Chapter 3
The Role of Functions in Economic Underperformance of Southern European Regions

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3.1 Introduction: Greece, Italy, Portugal and Spain before and after the crisis

Structural upgrading has been considered in the literature as fundamental for the possibility of middle and high income regions and countries to thrive in the global economy. In fact globalization has been proceeding very fast, and significantly affecting the European regions, providing them with important challenges (Capello et al. 2011).

To remain competitive is an imperative for regions in a globalized economy, despite an important and still on-going debate as to what the meaning of regional competitiveness is, since short and long run aspect merge and it is not easy to transfer concepts developed at a firm level to a territorial level (Bristow 2005; Camagni 2002; Gardiner et al. 2004). The issue of territorial competitiveness, however, is very important not only theoretically, but practically and for the policy makers, as shown by the recent attention and the different attempts to assess it (Huggins et al. 2014; Huggins 2013).

The competitiveness of regions is strictly linked to their role in the global value chain. Recently Coe and Yeung (2015) pointed out that the existence of networks which are increasingly fragmented and dispersed is one main reason for uneven development levels. Regions inserted in global networks can play different roles: they can be frontrunners, specialized in high-level phases for which innovativeness and managerial capabilities are important factors, or they can be specialized in production phases, for which they need low production costs with adequate quality levels. In this context, the intermediate regions which are present in the peripheries of developed countries can be

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squeezed in the middle, as many multinationals which de-locate production from core areas do it directly towards areas in emerging countries where greenfield investments are easier and possible on a larger scale. Also, once-successful production models such as the Italian industrial districts need to comply with the challenges coming from the upgrading of international competitors and remain successful insofar as they are no longer isolated but play the global game by delocalising activities with low value-added, and concentrate on higher level functions related to creativity, technology, innovation and retail. However, this also comes with a difficult equilibrium to be found between the local and the global (Chiarvesio et al. 2010; Dunford 2006).

For peripheral regions of European countries, upgrading towards higher level phases is therefore no longer needed for the purpose of converging towards the richest regions, but rather avoiding the decline which comes as a consequence if they don't do it. Three possible successful strategies for regions affected by the globalization processes are possible (Affuso et al. 2011): increasing productivity through innovation, reconverting to higher phases of the production process, and reconverting the regional sectoral structure. According to Ezcurra et al. (2007) the latter is probably less important, as the industry mix contributed only in minor part to the dispersion of productivity among European regions over the period 1977–1999, while national and spatial, region-specific, effects were more relevant. However, there is still disagreement on that and the relative importance of intra-sectoral and inter-sectoral structural change is still a matter of debate and investigation (O'Leary and Webber 2015).

Spain, Portugal Italy and Greece share a geographical location at the southern fringe of the European Union and, with some notable exceptions (such as Madrid, Catalonia or Lombardy which are often considered to be among the European motors) their regions are in this uncomfortable intermediate situation with respect to global value chains. The purpose of this chapter is to analyse the economic patterns of southern European countries and their regions, detecting to what extent they are coherent with the rest of the EU or different, and then to show that they have lags in GDP growth due to low productivity growth and finally show that this depends at least in part on inability to rise to higher functions.

The starting point of the analysis is the observation that the four countries relatively underperformed in the past 20 years with respect to the EU average, despite initial levels of GDP per person below those of the old 15 members of the union. As can be observed from Fig. 3.1, in 2012, among the four countries only Italy was marginally above the average of the then EU 27 in terms of GDP per person in PPS, while Spain was slightly below. Greece and Portugal, on the other hand, had values which placed them in the middle of the group of the 13 new member states which entered the EU on 1st January 2004 or afterwards, and this despite being members of the EU since respectively 1981 and 1986. On the contrary, Petrakos et al. (2012) evidence an adverse impact of integration for Greek regions over the period after accession, 1981–2005.

