per capita closely follows the approach by Frankel and Romer [1999]. In order to capture the geographic component of trade, a gravity model of bilateral trade is separately estimated for Germany and Italy between each region and their main 100 trading partners in the world. The gravity model takes the following form:

$$\ln\left(\frac{\tau_{ij}}{GDP_i}\right) = \alpha_0 + \alpha_1 \ln D_{ij} + \alpha_2 \ln N_i + \alpha_3 \ln A_i + \alpha_4 \ln N_j + \alpha_5 \ln A_j + \alpha_6 (L_i + L_j) + \alpha_7 GDP_j + \alpha_8 B_{ij} + \alpha_9 B_{ij} \ln D_{ij} + \alpha_{10} B_{ij} \ln N_i + \alpha_{11} B_{ij} \ln A_i + \alpha_{12} B_{ij} \ln N_j + \alpha_{13} B_{ij} \ln A_j + \alpha_{14} B_{ij} (L_i + L_j) + \varepsilon_{ij} \quad (A1)$$

where  $i$  denotes the *Land* ( $i = 1, 2, \dots, 16$ : Germany) or the region ( $i = 1, 2, \dots, 20$ : Italy),  $j = 1, 2, \dots, 100$  is the foreign country,  $\tau_{ij}$  measures the bilateral trade between *Land/region*  $i$  and country  $j$ ,  $GDP_i$  is regional GDP,  $D_{ij}$  is the metric distance between region  $i$  and country  $j$ ,  $N_i$  is the population of region  $i$ ,  $A_i$  is its size in km<sup>2</sup>,  $GDP_j$  is the GDP of the foreign country,  $L_i$  is a dummy variable which takes the value 1 if region  $i$  is landlocked,  $L_j$  is a dummy variable which takes the value 1 if country  $j$  is landlocked, and  $B_{ij}$  is a dummy variable which takes the value 1 if there is a common border between region  $i$  and country  $j$ .

Equation (A1) is estimated by OLS separately for Germany and for Italy. Table A1 presents the estimation results for the cross-sectional estimates of Tables 2 and 3. Distance attracts a negative coefficient, even after the interaction with the cross-border dummy is considered: the estimated elasticity of trade with respect to distance between region  $i$  and country  $j$  is about -1 for Germany and -1.1 for Italy. Bilateral trade is increasing in the population of the foreign country and is reduced when either the domestic region or the foreign country is landlocked. The population of the region has a negative coefficient for Germany and positive for Italy, whereas the area of the foreign country is not statistically significant. The dummy for poor regions is negative and significant both for Germany and for Italy.

The fitted values from equation (A1) are used to construct the geographic component of region  $i$ 's trade. Equation (A1) can be expressed compactly in vector form as  $\ln(\tau_{ij}/GDP_i) = \alpha' \cdot x_{ij} + \varepsilon_{ij}$ . The predicted trade share  $\hat{T}_i$  is thus computed as:

$$\hat{T}_i = \sum_{j=1}^{100} \exp(\hat{\alpha}' \cdot x_{ij}) \quad (A2)$$

for each region  $i$ . The predicted values  $\hat{T}_i$  can be used as instruments when regressing the observed trade shares on GDP per capita. The correlation coefficients between the actual and the constructed trade shares are 0.784 for Germany and 0.758 for Italy. Table A2 presents the relationship between observed and constructed trade share. Even after controlling for the population and the size of the regions, the constructed trade share contributes significant explanatory power to actual trade.

The predicted values  $\hat{T}_i$  are then used as instruments for the observed trade shares  $T_i$  in the regressions of GDP per capita of region  $i$  on the trade share, the logarithm of

population, the logarithm of size, and the area dummies  $S_i$  for eastern *Länder* (Germany) and for southern regions (Italy):

$$\ln\left(\frac{GDP_i}{N_i}\right) = \beta_0 + \beta_1 T_i + \beta_2 \ln N_i + \beta_3 \ln A_i + \beta_4 \ln S_i + \eta_i \quad (A3)$$

Equation (A3) is estimated separately for Germany and for Italy both by OLS and by IV, and the regression results are reported in Table 4 (without the area dummies) and in Table 5 (with the area dummies).

In order to validate the separate estimation of GDP per capita in Germany and in Italy, Table A3 presents the results of a pooled regression for the regions of the two countries. Columns (1) and (2) present the results of estimation by OLS, and columns (3) and (4) the estimation by IV. Columns (2) and (4) contain the coefficients of the variables interacted with a dummy variable which takes the value 1 for all the regions in East Germany. The null hypothesis that the coefficients on the variables are the same for Germany and Italy is rejected both when the equation is estimated by OLS ( $F(6,24) = 2.70$ ) and when it is estimated by IV ( $\text{Chi}^2(6) = 32,48$ ).

