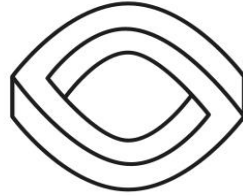


LABORATORIO LUISS SUL MEZZOGIORNO



Working Paper 3

The European Dimension of Regional and Cohesion Policies

By Daniel Gros

with Roberto Musmeci and Marta Pilati

(CEPS, Brussels and Laboratorio LUISS sul Mezzogiorno, Rome)

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Abstract

This contribution analyses the state of regional convergence within the European context. It finds that different country groups have had quite different experiences following the financial crisis and that in most cases there has been little convergence across regions within countries. More importantly, the seemingly permanent differences in regional per capita income are for some countries mainly the result of differences in occupation ratios. Regional differences in productivity (or income per worker) are relatively uniform across the larger member states and in all cases smaller than regional differences in per capita income. Convergence might thus be easier to achieve if cohesion and regional policies were to focus not only on productivity, but also on employment creation.

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Introduction

Cohesion is an explicit objective of the European Union (EU). One finds a first mention in the Single European Act (1986), where Article 130a reads: “In order to promote its overall harmonious development, the Community shall develop and pursue its actions leading to the strengthening of its economic and social cohesion.” This constituted the legal basis for the creation of the European Structural Investment (ESI) Funds, as well as the backbone for EU Cohesion Policy more generally. The same aim is now enshrined in Article 174 of the TFEU.

The emphasis on cohesion started in the 1990s, in view of the potential relocation of economic activities from the periphery to the core of the EU, following the creation of the European Single Market and the full realisation of the Four Freedoms (free movement of people, goods, capital and establishing and providing services).

During the boom years up to 2007, convergence seemed to be assured as all the peripheral countries (both East and South) grew at higher rates than the richer and older Member States. However, as documented below, the financial crisis and its aftermath led to some divergence again. This is why convergence and socio-economic cohesion are returning to the centre of the debate.

Another reason for the revival of the debate of economic convergence and socio-economic cohesion is that a more cohesive Union could be considered as a precondition for more effective economic governance, especially within the euro area. Ensuring sustainable economic convergence is therefore not only an aim of the EU, but also key for the better functioning of both the European Union and the Eurozone.

“Economic and social cohesion”, refers of course to much more than only income, but this contribution will focus on the economic aspect, and particularly on income per capita and productivity.

This paper is organised as follows. The first section summarises very briefly some key issues from convergence (or rather) growth theory. Section 2 then presents the stylised evolution of convergence in Europe over the last few decades. Section 3 then concentrates on the core theme, namely the contribution of differences in employment levels to observed differences in income per capita. Section 4 reflects on the reasons for the systematic and large differences in occupation ratios across regions. Section 5 speculates on how cohesion policy might take the role of employment into account. Section 6 concludes.

1. Some basics of convergence theory

To provide context to our analysis, it is useful to distinguish the three main strands of the literature on economic convergence.

The Neoclassical approach to convergence derives directly from the Solow growth model. It assumes that (1) the level of technology is determined by a number of exogenous factors and shared by all countries, and that (2) capital (as well as labour) has diminishing marginal returns. A first simple corollary of this approach is that capital flows downhill, from capital-intensive to relatively capital-scarce countries, and determines GDP growth differentials. This dynamic implies that there will be a catching-up effect. In other words, neoclassical models predict the so-called *unconditional convergence*, as GDP growth rates are exclusively determined by the initial stock of capital available in the country (and thus, in this model, by initial income per capita). Early approaches to Cohesion can be seen as accelerating convergence by increasing the 'downhill' flow of capital via infrastructure investment financed by the EU.

While preliminary evidence was found in the early datasets on GDP pro capita across countries (i.e. Maddison's dataset, 1982), the hypothesis of *unconditional convergence* failed the test with more comprehensive databases (i.e. Heston and Summers dataset, 1991). The failure of cross-country convergence constituted one of the motivations of "models that drop the two central assumptions of the neoclassical model" (Romer, 1994) opening, thereby, the door to the second strand of literature.

Romer and Lucas are considered the founders of the New Growth Theory (Lucas 1988; Romer 1986). As opposed to the neoclassical models, this theory predicts the possibility for a *conditional convergence*, which results from the introduction of efficiency enhancing technologies which can be 'produced' by investment in know-how and in other ways, leading to endogenous growth models. Demonstrating that a country's level of technology depends on the relative wealth of the country, they argue that economies tend to converge towards similar level of GDP per capita only if initial situations are similar.

The confrontation of the two main assumptions of the early models stimulated the creation of several modified neoclassical approaches.¹ Within this area of research, Azariadis (1996) and Galor (1996) were the first to formulate the concept of *club convergence*, according to which a robust convergence can be noticed in groups of countries that share certain characteristics. However, if the *conditional convergence theory* argues that a country approaches its own but unique equilibrium, *club convergence* theory predicts the existence of multiple equilibria (Islam, 2003).

The disintegration of the Soviet Union motivated another approach, which identifies difference in quality of institutions as the most important variable for convergence. North

¹ An extensive review of these models can be found in Borsi and Metiu (2013).

(1990) and Easterly and Levine (1997) were amongst the firsts to explore the link between long-term growth and quality of institutions.²

On this track, an increasing number of theoretical and empirical works have started analysing economic convergence across the EU. The common objective of these researches was to identify the driver behind productivity growth and investigate the impact of the introduction of the Euro (Monfort, 2008; ECB, 2015; Diaz del Hoyo et al., 2017).

2. Longer terms trends in convergence in Europe

This section presents some of the longer term trends in cohesion (or rather con- and divergence) across Member States. For this purpose, this section will analyse two of the main available indicators in the economic literature on convergence, namely β -convergence and σ -convergence³ whose formulation and first applications date back to Baumol (1986)⁴. This section will conclude with a brief comparison between the long term trend on convergence in the EU and the US. We concentrate on national level data since regional data is not available for longer periods (except for the US).

Figure 1 shows the variability of income per capita at Purchasing Power Standard (PPS) for the 'old' EU-15,⁵ and the original euro area 12 countries⁶, since 1960. For this chart, we have computed the Coefficient of variation of the GDP per capita at PPS for each group, which is obtained dividing the standard deviation by the mean of the group. The higher is the coefficient of variation, the larger is the level of variability of the observed variable.

For these two groups of countries, it is apparent that there has been a long-term trend in convergence in the EU until about the turn of the century. Nevertheless, convergence stopped during the first years of the common currency before turning into divergence consequently to the outbreak of financial crisis, i.e. a sharp increase in the variability. More recently, convergence seems to have resumed, albeit at rather slow pace.

However, if one considers the wider group of EA 19⁷ convergence seems to have been little affected by the financial and sovereign debt crisis as the catching up process of the New Member States (NMS) from Central and Eastern Europe (CEE) has continued after a short interruption.

² For a more detailed review of the related literature, the reader can refer to Diaz del Hoyo et al., 2017.

³ β -convergence focuses on the income convergence of poorer countries catching up and σ -convergence focuses on the dispersion of levels of income between countries.

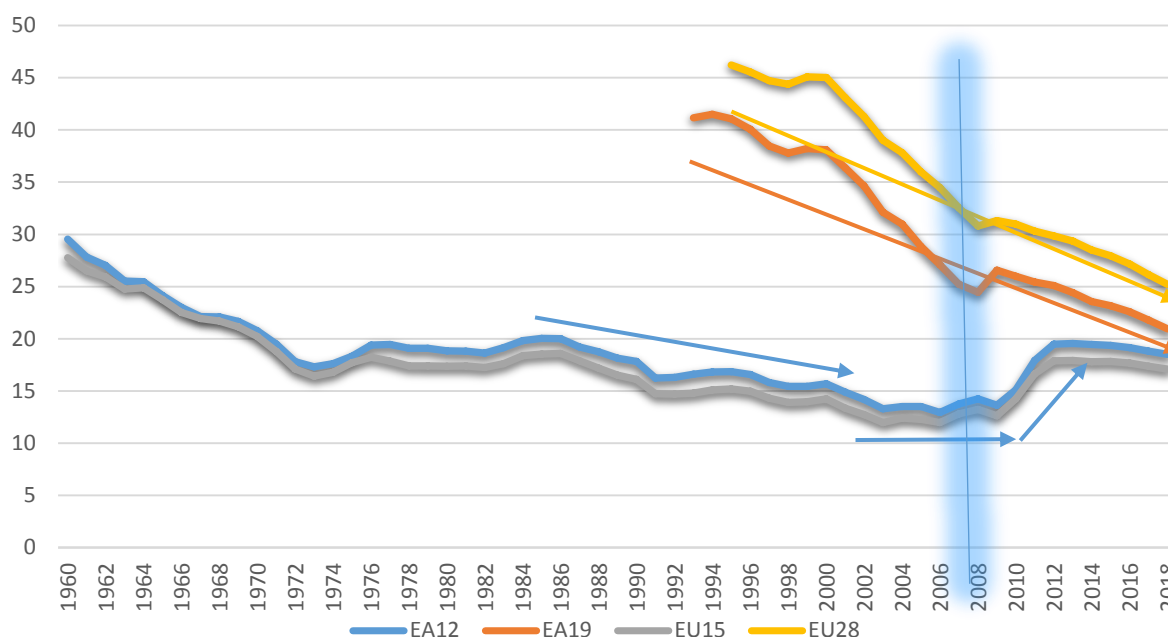
⁴ See also Barro and Sala-i-Martin (1992), and Mankiw et al. (1992)

⁵ EU15: Austria (AT), Belgium (BE), Denmark (DK), Finland (FI), France (FR), Germany (DE), Greece (EL), Italy (IT), Netherlands (NL), Portugal (PT), Spain (ES), Sweden (SE) and United Kingdom (UK)

⁶ EA12: Austria (AT), Belgium (BE), Finland (FI), France (FR), Germany (DE), Greece (EL), Italy (IT), Netherlands (NL), Portugal (PT), Spain (ES).