Before the crisis, indeed, some level of convergence between these four countries and the rest of the old members of the EU was taking place. Figure 3.2 plots their level of GDP and the GDP of the rest of the EU countries, plotting the figures
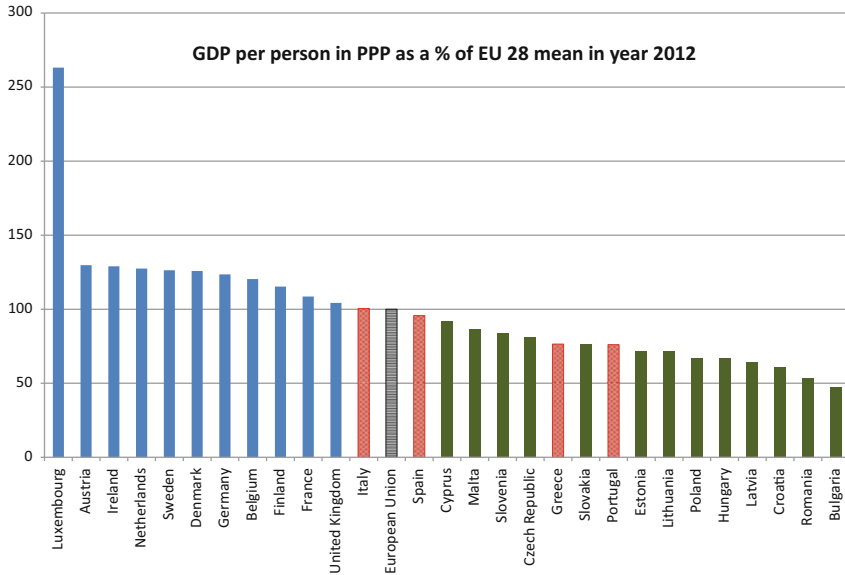
Fig. 3.1 Income per capita in PPS in 2012 as a percentage of the EU27mean. Italy, Spain, Portugal and Greece in *red*; other old members of the EU in *blue*, new members of the EU in *green*. Source: Elaborations on Eurostat data

as an index which uses 2008 as the basis year as this was the one with highest total GDP in Europe before the decrease with the crisis.

Before the crisis, Greece and Spain were growing less than the new member states of the EU, but they also were outperforming the old member states. Portugal was growing more than the EU average in the 1990s but less than the average in the 2000s, so that its performance in the total 13 year period is the same of the rest of the old member states. Italy, finally, which was the richest of the four countries in 1995 (and still is, even if to a lower extent) has been growing significantly less than the new and the old member states, as well as Greece, Portugal and Spain.

Then the crisis hit, starting in 2007–2008, and the four southern European countries, confirming their weakness, were again more affected than the rest of the Union. The right part of Fig. 3.2 shows this very clearly. The 13 new member states went down by less than 3.6% in 2009, then rebounded and in 2013 were already at 103.5% of the values of 2008. The other 11 old EU member states went down by 4.5% in 2009 and then—slowly—recovered, until slightly surpassing the pre-crisis values.

The four countries were all more affected than the European average. Greece is the most notable case which, due to a large number of financial and structural issues, went steadily down until reaching 76.5% of 2008 GDP in 2013; i.e., almost one quarter of total GDP was lost in just 5 years. The other countries were not hit so hard, but still had a pattern which is very different from the rest of the EU, due to the
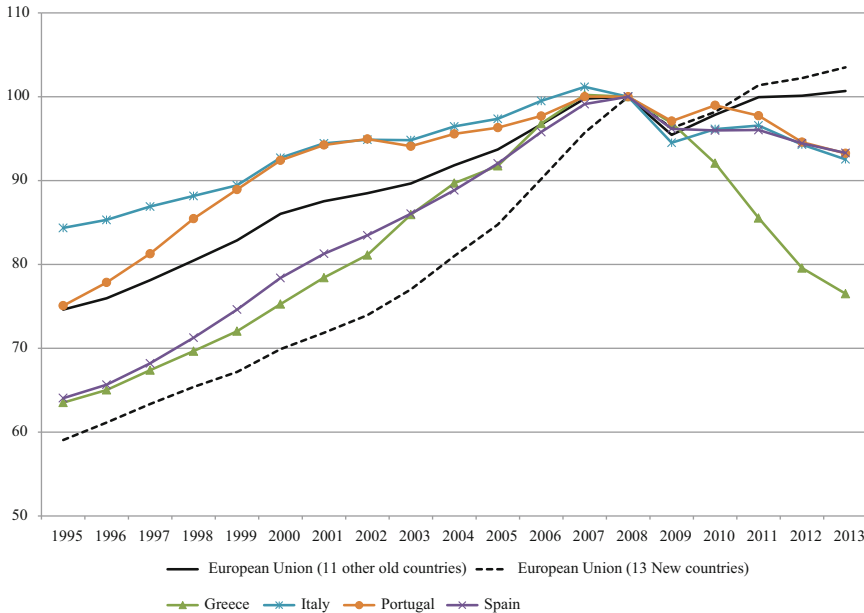
Fig. 3.2 Growth of total GDP of European Union countries 1995–2013 (index with 2008 = 100). Source: Elaborations on Eurostat data