Data sources:

Regional accounts were obtained from the official German and Italian statistical sites (Statistische Ämter des Bundes und der Länder, Volkswirtschaftliche Gesamtrechnung der Länder; ISTAT, Conti e aggregati economici territoriali). Foreign trade data for Germany come from the Statistisches Bundesamt, GENESIS-Online data bank; for Italy from ISTAT's Coeweb data bank. Distances between the various national and regional capitals come from the DistanceFromTo website. Whether countries or regions were landlocked or had common borders was subjectively decided by looking at an atlas.

Table A1. The Bilateral Trade Equation

	Germany		Italy	
	(1)	(2)	(3)	(4)
	Variable	Interaction	Variable	Interaction
Dependent variable: log of trade share				
Constant	24.089*** (0.657)	0.753 (1.439)	-31.670*** (2.197)	9.625*** (2.626)
Ln distance	-0.723*** (0.030)	-0.014 (0.064)	-0.960*** (0.067)	0.049 (0.080)
Ln population (country <i>i</i> )	-0.108* (0.051)	0.593*** (0.094)	0.556*** (0.101)	-0.178 (0.138)
Ln size (country <i>i</i> )	0.028 (0.030)	-0.363*** (0.052)	0.335 (0.255)	-0.261 (0.291)
Ln population (country <i>j</i> )	0.011 (0.032)	-0.003 (0.064)	-0.041 (0.068)	0.161+ (0.091)
Ln area (country <i>j</i> )	-0.077*** (0.019)	0.054 (0.037)	-0.119* (0.038)	-0.026 (0.052)
Ln GDP (country <i>j</i> )	0.945*** (0.027)	-0.087 (0.061)	1.039*** (0.061)	-0.279** (0.087)
Landlocked	0.192* (0.083)	-0.253 (0.156)	-0.018 (0.214)	0.539* (0.262)
East	-0.294*** (0.067)			
South			-1.454*** (0.082)	
No. obs.	1503		1958	
Adjusted $R^2$	0.740		0.554	
Root MSE	0.920		1.635	

*Note:* Heteroskedasticity robust standard errors in parentheses. The trade share is defined as the ratio between the bilateral trade between *Land/region i* and country *j* and the GDP of country *I* (equation (A1)).

+ Significant at 10% \*Significant at 5% \*\*Significant at 1% \*\*\* Significant at 0.1%.

Table A2. The Relation between Actual and Constructed Trade Shares

	(1)	Germany (2)	(3)	(4)	Italy (5)	(6)
Dependent variable: Actual trade share						
Constant	-0.116 (0.168)	1.538* (0.524)	0.441 (0.850)	0.230*** (0.035)	-0.944+ (0.456)	-0.699 (0.492)
Constructed trade share	1.563*** (0.279)		1.545* (0.528)	0.536*** (0.081)		0.383** (0.105)
Ln population		-0.044 (0.161)	-0.096 (0.112)		0.009 (0.046)	0.034 (0.048)
Ln size		-0.050 (0.118)	0.028 (0.079)		0.139 (0.080)	0.132 (0.083)
East	0.106 (0.110)	-0.193 (0.129)	0.022 (0.148)			
South				-0.009 (0.062)	-0.194** (0.051)	0.076 (0.059)
No. obs.	16	16	16	20	20	20
Adjusted $R^2$	0.565	0.084	0.539	0.530	0.515	0.559
Root MSE	0.623	0.257	0.662	0.117	0.119	0.114

*Note:* Heteroskedasticity robust standard errors in parentheses.

- + Significant at 10%
- \* Significant at 5%.
- \*\* Significant at 1%.
- \*\*\* Significant at 0.1%.

Table A3. Pooled regression for trade and GDP per capita

	(1)	OLS	(3)	IV
	Variable	(2)	Variable	(4)
		Interaction		Interaction
Dependent variable: log of GDP per capita				
Constant	3.451*** (0.421)	-0.811 (0.557)	4.239*** (1.262)	-1.545 (1.285)
Trade share	0.409 (0.384)	0.191 (0.390)	1.308* (0.617)	-0.737 (0.620)
Ln population	-0.070+ (0.039)	0.223** (0.073)	-0.082+ (0.043)	0.237*** (0.064)
Ln size	0.030 (0.066)	-0.119 (0.071)	-0.086 (0.168)	-0.010 (0.170)
Dummy for poor region	-0.385* (0.181)	0.400 (0.260)	-0.189 (0.179)	0.295 (0.235)
Trade share × Dummy for poor region	-0.094 (0.370)	-0.073 (0.448)	-0.179 (0.928)	-0.161 (0.962)
No. obs.		36		36
Adjusted $R^2$		0.832		0.738
Root MSE		0.114		0.116
$F(6,24)$		2.67*		
Chi2(6)				30.06***

*Note:* Heteroskedasticity robust standard errors in parentheses.

Columns (2) and (4): interactions with Dummy variable = 1 for German regions.

The null hypothesis for the test statistics  $F(6,24)$  and  $\text{Chi}(6)$  is that the coefficients on the interactions of the variables with the dummy variable for the German regions are jointly equal to zero.

+ Significant at 10%.

\* Significant at 5%.

\*\* Significant at 1%

\*\*\* Significant at 0.1%.

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