⁷ EA19: Austria (AT), Belgium (BE), Estonia (EE), Finland (FI), France (FR), Germany (DE), Greece (EL), Italy (IT), Latvia (LV), Lithuania (LT), Netherlands (NL), Portugal (PT), Slovakia (SK), Slovenia (SI), and Spain (ES).

Figure 1. σ -convergence (Coefficient of variation (standard deviation/mean) of GDP per capita at PPS) 1960-2018⁸



Source: own calculations based on AMECO data.

Note: Luxembourg, Malta, Cyprus and Ireland are always excluded. EA12 includes Belgium, Germany, Greece, Spain, France, Italy, Netherlands, Austria, Portugal, and Finland. EA19 includes Belgium, Germany, Greece, Spain, France, Italy, Netherlands, Austria, Portugal, Finland, Estonia, Latvia, Lithuania, Slovenia, and Slovakia. EU15 includes Belgium, Germany, Greece, Spain, France, Italy, Netherlands, Austria, Portugal, Finland, Denmark, Sweden, and United Kingdom. Projections for 2017 and 2018.

Figure 2 illustrates the more recent pattern by comparing the initial level of GDP per capita (horizontal axis) to cumulative growth rates since 1999 (vertical axis). In technical terms, the figure illustrates the so-called ‘beta convergence’, and it helps testing the hypothesis of convergence. When cross-country income convergence takes place, the lower is the initial level of GDP per capita, the higher should be the cumulative growth rate at the end of the period of reference. Accordingly, under the hypothesis of convergence, relatively poorer countries should appear in the upper-left corner of the graph.

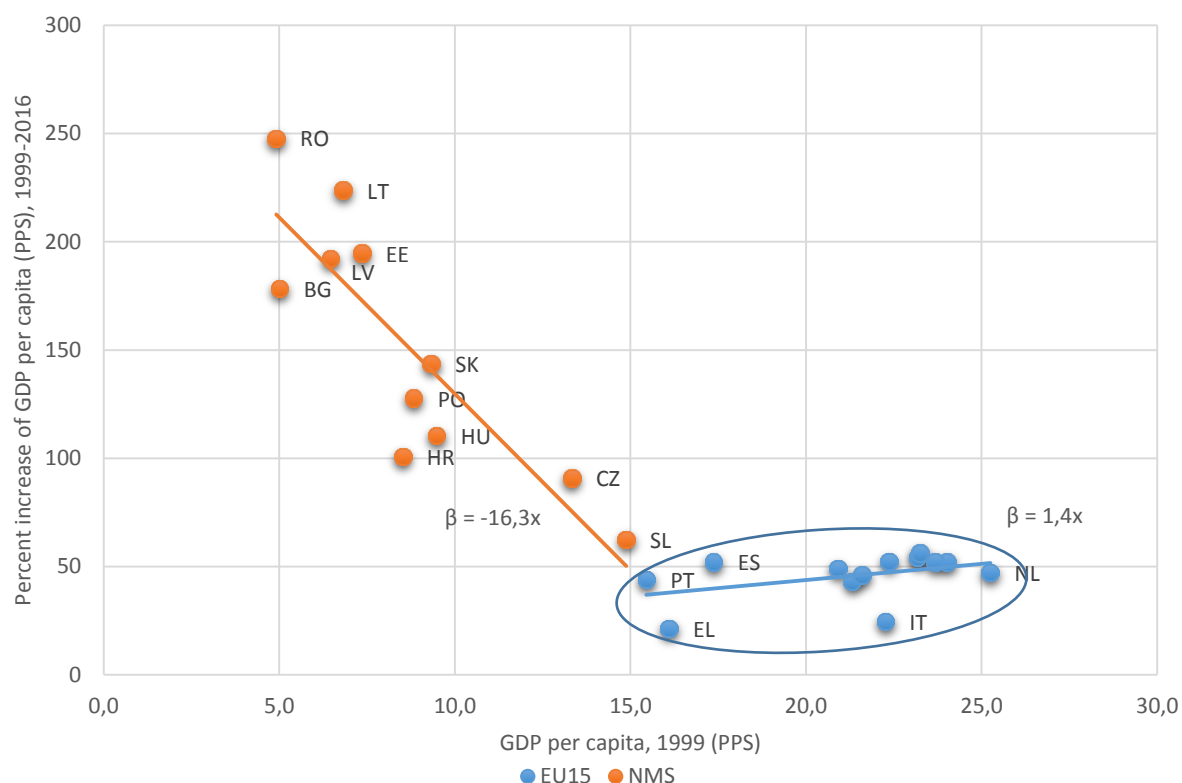
Figure 2 show clearly the existence of two groups: the old EU 15 and the New Member States. Among the latter one sees convergence. Indeed, the (initially) poorer countries grew faster than the others did. Moreover, it is worth to notice that all the New Member States that are currently in the euro area lie above the convergence line. They seem to have performed better than the ones, which have not joined the common currency.

⁸ Luxembourg, Cyprus and Ireland are not considered here because their GDP numbers are distorted by very large financial centers.

However, among the group of old Member States (in the blue oval) there is no convergence. On the contrary, the positive slope of the trend line suggests that the economies in this group are diverging, since relatively poorer countries (Greece, Portugal) grew slower than the richer ones (e.g. Germany).

Overall, the data shows the existence of different country 'clubs', suggesting that convergence is not a universal and automatic process. Nevertheless, as recent data is dominated by the impact of the financial crisis, it is difficult to draw general conclusions.

Figure 2. Beta-convergence at country level



Source: own calculations based on AMECO data. Note: Luxembourg, Malta, Cyprus and Ireland are always excluded. EU15 includes Belgium, Germany, Greece, Spain, France, Italy, Netherlands, Austria, Portugal, Finland, Denmark, Sweden, and United Kingdom.

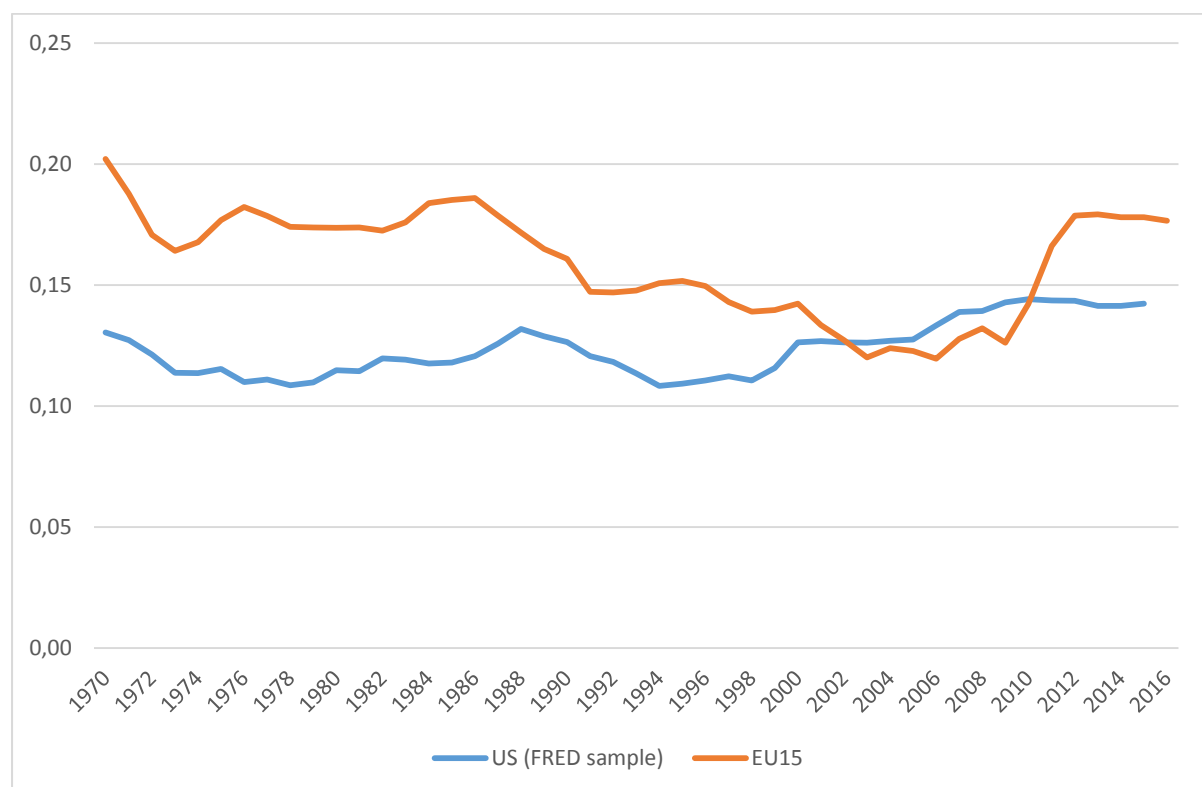
To conclude this section, it is interesting to compare the EU and the US. In the latter the process of convergence seems to have stopped as well, and even reversed since the turn of the century. Figure 3 below compares the variability, measured again in terms of Coefficient of variation (the standard deviation divided by the mean of the group) of income per capita for the US and the EU-15.