fact that after the hit of 2009 and the recovery of 2010, Italy Portugal and Spain were again decreasing their total GDP. This is most notable in Portugal, which survived the first 2 years of crisis better than the average, but then rapidly lost ground, while Italy and Spain, larger countries, had smoother paths. The result, however, is strikingly similar, with Spain and Portugal being at about 93.3% of 2008 GDP in 2013, and Italy at 92.5%.

In a big crisis, which was originated in the financial sector (and only trigged by the real estate sector), and was later nourished by important difficulties in public finances and in the banking sector, the explanations at the/a national level are certainly of paramount importance, as all these processes take place at the country macro level. For example, Moro and Beker (2016) provide an interesting history of how the crisis extended from the international banking system to a European sovereign debt crisis, hitting countries with high levels of public debt particularly hard.

However, there are also issues linked to the regions, since some of them have weaker economic structures and hence experience more difficulties remaining competitive in the real economy. Using the theory of territorial capital, it is possible to say that some regional structures are less endowed with material, immaterial, public and private assets of growth, which makes them weaker in the long run (Camagni 2009).

It is possible to look at the same period of time and the same indicator of Fig. 3.2 (the variation of total GDP as a percentage of the 2008 value) at the regional level,

in a map (Fig. 3.3). The map clearly shows national effects. All Polish and Swedish regions have a positive increment of GDP, and the same holds true for a large majority of German and British regions. The four southern European countries which are the object of this book are all composed by regions with negative GDP growth, so that the strong impact of the crisis which was detected at the national level in Fig. 3.2 has no exception at the regional level.

However, the map also shows that there also are important differentiations in the way the crisis hit the regions, within the same countries. For many countries, the capital areas, or the areas with the most dynamic large cities are above the national average; this applies, for example, to London, Stockholm, Munich, Berlin, Paris, Warsaw, Bratislava, Sofia.

In the four southern European countries, significant differentiations also exist. While Greece is relatively homogeneous, in Portugal there is a clear north-south differentiation, with the south more strongly hit by the crisis. In Spain the differentiation is along the traditional division between more developed and less developed regions, since the crisis hit less hard in Madrid, Catalonia and the Basque Country. In Italy there is a more nuanced pattern: while the Mezzogiorno performed badly, also some areas in the north, such as Piedmont, and in the Centre, such as Umbria, went worse than the average.

The evidence shown in Figs. 3.2 and 3.3 points to the weakness of southern European countries and their regions. Beyond the financial and macroeconomic issues, which are out of the scope of this book, this is also due to structural issues in the real economy of the regions of these countries.

One major issue which has been pointed out is the one of productivity: regions of these countries experienced lower productivity growth for a long time before the crisis, which also made them more vulnerable to the crisis.

The aim of this second introductory chapter is hence to show the low level of functional upgrading in southern European regions, which contributes to explain their low productivity levels and their relative low growth. In this chapter upgrading will be measured through the functions performed in the economy. The logical progression of the chapter is hence to analyse the economic patterns of southern European countries, showing to what extent they are coherent with rest of the EU or different, then show that they have lags in GDP due to productivity and that these depend at least in part on the inability of their regions to rise to higher functions.