Data suggests that the US⁹ has always shown a low degree of variability, but there was some deterioration after the turn of the century, as the measure of income variability has

⁹ We use here a sample of the 24 largest US States from the FRED site, which has a longer time series available. The variability over all 50 States is somewhat higher since some of the smaller states represent special situations (like shale gas and oil in North Dakota, etc.).

increased. The EU-15 started out with much larger differences in income per capita. Nevertheless, between 2003 and 2009, the convergence process brought the EU-15 to a level even below that of the US. However, much of this convergence disappeared as a result of the financial crisis (whose impact on the US economy was much shorter). Nevertheless, once the full picture of the EU-28 is taken into account, the convergence process is steadily taking place.

Figure 3. Convergence/divergence compared across the Atlantic (standard deviation/mean of GDP per capita at PPS)



Source: own calculations based on AMECO data. Luxembourg, Malta, Cyprus and Ireland are always excluded. EU15 includes Belgium, Germany, Greece, Spain, France, Italy, Netherlands, Austria, Portugal, Finland, Denmark, Sweden, and United Kingdom. The US FRED sample includes only the 24 largest states, which have a longer time series available, i.e. Texas, Minnesota, Missouri, Alabama, Arizona, Georgia, North Carolina, South Carolina, Tennessee, Virginia, Florida, Indiana, California, Washington, Maryland, Massachusetts, Colorado, Illinois, Jersey, Ohio, Wisconsin, Michigan, Pennsylvania, and New York.

The comparison with the US shows that even in a monetary union, which is generally regarded as functioning well, convergence has its limits. Some variability of income seems physiological in any large and diverse economic area. In Europe, expectations of continuing convergence might be too ambitious.

For the EU (as well as for the euro area) there is always the problem of relatively smaller economies, which have an inordinate impact on the standard deviation. However, using a weighted measure of variability (with the weights given by GDP at PPS) one finds the same pattern.

3. Productivity versus Standard of Living

Income per capita constitutes the most widely used measure of economic wellbeing because it is a good proxy of the average standard of living of a population (especially if GDP is measured in ‘Purchasing Power Standard’ PPS). However, it is clear that over the long run, the standard of living can grow only if productivity grows. For this reason, many studies on convergence (see for instance Jona Lasinio and Manzocchi (2017)) focus on the factors driving or affecting differences in productivity, both over time and across space (regions/countries).

GDP per capita (at PPS) is also the measure used by the EU to determine the maximum rate of EU co-financing under ESI Funds. The latter depends on the level of economic development of each region compared to the rest of the EU. According to the Common Provision Regulation (CPR)¹⁰, regions whose GDP per capita (at PPS) is below 75% of the EU average are considered as “lagging behind”, therefore they are eligible for a higher share of EU co-funding. The EU maximum co-financing rate for ESI Funds decreases for “transitionary regions” and for “more developed regions”, whose GDP per capita at PPS is respectively below and higher than 90% of the EU average.

As aside, we note that for any regional unit which has to make, or which receives, large factor payments from abroad, GNP (or GNI), rather than GDP, would be the appropriate proxy for the standard of living which that economy can afford in the long run. However, at the national level the difference GDP versus GNP is usual minor. In Europe, there are only two major exceptions: Luxembourg and Ireland. In these two cases, the massive presence of foreign investment has led to a large difference between GDP and GNP, with the former 20-30% higher than the latter. The table below shows the ratio of GNI (Gross National Income) to GDP for the few countries for which this difference is at or above 5 %.

Table 1 Difference in GDP and GNI

	IE	LUX	CZ	PL
GNI/GDP	0.79	0.68	0.94	0.96

Unfortunately, it is impossible to measure whether similar differences also exist between income and production across regions within member states. We will thus continue to use the GDP data.

3.1 Decomposing GDP per capita in productivity and employment

The simplest way to illustrate formally the link between GDP per capita and some measure of productivity is to write GDP per capita in the following way:¹¹

¹⁰ Regulation 1303/2013

¹¹ The Cohesion Report 2017 of the Commission also uses the approach, but considers also the age structure of the population. The latter should not make a decisive difference for any comparison with one country.

$$(1) \text{ GDP pc} = \frac{Y}{\text{Pop}} = \frac{Y}{L} \frac{L}{\text{Pop}}$$

Where Y is GDP, L is total employed persons, Y/L represents productivity, or GDP per worker, and L/Pop represents the occupation ratio, i.e. the ratio of total occupied persons to the (resident) population. In logarithmic form, this can be written as:

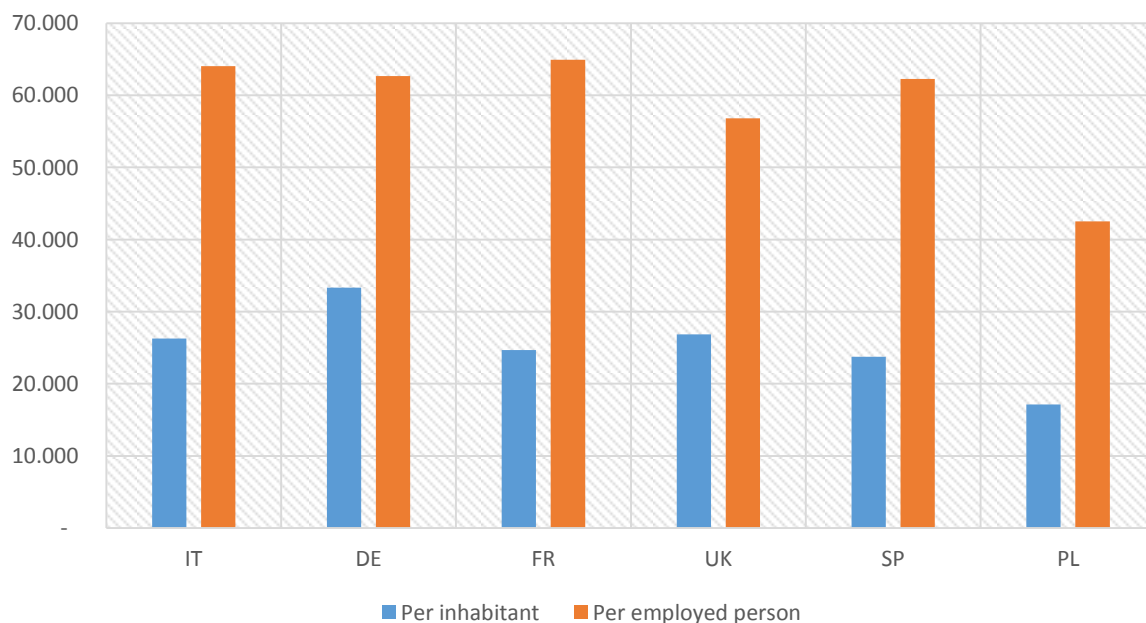
$$(2) \ln(\text{GDP pc}) = \ln\left(\frac{Y}{L}\right) + \ln\left(\frac{L}{\text{Pop}}\right)$$

This implies that any percentage difference in the GDP per capita between two countries or regions can be expressed as the sum of the percentage difference in productivity (GDP per employed) and the percentage difference in the occupation ratio (employed over total population).

Leading from these consideration, Figure 5 (below) summarises the national averages in income per capita and productivity, expressed respectively in terms of GDP per capita and GDP per employed person (2014 data). It emerges that the three largest euro area countries, namely Germany, France, and Italy, have very similar productivity levels, but show important differences in GDP per capita. Indeed, GDP per workers is at around 63 thousand euro (per annum), while GDP per capita ranges from 27 thousand to 33 thousand euro.

Moreover, there is little correlation between the ranking in terms of GDP per capita and per employed person in this group of countries. For example, productivity (GDP per employed person at PPS) is slightly higher in Italy than in Germany. But GDP per capita is almost one third lower in Italy than in Germany. The difference is of course due to the fact that a much higher proportion of the German population is employed.

Figure 4. GDP National Averages; average income (GDP per capita) versus Average productivity (GDP per employed person), 2014



Source: own calculation based on Eurostat data.

It thus depends very much whether one ranks countries by productivity or GDP per capita. The two measures give at times a very different picture. This is important not just for country rankings, but also for the definition of the different EU co-financing rates in ESI funds whose official thresholds are defined in terms of GDP per capita (as explained above).

Table 2. GDP (at PPS) as % of EU average (2014)

National Average GDP in euro PPS as % of EU average (2014)						
	IT	DE	FR	UK	SP	PL
Per capita	97	125	107	108	90	68
Per employed person	103	101	105	92	101	69

Source: own calculations on Eurostat data.

3.2 Regional dispersion

The difference between the two concepts of GDP per capita and per employed person, also plays an important role if one considers the regional dimension within member countries.

The variability (measured here for convenience by the variance) of GDP per capita across a set of countries or regions, is equal to the variance of productivity plus the variance of occupation ratios plus the covariance of these two variables.

$$(3) \text{VAR}\{\ln(\text{GDP pc})\} = \text{VAR}\left\{\ln\left(\frac{Y}{L}\right)\right\} + \text{VAR}\left\{\ln\left(\frac{L}{\text{Pop}}\right)\right\} + \text{COVA}\left\{\ln\left(\frac{L}{\text{Pop}}\right), \ln\left(\frac{L}{\text{Pop}}\right)\right\}$$

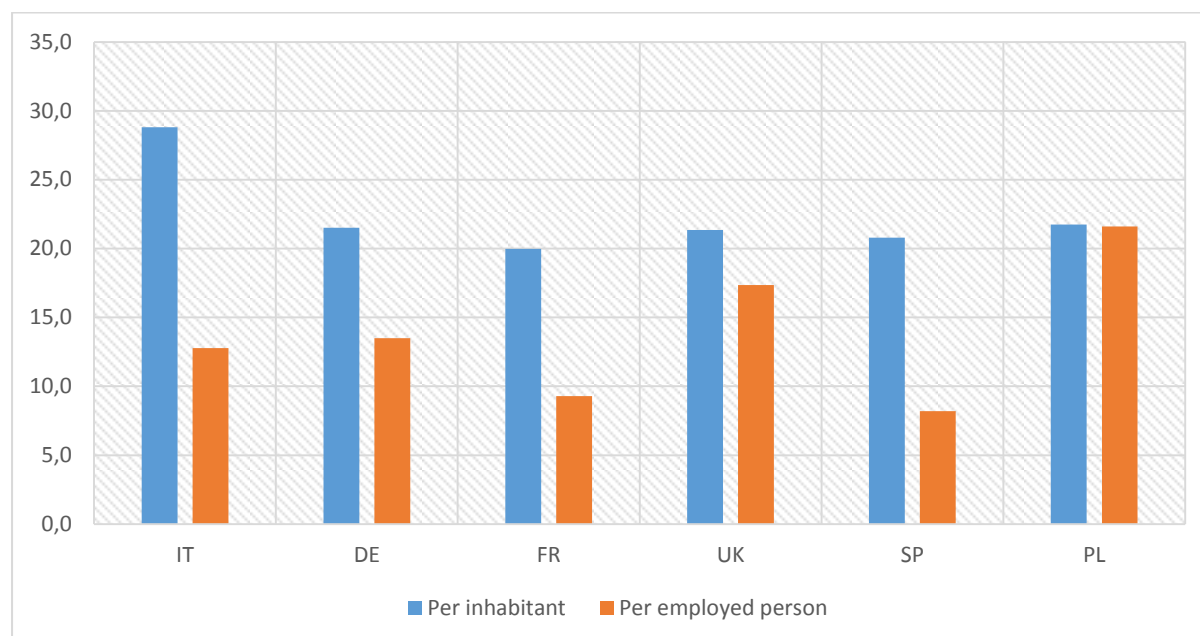
The variability of income per capita could thus be larger or smaller than the variability of productivity, depending on whether employment is positively or negatively correlated with productivity.

Figure 6 (below) shows the cross-regional variability within the larger Member States measured by the standard deviation of the regional values relative to the national average. It is apparent, first of all, that GDP per capita has in general a higher variability than productivity. This implies that there must be a positive covariance between productivity and employment.

In terms of individual countries, one finds that based on 2014 data Italy has by far the largest differences across regions in terms of GDP per capita, with a standard deviation close to 30%, compared to around 20 % for the other countries considered here. However, the Italian cross-regional variability in terms of productivity is in line with the average of the other countries considered. The standard deviation of GDP per employed person is at around 13%, (marginally) lower in Italy than in Germany, and much lower than in the UK. Spain shows a similarly large discrepancy between measures of dispersion of productivity

and GDP per capita. Spain has also the lowest dispersion of productivity (around 8 %), but still an average level of dispersion in terms of GDP per capita.

Figure 5. Variability (Standard deviation) across regions (in %) within selected large member states, 20145



Source: own calculations based on Eurostat data.

The cross-regional measures of variability within countries are quite stable in the short run and in most cases have changed very little over the last 15 years, for which comparable data is available. The exception to this is Germany, where the standard deviation of productivity has fallen by about one fifth if one compares 2014 to 2000; and that of income per capita by about 10% over the same period. By contrast, in Italy the differences in productivity have widened by about 6 % since 2000, but the differences in GDP per capita have barely moved (increase of 2 %). Table 3 below provides some of the figures for Germany, Italy and the US for the years 2000 and 2014-5.

Table 3. Variability within countries: Germany, Italy (years 2000 and 2014) and the US (years 2000 and 2015)

	Standard deviations (in %)			Correlation coefficient (in %)
	GDP per capita	GDP per worker	Employment ratio (workers/population)	Employment rate - GDP per worker
DE 2000	24.1%	16.9%	10.0%	74.5%
DE 2014	21.5%	13.5%	9.4%	76.2%
IT 2000	28.3%	12.1%	17.0%	80.3%
IT 2014	28.8%	12.8%	16.6%	92.4%

US 2000	19.0%	17.9%	7.7%	-7.3%
US 2015	18.6%	14.6%	9.1%	20.0%

Source: own calculations based on Eurostat and BLS data (US data without Washington, D.C.).

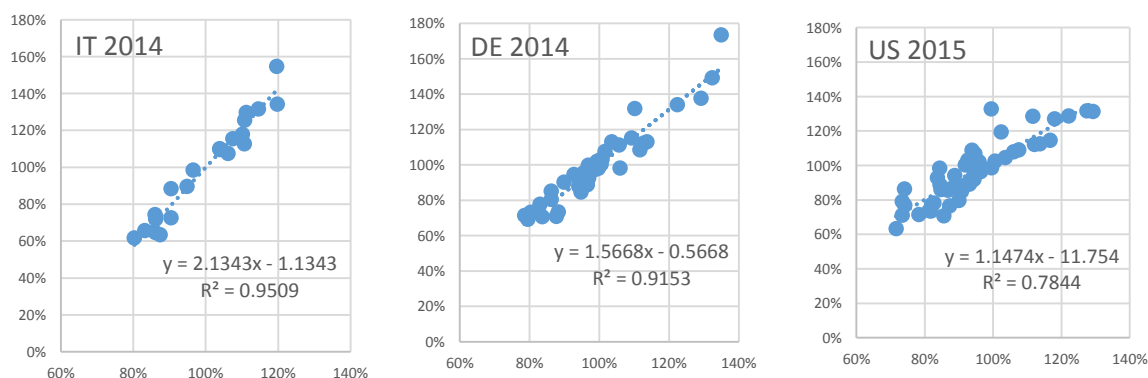
3.3 Regional dispersion in detail

The considerations so far have concentrated on two relationships, involving the first three variables from the list below. These should be taken into account when analysing regional disparities. Moreover, if there are large regional differences in productivity a question that arises immediately is whether they correspond to differences in wages. Accordingly, the analysis will also include a fourth variable:

1. GDP per inhabitant (= per capita)
2. GDP per employed person
3. GDP per employed person and the employment/population ratio
4. GDP per worker and wages

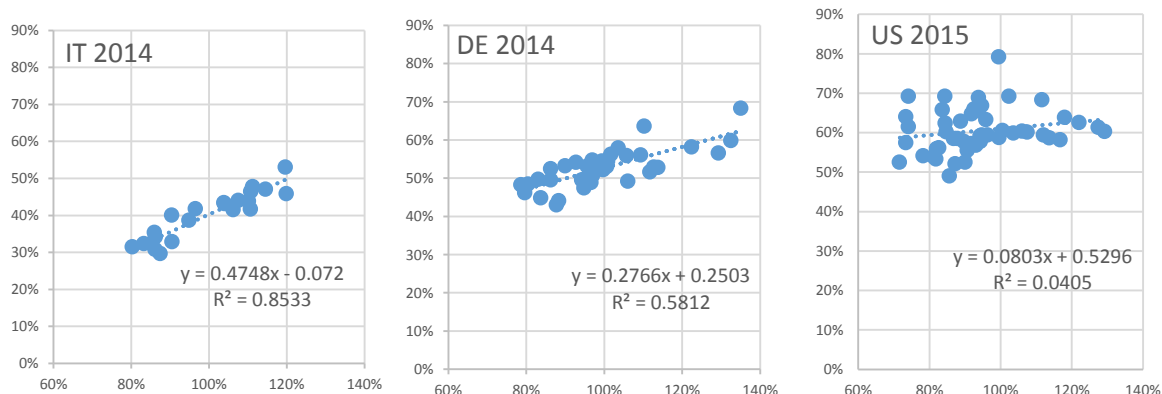
In the following, we present the three relationships, using 2014¹² data in more detail for three countries: Germany and Italy, the two MS with the strongest federal structures, plus the US, which is often taken as the working model for Europe (data from 2015). Since we are analysing regional disparities within countries all variables are measured relative (i.e. as %) of the national average. There are three graphs for each country:

Graph 1: X-axis: GDP per employed person as percentage of national average
Y-axis: GDP per inhabitant as percentage of national average

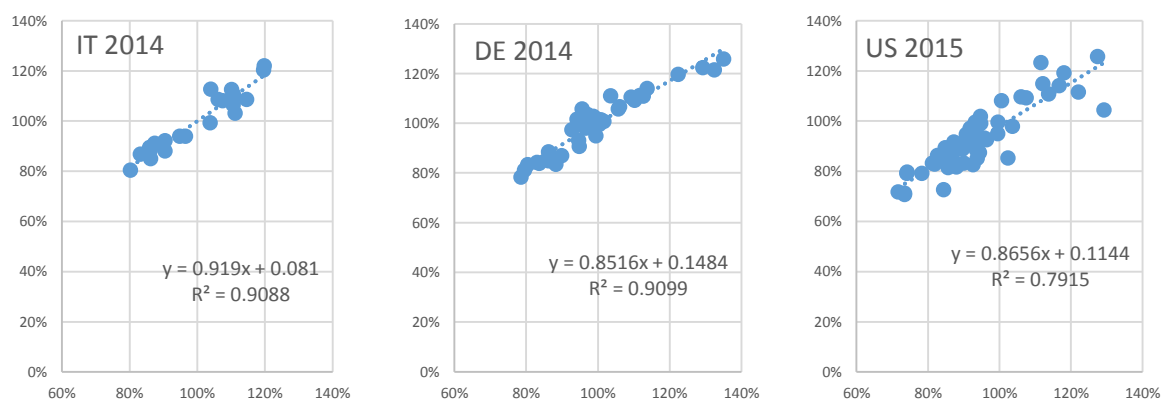


Graph 2: X-axis: GDP per employed person as percentage of national average
Y-axis: Number of employed persons as percentage of population

¹² The choice is driven by the data coverage which is the highest.