Accordingly, the next section will present the macroeconomic patterns of southern European countries. In the following sections the functions performed in these countries will be assessed and, after having shown their specialization in low-level functions, this will be related to the levels of regional growth.
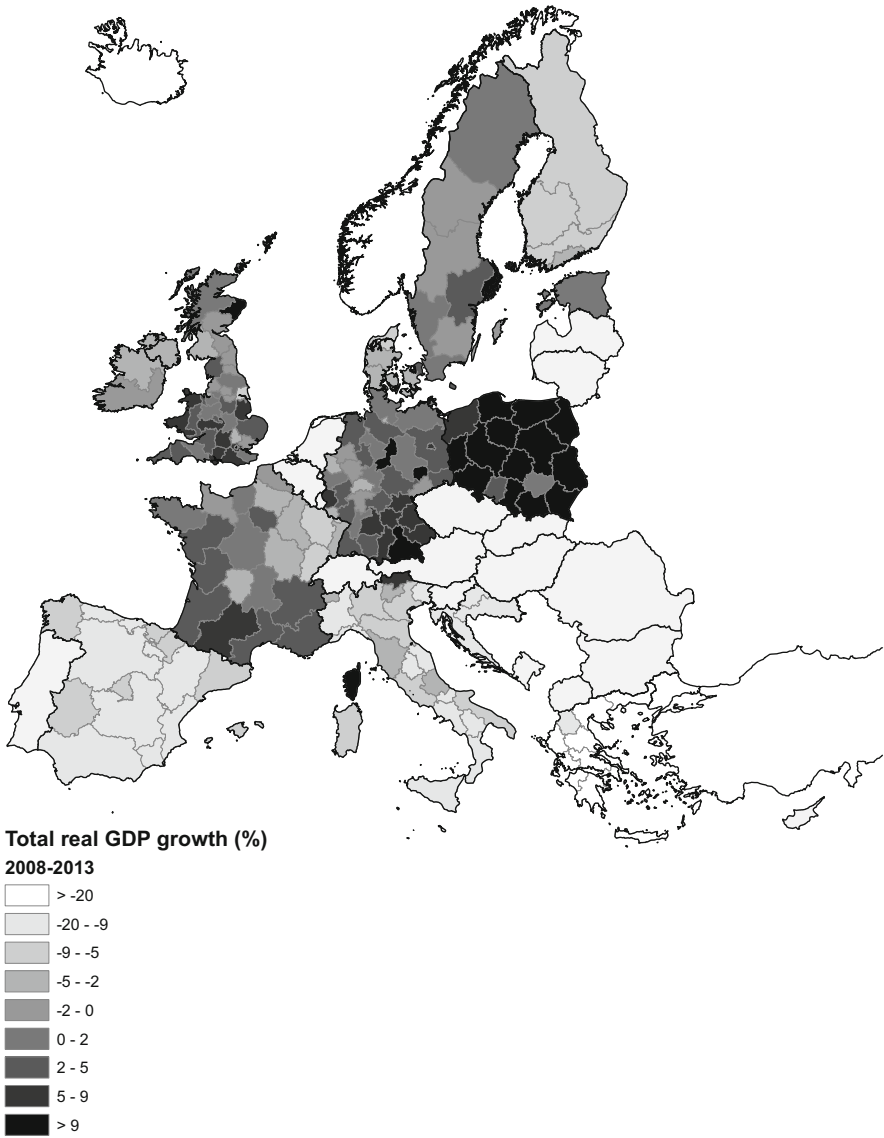
Fig. 3.3 Growth of total GDP of European Union regions 2008–2013 (with respect to 2008 = 100)
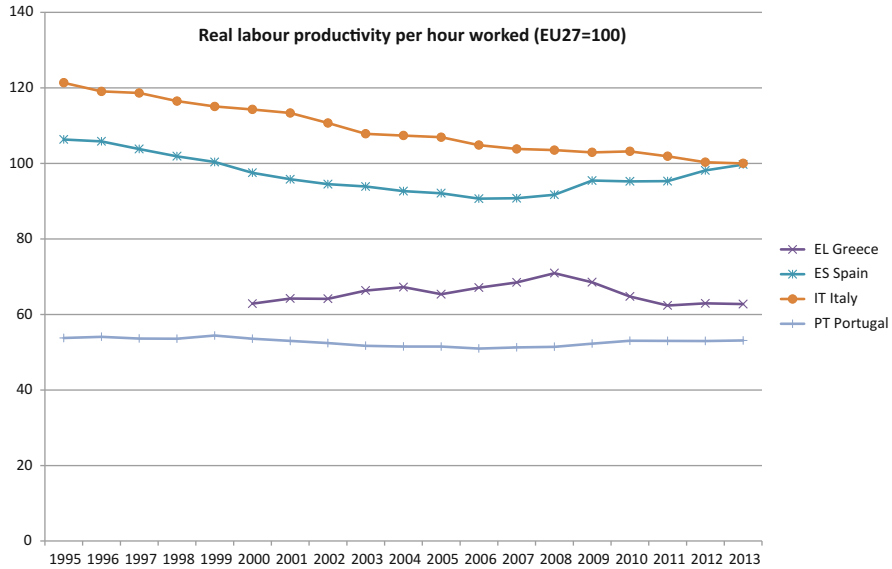
Fig. 3.4 Real labour productivity per hour worked (EU27 = 100). Source: Eurostat