Graph 3: X-axis: GDP per employed person as percentage of national average
Y-axis: wage per employed person as percentage of national average



Source: all graphs above derive from own calculations based on Eurostat data.

The results are suggestive of some patterns: in the large EU countries, like Germany and Italy, GDP per capita increases more than 1:1 with GDP per worker (=productivity) because, the employment rate is higher in more productive regions. Both these relationships appear stronger in Italy than in Germany. The US seems different in that. It shows very little difference between the dispersion of GDP per capita and per employed person because there is only a very weak correlation across US States between productivity and employment ratios.

For all three countries¹³ one finds that productivity (as measured by GDP per worker) is strongly correlated with observed wages, and the relationship appears to be 1:1. This suggests that employers are in general on their labour demand curve. This is what one would expect in a longer run equilibrium perspective: one would not expect entrepreneurs to keep for long time workers whose productivity is lower than their wages. Vice-versa, investors would forego substantial profit opportunities if they did not hire more workers where the wage rate is below productivity.

¹³ For Germany it appears that in some years, the coefficient linking wages to productivity (at the regional level) is different from 1. However, even in these cases a strong correlation remains.

4. Productivity and employment: what link?

The key issue raised by these observations is straightforward: what determines (persistent) vast differences in employment rates within one country? Long term cross-country differences in employment rates are usually taken to be the outcome of, inter alia, differences in labour market structures and social security systems.

Differences in the business cycle can of course constitute a factor contributing to short term differences in employment rates, but the impact of cyclical conditions on employment rates (as opposed to unemployment rates) is usually an order of magnitude smaller than differences in employment rates across countries. For example, during the Great Recession of 2009, which represents an extreme event, the employment rate fell only by a few percentage points in most Member States. But the differences in the overall employment rates are of the order of 10-12 percentage points (employment to population ratio of 40 % for Italy versus over 52 % for Germany and other Northern Countries).

In principle, one would not expect large systematic differences at regional level in the share of the population that is employed, given that social security system and labour market relations are the same within each single country. For different regions, one might of course find differences in the supply of labour, but there does not exist any a priori reason why these differences should be systematically related to regional productivity.

One explanation could be that low-wage activities are driven underground due to high explicit and implicit taxes. If this factor plays out differently in different regions, one would expect that regions, where the underground economy is more important, exhibit a higher measured productivity (measured GDP divided by measured employment).

Accordingly, if the correction for the non-observed economy is excluded from the GDP measure, one would expect higher difference and higher variability of the productivity across the regions (GDP per worker). Yet, considering the Italian case, once non-observed economy is excluded from the official GDP figure (2015)¹⁴, the standard deviation across regions of both GDP per inhabitant and per employed person records only a slight increase (see Table 4).

Table 4. Difference in Standard Deviation for GDP measures, corrected and not corrected for the non-observed economy (2015).

Italy 2015 Standard Deviation	GDP corrected for the non-observed economy	GDP not-corrected for non- observed economy
GDP per inhabitant	0.28	0.31
GDP per worker	0.13	0.16

¹⁴ Include the estimation from ISTAT.

The most straightforward way to explain the positive correlation between regional productivity and regional employment ratios would be assuming that the supply of labour reacts to the wage rate, which in turn is closely correlated to productivity as shown above. Higher wages should make it more attractive to take a job rather than remaining inactive or an unemployed job seeker.

At first sight one could argue that the positive correlation between regional productivity and regional employment ratios would lead to a 'double dividend' from productivity enhancing policies: if one can increase overall productivity levels in a region, the GDP produced in that region should increase proportionally given the starting employment level. But this would not be all: the higher productivity should lead to more employment as wages increase according to productivity levels, thus magnifying the increase in regional GDP.

This can be illustrated best using the decomposition of GDP per capita presented in equation (2) above. If one posits that the economy wide production function takes the form $GDP = A F(K, L)$, where K and L are labour inputs and A is a generalised productivity factor (the population has been normalised to one). Denoting the natural logarithm by lower case letters of the corresponding variable this means that GDP (per capita) can be written as:

$$(4) \ln(GDP\ pc) = a + \ln F(K, L)$$

The direct impact of an increase in the overall productivity parameter (which is different from assuming labour or capital saving technological progress) would thus be to increase GDP proportionally.

But it is also clear from equation (4) that the eventual increase in GDP would be even higher if employment (L) also increases, which is likely to be the case, since as we have showed above, an increase of productivity leads to higher wages and a higher labour supply.

The joint assumption that the supply of labour reacts to wages (w), and that wages are equal to the marginal productivity of labour can be written as:

$$(5) L = g(w) = g(AF_L)$$

However, the marginal productivity of labour is also a function of the productivity parameter A which just multiplies the entire production function. This implies that any change in A will also have a second round impact on GDP as A also appears in the second term of equation (6):

$$(6) \ln(GDP\ pc) = a + \ln[F(K, g(AF_L))]$$

The total impact of a change in A on GDP will thus be given by two elements. The box uses a particular functional form to arrive at an explicit solution.

Box labour market

The purpose of this box is to illustrate the difference between (regional) policies geared to increase the overall productivity of factors of production (in the region) versus policies that just

increase the capital endowment.

This formalization also shows under what labour market conditions and improvement in productivity will have a more than proportional impact on GDP.

The starting point is a standard production function

$$GDP = AK^\alpha L^{1-\alpha}$$

Where A denotes an overall productivity parameter.

The usual labour demand curve is given by the conditions that wages equal the marginal product of labour:

$$w' = (1 - \alpha)A \left(\frac{K}{L}\right)^\alpha$$

To simplify notation it is convenient to operate from now on with a linear re-calibration of the wage rate:

$$w = w'/(1 - \alpha)$$

We now consider the determination of regional GDP under two assumption about the (local) labour market:

- a) Wages (and thus employment) are determined by local market equilibrium: labour supply equals demand, which implies no local unemployment.
- b) Wages are exogenous (either because of uniform national wages or because the local 'grey' economy offers an alternative option). But employers hire up the point where the marginal productivity of labour equals that wage rate.

Notice that in both cases the capital stock is taken as exogenous and fixed. If the capital stock were to be determined by the requirement that the return to capital equals some exogenous, perhaps global, interest rate, the system would be over-determined (in the case of exogenous wages).

Case a) Local labour market equilibrium.

The condition that labour supply equals labour demand can be written as:

$$L = \gamma w = \gamma A \left(\frac{K}{L}\right)^\alpha$$

Where the parameter gamma indicates how strongly labour supply reacts to higher wages. The assumption that (regional) labour supply is assumed to be a linear function of the (regional) wage rate would be compatible with the data presented above.

Solving explicitly for L yields:

$$L = [\gamma A(K)^\alpha]^{1/(1+\alpha)}$$

This can be substituted back into the production function to solve for GDP as a function of A (the capital stock, K, and the parameters, alpha and gamma):

$$GDP = A^{1+\frac{1-\alpha}{1+\alpha}} \left(K^{\alpha 1+\frac{1-\alpha}{1+\alpha}}\right) \left(\gamma^{\frac{1-\alpha}{1+\alpha}}\right)$$

Taking logarithms yields:

$$\ln(GDP) = \left(1 + \frac{1-\alpha}{1+\alpha}\right) \ln(A) + \alpha \left(1 + \frac{1-\alpha}{1+\alpha}\right) \ln(K) + \frac{1-\alpha}{1+\alpha} \ln(\gamma)$$

If the supply of labour reacts linearly to an increase in wages (and wages are equal to productivity) the impact of an increase in the overall productivity parameter on GDP is clearly larger than 1.

An increase in the capital endowment (i.e. an increase in K) has a much smaller impact since an increase in capital (or rather $\ln(K)$) leads to a change in GDP which is equal to that of a change in the overall productivity parameter (or rather $\ln(A)$) times alpha, which is a fraction (representing the share of capital in output).

Second case: rigid wages

We start with the same production function, which can be equivalently re-written in a form which emphasizes the role of the capital stock and the capital/labour ratio:

$$GDP = AK^{1-1+\alpha}L^{1-\alpha} = KA \left(\frac{K}{L}\right)^{-(1-\alpha)}$$

As before labour demand operates under the condition that the wage equals the marginal product of labour):

$$w = A \left(\frac{K}{L}\right)^{\alpha}$$

This implies that the capital/labour ratio is determined by the wage rate:

$$\left(\frac{w}{A}\right)^{1/\alpha} = \frac{K}{L}$$

This then implies that that employment is a linear function of the capital stock and increasing in the overall productivity parameter, A, but decreasing in the wage rate.

$$L = K \left(\frac{A}{w}\right)^{1/\alpha}$$

This would imply of course that (regional) unemployment would be increasing in the wage rate (demand decreasing, but supply increasing).

Given the capital stock, GDP is given by:

$$GDP = KA \left(\frac{K}{L}\right)^{-(1-\alpha)} = KA \left(\frac{w}{A}\right)^{-(1-\alpha)/\alpha} = KA^{(1-\alpha)/\alpha} (w)^{-(1-\alpha)/\alpha}$$

Output is linear in the capital stock in this case because any increase in the available capital will be matched by an equiproportional increase in labour use, thus keeping the capital intensity constant.

Taking logarithms gives:

$$\ln(GDP) = \ln(K) + \left[\frac{1-\alpha}{\alpha}\right] \ln(A) - \left[\frac{1-\alpha}{\alpha}\right] \ln(w)$$

The elasticity of output with respect to the capital stock is equal to one, but the elasticity of output depends on the size of the relative capital and labour shares.

If the share of labour exceeds that of capital ($1-\alpha > \alpha$, or equivalently $\alpha > 0.5$) output will increase more than 1:1 for any increase in the efficiency parameter A , because it will make existing labour and capital more efficient and draw in more labour into the economy. The same ‘magnifying’ effect also applies with a different sign to the wage rate: a fall in the regional wage rate by 1 % would increase output by more than 1 %. Under the usual calibration that the share of capital is about one fourth, the output would crease by 3 times of any one percent increase in A , or any one percent fall in the local wage rate.

Unfortunately, it is difficult to reconcile the idea that the link between regional productivity and regional employment ratios is due to an elastic labour supply, with the fact the lower productivity regions have in general also higher unemployment rates.

A subtler variant of the labour supply hypothesis could be that job seekers are motivated by the difference between the locally available wage rate relative to an explicit, (or implicit) unemployment subsidy, a minimum guaranteed income or opportunities in the grey economy. In this case, the local (regional) supply curve would be horizontal (up to local labour supply). This assumption would generate the strong correlation between regional productivity and unemployment one observes for Italy.¹⁵

However, one has to keep in mind that Table 1 (above) and Figure 6 have shown that there are large differences across Member States in terms of the relationship between regional employment and productivity (and wages) and that in some cases that there is no relationship at all between wages and productivity. In Poland, for example, the correlation between regional employment ratios and regional productivity is negative, which explains why the country’s standard deviation of regional GDP per capita is equal to that of GDP per employed person. The country thus has a much higher dispersion of regional productivity than Italy, but also a much lower dispersion of GDP per capita.

The relationship between GDP per capita and productivity and employment at the regional is therefore clearly very country-specific. If cohesion policy is to be made more efficient, more research is needed to identify what factors drive regional differences in employment in countries where the general employment rate is low.

5. Implications for EU Cohesion Policy

The official aim of European cohesion policy is to “strengthening of its [EU] economic and social cohesion”. This general aim is developed in somewhat more length in Article 174 of

¹⁵ Moreover, even after accounting for differences in unemployment rats one finds considerable differences in labour market outcomes. The labour force participation rate is only 47 in the Italian South, against 62 % in the North. This observation would be difficult to reconcile with the argument that too high regional wages are the main reason for regional employment rates.

the Treaty on the Functioning of the European Union (TFEU), which, however, does not define cohesion in a more operational way.¹⁶

In practice, most policy prescriptions as well as most policy instruments aim at increasing productivity. During the early phases of implementation of the EU cohesion policy, resources mobilised under the ESI Funds aimed mainly at financing ‘hard’ infrastructure, since the main idea behind was that better infrastructures would be conducive to stronger local growth. The empirical evidence of the effectiveness of the first rounds of Structural Funds is mixed as a large share of the EU funding went to regions and countries whose growth was severely curtailed during the financial crisis.¹⁷

In the current multi-annual Financial Framework, the amount available for cohesion policy has been increased to € 351.8 billion, and spending is today much more diverse, with a lower share of funding to “hard” infrastructure. What remains is that the aim of most projects financed under the ESI funds have the explicit or implicit goal to increase regional productivity. However, given that in many countries differences in employment ratios are today more important than differences in productivity, more thought should be given to employment as the real objective.

The key issue can also be put in more practical terms: for countries/regions with much lower employment ratios the only way to converge in terms of GDP per capita would be to achieve a higher than average productivity (of those who actually work). For the case of Italy (or Spain) achieving higher productivity for the lagging regions in the South would require the entire country to achieve a higher productivity than Germany. Whereas this might not be impossible, it seems a priori more likely that the country could increase its low employment ratios to closer to the EU average levels.

Regarding the EU cohesion policy, one might thus ask why the Union should invest common resources into regions whose productivity level is already close to the EU average, but whose income is low just because low employment. If the sole objective of the EU resources in cohesion policy is to contribute to establishing the material (and immaterial) base for higher productivity, the indicator determining the EU co-financing rates in ESI funds could be redefined in terms of productivity (GDP per employed person) rather than GDP per capita. Figure 7 and Table 5 summarise the changes in terms of number of regions eligible

¹⁶ Article 174 TFEU

“In order to promote its overall harmonious development, the Union shall develop and pursue its actions leading to the strengthening of its economic, social and territorial cohesion.

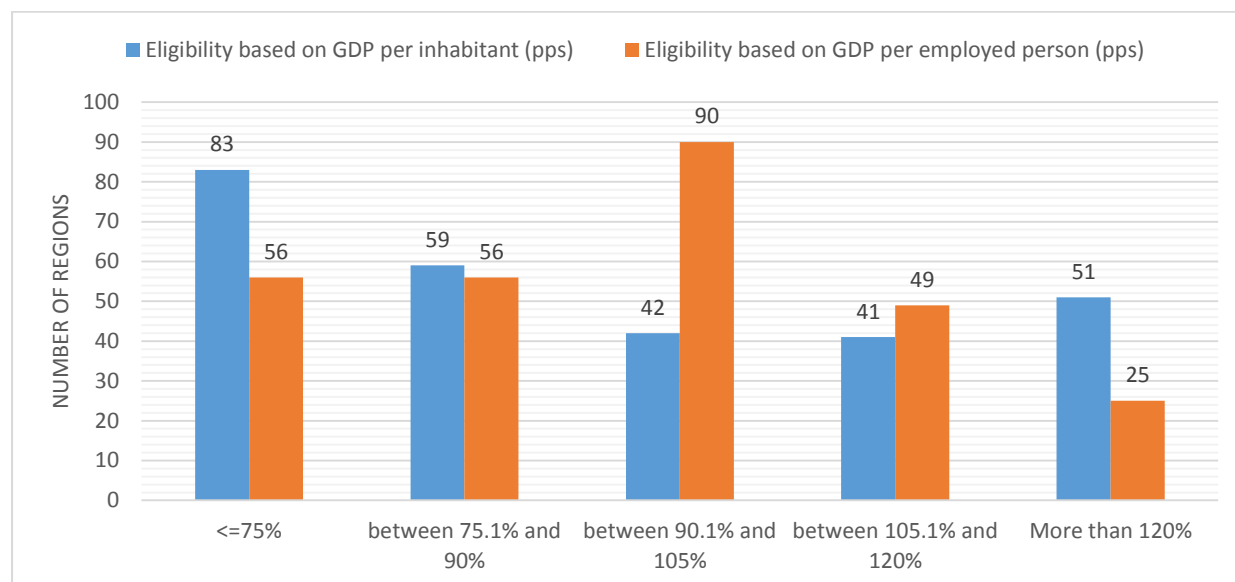
In particular, the Union shall aim at reducing disparities between the levels of development of the various regions and the backwardness of the least favoured regions.

Among the regions concerned, particular attention shall be paid to rural areas, areas affected by industrial transition, and regions which suffer from severe and permanent natural or demographic handicaps such as the northernmost regions with very low population density and island, cross-border and mountain regions.”

¹⁷ In the late 1980s, cohesion policy was reinforced to adapt to the recent entry of relatively poorer countries, namely Greece (1981), and Spain and Portugal (1986).

for the different rates of EU co-financing in the current (average income based) and the alternative (productivity based) scenario.

Figure 6. Structural funds, eligibility scenarios (GDP per inhabitant and GDP per employed person as % of EU average). Number of Regions.



Source: Own calculations based on Eurostat data.

Table 5. Structural funds, eligibility scenarios (GDP per inhabitant and GDP per employed person as % of EU average) with their population

Eligibility based on GDP per inhabitant (pps)			
	No of regions	Population	Population %
<=75%	83	137,212,610	27%
between 75.1% and 90%	59	93,138,884	18%
between 90.1% and 105%	42	72,674,268	14%
between 105.1% and 120%	41	92,496,628	18%
More than 120%	51	111,451,478	22%
Total	276	506,973,868	1
Eligibility based on GDP per employed person (pps)			
	No of regions	Population	Population %
<=75%	56	84,857,122	17%
between 75.1% and 90%	56	90,412,480	18%
between 90.1% and 105%	90	155,514,523	31%
between 105.1% and 120%	49	112,414,161	22%
More than 120%	25	63,775,582	13%

Source: Own calculations based on Eurostat data.

The redefinition of EU co-financing criteria would considerably reduce the number of regions that would still qualify for the highest co-financing rate. In this case, as significant number of regions would change their status from “regions lagging behind” to “transitional regions”, (with the consequent adjustment of the EU co-financing rate), the ultimate result would be the reduction of the overall contribution from the EU Budget to the cohesion policy.

Yet, such a change would, at least in part, ignore the economic reality of these regions, since low employment rate would still remain a significant obstacle to achieve the explicit EU objective of economic convergence (Article 130 Single European Act; Article 174 of TFEU).