3.2 Macroeconomic Patterns of Southern European Countries and Their Regions

The issue of productivity is an important and long standing one, contributing to the explanation of the economic troubles of southern European countries. As evidenced in Fig. 3.4, real productivity has historically been very low with respect to the rest of Europe in Portugal, and has also been low in Greece, with some small increments in the years prior to the crisis which were compensated by decrements in the years of crisis.

Italy, the only one of the four countries with significantly higher labour productivity in 1995 (more than 120% of the EU average) also decreased in this measure significantly and steadily over the following 18 years, with the same speed of decline in the years before and during the crisis.

Finally, the Spanish case is peculiar. Starting from slightly higher than average productivity levels in 1995, these declined steadily until the beginning of the crisis, and then recovered during the crisis due to strong restructuring and layoffs in the Spanish economy in these years.

Adopting a rougher measure of productivity, the gross value added per employee, it is possible to get a more disaggregated picture of the patterns of productivity in southern European countries with respect to the EU. This is presented in Table 3.1, where the values of GVA per person[1], employment and

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[1]In order to disaggregate between types of regions, these data come from regional level statistics, which provide GVA rather than GDP.

Table 3.1 GVA, employment and productivity trends in southern European countries and the rest of the EU (EU27 = 100)

GVA per person as a % of EU27			
	1995	2001	2006
Old North	135.3	134.5	133.5
Old South non obj1	122.9	120.3	111.5
Old South obj1	66.4	67.3	67.5
EU27[a]	100.0	100.0	100.0
Employment rate as a % of EU27			
	1995	2001	2006
Old North	101.9	104.3	102.8
Old South non obj1	100.3	104.9	107.3
Old South obj1	81.9	84.3	87.6
EU27[a]	100.0	100.0	100.0
GVA per employee as a % of EU27			
	1995	2001	2006
Old North	132.8	128.9	129.9
Old South non obj1	122.6	114.7	103.9
Old South obj1	81.1	79.8	77.1
EU27[a]	100.0	100.0	100.0

[a]Excluding Finland, countries with only one region and the French overseas departments

productivity are presented for the long period before the economic crisis. This table allows for a dynamic comparison of the trends in Southern European countries to the rest of the EU, separating old western members and new eastern members, and disaggregating between poorer and richer regions, i.e., regions which belonged to objective 1 in the 2007–2013 EU cohesion policy programming period, to be eligible for which, a GVA per person in pps lower than 75% of the EU average was needed.

The first to be observed is the trend of GVA per person. While in the 11 years before the crisis the eastern countries showed important degrees of convergence, the lagging regions of southern European countries did not significantly converge, remaining at about 67% of the EU average. At the same time, the richest regions of these countries, which were at more than 122% of the EU average in 1995, slowly lost ground, reaching 111% in 2006; this path is very different from the one of the other rich regions, as the regions of the northern old members of the EU did not lose ground, if only marginally.