Under the current MFF, the EU cohesion policy is declined in 11 ‘Thematic Objectives’, which sectors and areas of intervention where EU support through the ESI Funds can be used. The slogan of the Europe 2020 objectives of ‘Smart, Sustainable and Inclusive’ growth is so broad that virtually anything could be financed under one of these objectives. One thematic objective would seem particularly important for countries with an employment problem, namely “Promoting sustainable and quality employment and supporting labour mobility”.¹⁸

As showed above with the case of Poland, the relation between productivity and employment rates across EU Member State is very country-specific. Yet, this contribution has also demonstrated the great impact that employment level has on the average income level in very large Member States, such as Italy, Spain, and France. In conclusion, it seems crucial at this stage to find a solution to reconcile different needs. On the one hand, the severe consequences of the financial crisis on less developed and peripheral regions make the EU cohesion policy essential for the development of these local economies. On the other hand, the existence of country-specific problems increases the need for strengthening the possibility for regions and country to receive the support of the EU Budget in the areas of most need. Leading from these considerations, national and EU policymakers should ensure that EU resources allocated to the EU cohesion policy are aligned and designed to support the economic strategies of EU Member States. In this way, the EU would ensure that country-specific issues are addressed effectively while maintaining an holistic approach to the common Cohesion policy.

6. Conclusions: Two sources of tension in EU cohesion policy

This contribution has analysed convergence across member states of the EU and across regions within them. The main finding for convergence at the national level is that the new member states (NMS) from Central and Eastern Europe have converged strongly, whereas

¹⁸ See http://ec.europa.eu/regional_policy/sources/docgener/guides/blue_book/blueguide_en.pdf

the euro periphery to the South has fallen behind. Outside Germany, there seems to have been little change in regional convergence within the larger member states. Furthermore, we find that inter-regional differences in GDP per capita far exceed those in terms of productivity (or GDP per employed person). This higher variability of GDP per capita across regions is particularly pronounced in countries like Spain and Italy, because in these countries regional employment ratios are tightly linked to regional productivity levels, with much higher employment in the more productive regions.

The results underline the importance of two issues:

1. The interplay between the national and regional dimension in economic growth and convergence and
2. The difference between the conventional measure of GDP per capita and productivity.

National versus regional perspective

EU cohesion policy has always been subject to tension between the national and the regional level. This tension arose first when Portugal and Spain joined, with the latter being characterised by strong regional diversity, whereas Portugal represented the case (alongside Greece) of a country that was entirely at a lower level of development.

With the enlargement towards the East, the national dimension came again to the foreground as all of the NMS qualified for support under the Structural Funds and entire countries had a lower endowment in basic infrastructure.

Given the strong progress made in terms of East-West convergence, however, it is likely that the country averages of a number of NMS will surpass the existing thresholds for eligibility for Structural Funds. This would tend to reinforce the regional dimension.

By contrast, the euro area peripheral states have fallen back in terms of GDP per capita, and most of their regions have shared this tendency. However, this might have been due mainly to the financial crisis whose impact has been at the national level. In principle, one would expect that impact of the financial crisis to be temporary, thus leading to a reduction in the importance of the national dimension in economic growth. In the NMS, the impact of the financial crisis had been stronger in the short term, but this seems to have been overcome by now. The recovery in the 'old' euro area periphery has been more hesitant and incomplete so far.

Productivity versus GDP per capita

Another source of tension, which so far has received little attention, concerns the difference between productivity and GDP per capita. The data presented in this study show that for some countries the regional differences in GDP per capita are much wider than the differences in productivity, as measured by GDP per worker (or rather employed person). Differences between income per capita and per worker are of course a function of

differences in the proportion of the population that is employed.¹⁹ This raises a key issue for cohesion policy, which traditionally has focused on drivers of productivity, such as infrastructure ('tangible' capital) and education/innovation ('intangible' capital). This does not appear adequate when the key source of differences in GDP per capita are differences in employment patterns. Efforts to reduce differences in productivity might thus encounter diminishing returns. Efforts to reduce differences in income per capita might thus be better directed at reducing differences in employment ratios.

The fundamental question for cohesion policy is thus: What should be the focus of cohesion policy when differences in employment ratios are the key drivers of differences in per capita income levels?

The question should concern both European and national policymakers. At the national level, more thought should be given to finding the reasons for the large differences in employment levels. Not all member states are affected by this phenomenon, but in some key countries, like Italy, differences in employment rates seem to be responsible for a larger part of the long-standing North-South differences in income levels than differences in productivity.

Should cohesion policy thus switch from investment in tangible and intangible capital to active labour market policies? This would appear to be difficult for the EU since the responsibility for social and labour market policies remains squarely at the national level. But a more flexibility tailored approach to country specific issues is desirable to ensure that European structural investments are directed in the area of most need. The possibility to introduce ex-ante conditionality regarding reforms which facilitate employment could be considered.

¹⁹ This is not exactly equal to the employment rate, which refers to the ratio between persons employed and the working age population (traditionally those aged 15-65). But regional differences in the age structure of the population appear to be minor.

References

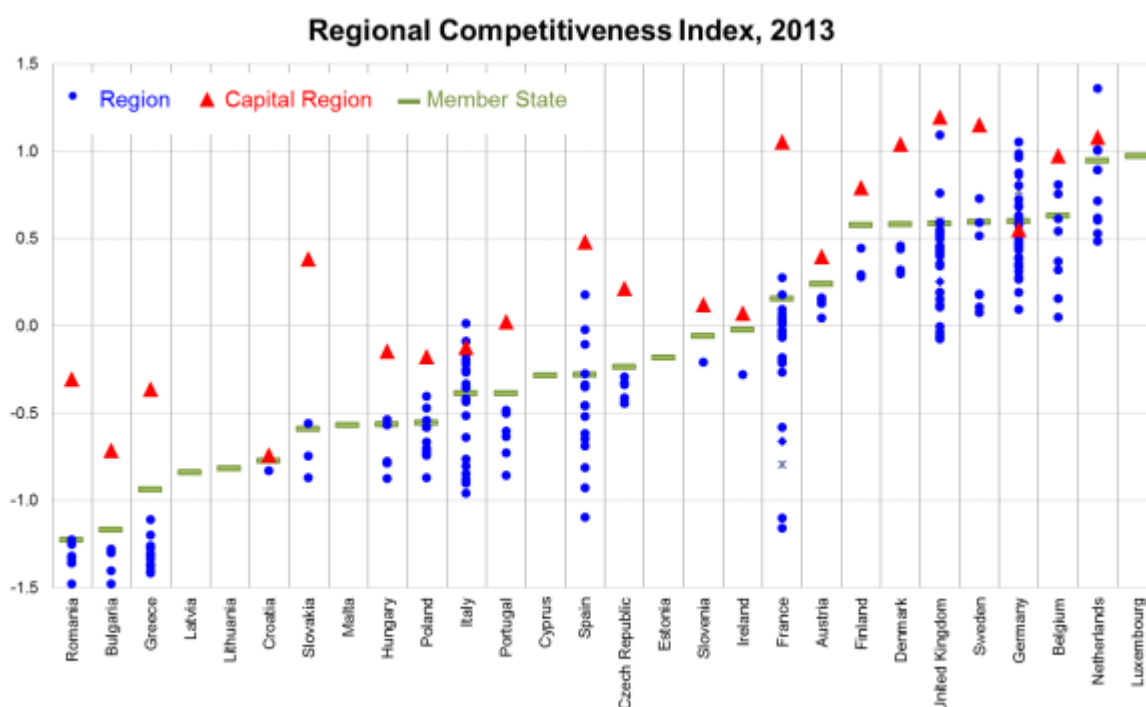
- Annoni P. and Dijkstra L (2013) EU Regional Competitiveness Index, RCI 2013
http://ec.europa.eu/regional_policy/sources/docgener/studies/pdf/6th_report/rci_2013_report_final.pdf
- Azariadis, C. (1996). "The economics of poverty traps part one: complete markets". *Journal of Economic Growth*, Vol. 1 (4): 449–486.
- Bachtler, John with Iain Begg, David Charles and Laura Polverari (2016) "The long-term effectiveness of EU Cohesion Policy: Assessing the achievements of the ERDF, 1989–2012"
- Borsi, M. T. and Metiu, N. (2014). "The evolution of economic convergence in the European Union". *Empirical Economics*, Vol 48 (2): 657-681.
- Diaz del Hoyo, J. L., Dorrucci, E., Heinz, F. F. and Muzikarova, S. (2017). "Real Convergence in the euro area: a long term perspective". *ECB Occasional Paper Series No 203*.
- Easterly, W. and Levine, R. (1997). "Africa's growth tragedy: policies and ethnic divisions". *Quarterly Journal of Economics*, Vol. 112 (4): 1203-1250.
- ECB (2015). "Real convergence in the euro area: evidence, theory and policy implications". *ECB Economic Bulletin*, Issue 5 / 2015.
- European Commission (2017) "Seventh report on economic, social and territorial cohesion"
- Galor, O. (1996). "Convergence? Inference from Theoretical Models". *Economic Journal* Vol. 106: 1056–1069.
- <https://www.routledge.com/EU-Cohesion-Policy-Open-Access-Reassessing-performance-and-direction/Bachtler-Berkowitz-Hardy-Muravska/p/book/9781138224643> in 'EU Cohesion Policy (Open Access) Reassessing performance and direction' Edited By John Bachtler, Peter Berkowitz, Sally Hardy, Tatjana Muravska 2016
- Islam, N. (2003). "What have we learnt from the convergence debate?" *Journal of Economic Surveys*, Vol. 17 (3).
- Lucas, R.E. (1988). "On the mechanics of economic development". *Journal of Monetary Economics*, Vol. 22 (1): 3-42.
- Manzocchi (2017) "La collocazione delle industrie del Mezzogiorno nelle catene globali del valore: strategie d'investimento e politiche pubbliche" Working Paper 1, Laboratorio LUISS sul Mezzogiorno.
- Monfort, P. (2008). "Convergence of EU regions. Measures and Evolution". Working Papers No1/2008. European Union Regional Policy.
- North, D.C. (1990). "Institutions, institutional change, and economic performance". Cambridge University Press.
- Romer, P. M. (1986). "Increasing returns and long run growth". *Journal of Political Economy*, Vol. 94 (5): 1002-1037.
- Romer, P. M. (1994). "The origins of endogenous growth". *Journal of Economic Perspectives*, Vol. 8 (1): 3-22.