This general trend is the result of two concurring trends going in opposite directions. In terms of employment rate, in fact, the southern European countries increased with respect to the EU average, both in lagging and in rich regions. The first ones, starting from lower than average levels improved towards the mean, while the latter, starting around the mean, significantly improved until reaching levels higher than the ones of northern old members of the EU.

The trend of productivity, however, goes in the opposite direction. The richest regions of southern European countries started from levels well above the EU

mean, at 122%, and lost ground very quickly, going to 103% before the start of the crisis. The poorest regions of southern European countries started at levels significantly lower than the average and still decreased to 77% of the EU average. This decrease is less marked than the one of richer regions but is still important, considering that the starting point was much lower.

It has to be observed that this trend is not due to the well-known productivity increases of new member states, as the northern old members of the EU did not experience the same important relative decline despite starting from very high levels.

It is therefore clear that the regions of southern European countries, in the years before the crisis, were quite good at creating jobs but much less at creating new output, and this implied an important decrease of average productivity.

To consider both indicators at the same time, it is possible to represent the patterns of employment and productivity growth in a single graph, in a way first introduced by Camagni (1991) for manufacturing and extended to the whole regional economy by Affuso et al. (2011).

Departing from Camagni (1991), the indicators are not calculated here relative to the national average, but to the European average, in order to show where the regions of southern European countries stand with respect to the other regions of Europe.

On the horizontal axis, there will therefore be the relative growth of employment in a certain programming period, calculated as:

$$RelativeEmploymentGrowth_r = \left(\frac{Emp_r^{2006}}{Emp_r^{1995}}\right)^{1/11} - \left(\frac{Emp_{EU}^{2006}}{Emp_{EU}^{1995}}\right)^{1/11}, \qquad (3.1)$$

where Emp is total employment, r is the subscript for the regional value and N is the subscript for the national value.

On the vertical axis, there is the relative growth of productivity in the programming period, calculated as:

$$RelativeProductivityGrowth_r = \left(\frac{Prod_r^{2006}}{Prod_r^{1995}}\right)^{1/11} - \left(\frac{Prod_{EU}^{2006}}{Prod_{EU}^{1995}}\right)^{1/11}, \qquad (3.2)$$

where $Prod$ is productivity calculated as GVA per employee and r is again the subscript for the regional value.

Putting these two indicators in the same graph brings an interesting property: a 135°, negatively sloped line passing through the origin evidences a condition of regional GVA growth equal to the European average. In fact, a region may develop at the same rate as the European GVA either if both productivity and employment grow at the same rate as the average or if productivity increases at a lower rate but employment does so at a proportionally higher-than-average rate, and vice-versa. If
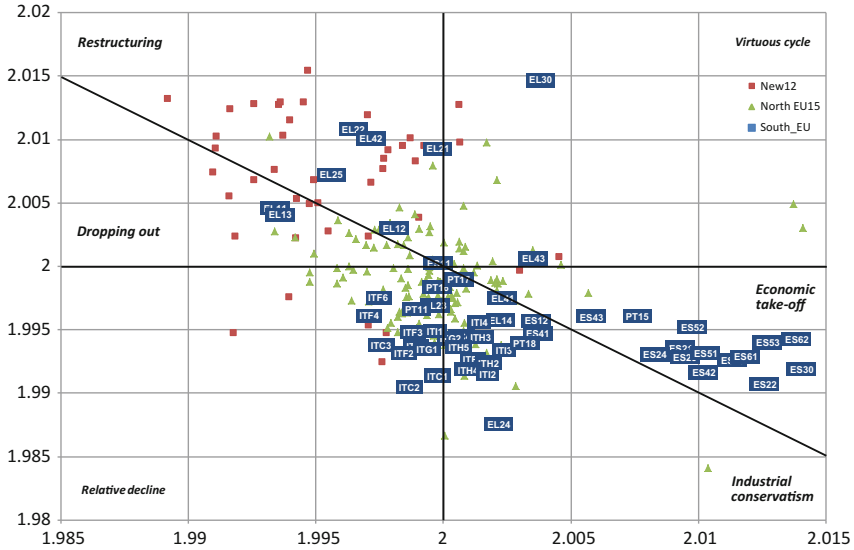
Fig. 3.5 Growth patterns of European regions 1995–2006 (EU27 = 100) (logarithmic scale used to improve readability)

a region is above this line, it increases its total GVA more than the average of the EU; if it is below it, the GVA growth rate is below average.