Annex I: The special case of Italy: Less heterogeneous than appears at first sight? Different messages from different indicators

Italy has one of the highest indicators in terms of the dispersion of income per capita. However, in terms of productivity Italy seems to be rather close to the average for the other large EU countries. This is not a fluke, other indicators also suggest that Italy is not necessarily the country with the highest dispersion in regional indicators.

Two examples, drawn from the 7th Cohesion Report of the Commission, can illustrate this pattern: the indicator of regional competitiveness used by the Commission and one key element of competitiveness, namely the percentage of the population in working age with a tertiary degree.

Regional competitiveness indicator (shown below). Spain, the UK and France show a higher dispersion than Italy (and that of Germany is of a similar size). A number of smaller countries have also a higher dispersion, often related to the special position of the capital city in the New Member States.



In terms of educational achievements and expenditure on R&D one also finds that in Italy the dispersion across regions is actually smaller than in most other countries as illustrated below

Figure 1.17 Total expenditure on R&D, 2014

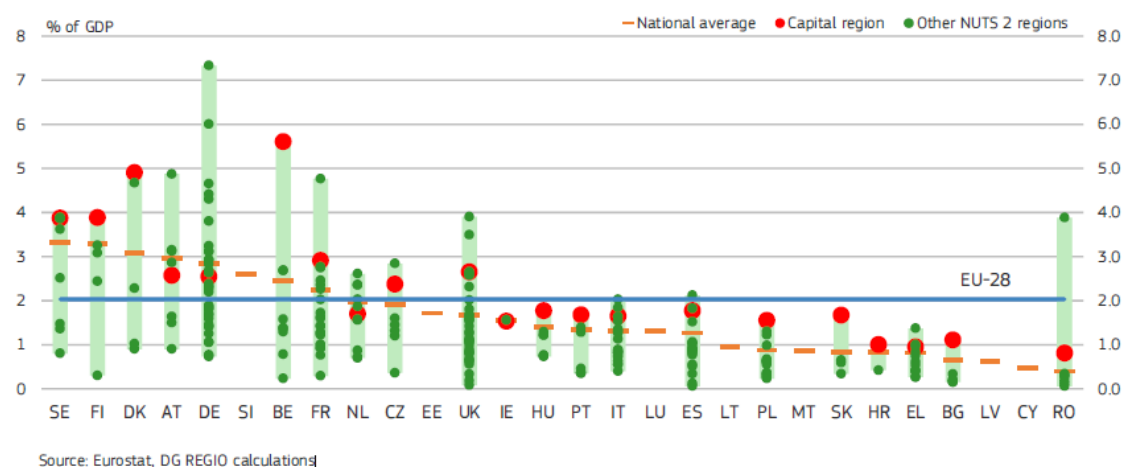
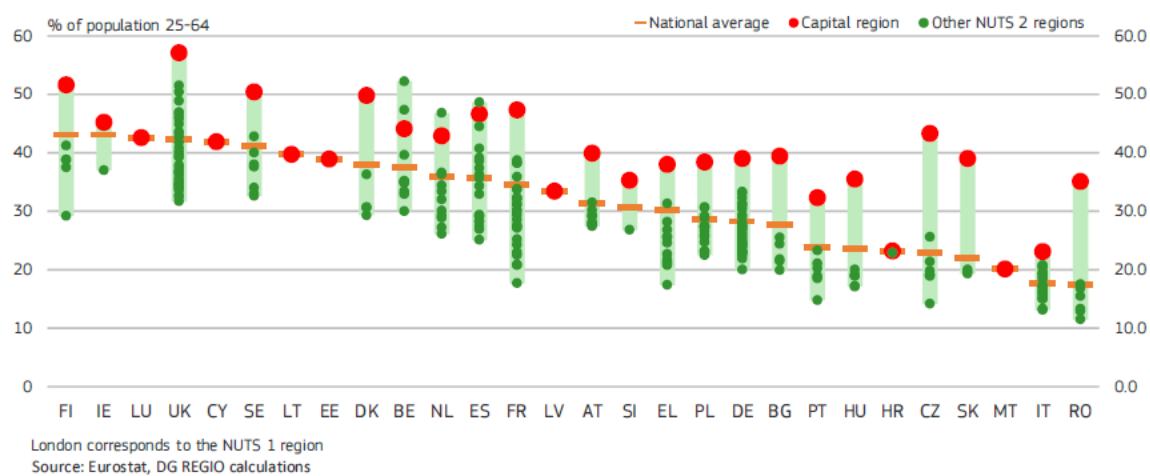


Figure 1.19 Population aged 25-64 with tertiary education, 2016

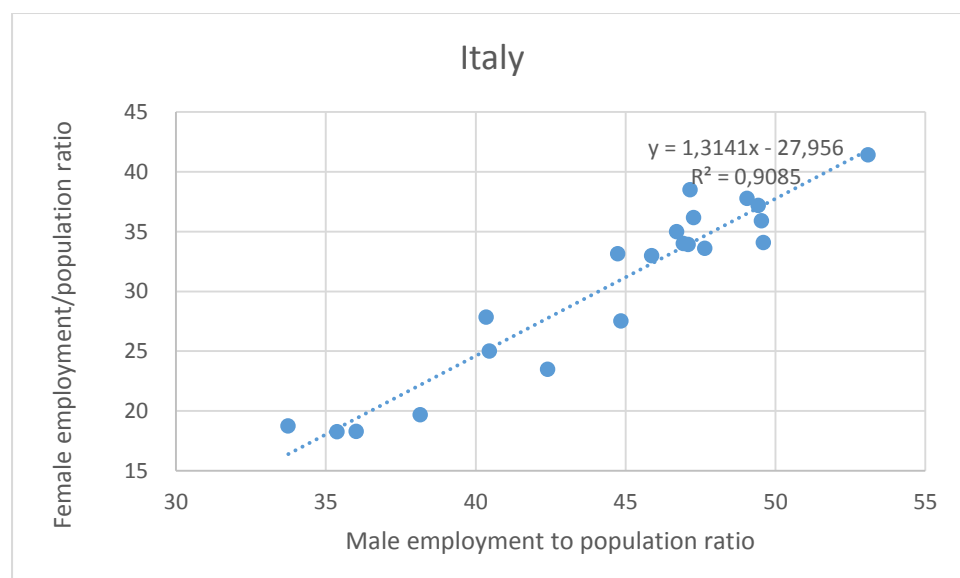


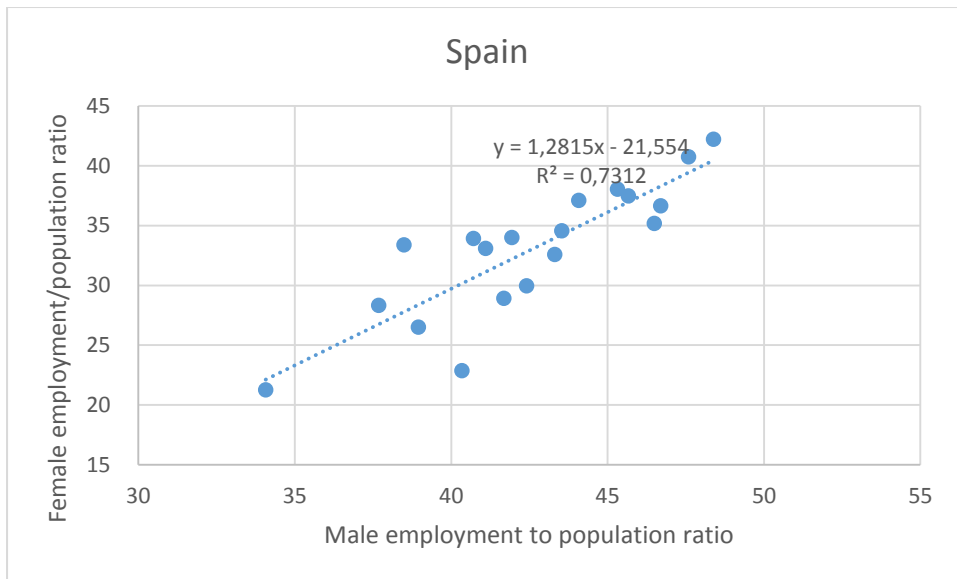
Annex: II Employment rates by gender

It has often been noted that Italy has one of the lowest employment rates of women, with especially low rates in the South. One question is whether this is a specific feature of the South of Italy, or whether this is just part of the overall phenomenon of low employment in these regions.

One way to approach this issue is by analysing the occupation ratios for both males and females. There is a strong correlation between the employment ratios of the two genders across regions, almost everywhere. However, the nature of the relationship is different across countries.

In the two large Med countries (IT and Spain) the female employment ratio tends to increase more than one to one with an increase in the male employment ratio. The cross-regional variability in female occupation ratios is thus higher than that for males. The low values for female occupation in the South do not constitute an exception to the overall relationship. They should thus be seen part of a larger problem of low (measured or official) occupation ratios.





However, in more Northern Member States the relationship is both weaker and the female participation rate tends to increase by less than 1:1 with increases in the ratio for males. It follows that in these countries, the cross-regional variability in female occupation ratios is lower than that for males. Moreover, the differences between male and female occupation ratios tend to be smaller in these countries. The lowest regional female occupation rates are above 40 % in Germany and above 30 % in France, but only around 15 % in both Spain and Italy.