For this reason, the graph can be divided into six sectors rather than the usual four quadrants, each of them representing a specific possible pattern of regional economic development. Following Affuso et al. (2011) these patterns can be defined as follows (Fig. 3.5):

1. Virtuous cycle, when the regional economy is able to grow more than the average in terms of output thanks to both higher-than-average productivity growth and employment growth;
2. Restructuring, when higher-than-average productivity growth is achieved through employment cuts, leading nevertheless to good GVA performance due to the increases of productivity;
3. Dropping-out, when productivity growth is achieved by dropping inefficient production units, therefore generating not only lower than average employment growth, but also lower-than-average GVA growth;
4. Relative decline[2], defined as a vicious cycle in which employment cuts are unable to restore competitiveness, a condition in which there is therefore very low job and output growth;

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[2]In this context and for this quadrant it is preferable to detach from the definition used in Affuso et al. who called this quadrant de-industrialization.

5. Industrial conservatism, when poor productivity growth is accompanied (and sometimes explained) by better-than-average employment growth; this pattern is more likely to take place in the presence of public assistance and industrial rescues;
6. Economic take-off, when lower-than-average productivity performance occurs together with very good employment performance, so that the effect on total value added is positive.

From Fig. 3.5 some very strong evidence emerges: even in the years before the all the turmoil due to the financial and the public finance crisis (Moro and Beker 2016), the regions of southern European countries were following specific growth patterns which would be the only ones compatible with a specialization in lower level production phases.

In particular, only one region, Attiki, clearly qualified as a *virtuous cycle* region, with positive growth of both employment and productivity. Two others, Ipeiros and Kriti are only marginally in the same sector. Other Greek regions are in the *restructuring* and *dropping out* quadrants, i.e., they were losing employment and increasing productivity, but only in some cases was this increase of productivity sizeable enough to compensate for employment losses. Apart from these Greek regions, no other region of southern European countries experienced a higher than average productivity growth.

The Spanish regions, in fact, are for the most part in the *economic take-off quadrant*, i.e., with respect to the EU mean, they were growing more than the average thanks to a very strong employment performance, coupled however with a relative decline of productivity. It is interesting to note that the region where this patters is more marked is Comunidad de Madrid. In other words, the capital in this case is the most representative region in the trend of the whole country.

Finally, Italian and Portuguese regions are all clustered in two sectors, *relative decline* and *industrial conservatism*. These are quadrants with lower than average GVA growth and lower than average productivity growth. In some cases, especially for some central and northern Italian regions[3] such as Veneto, Tuscany, and Emilia Romagna, employment growth has been higher than average. This is also the case of the last two Greek regions, Thessalia and Sterea Ellada, and, in the case of Portugal, of Lisbon.

The last group of regions is in the weakest *relative decline* quadrant, with lower than average growth in all three variables. It is possible to find there many regions belonging to the Italian Mezzogiorno, such as Apulia, Calabria, Sicily, as well as some weak regions in the north of the country, notably Liguria. In this quadrant we also find the Portuguese North and Centro.

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[3]Due to the long standing and well-known dualism in this country, northern regions are also normally richer (Dunford 2002; Trigilia 2012).

3.3 The Functions Performed in Southern European Countries and Their Regions

The previous sections have illustrated the homogeneity and the weakness in economic terms of southern European regions with respect to the rest of the EU, in particular for what concerns productivity growth. Consistent with the main purpose of the book, this section analyses the issue with respect to the inability of these regions to restructure their economy.

The most common indicator could be one of sectoral change, but the presence of a certain sector does not give significant enough information on the role a region plays in the international division of labour. In fact, intra-sectoral trade has been growing very fast in the last decades, and international trade has been unbundled into smaller and smaller tasks (Grossman and Rossi-Hansberg 2008; Baldwin 2006).

From the European Labour Force data, however, it is also possible to know what type of occupation is performed by the worker, according to a classification which is called ISCO (International Standard Classification of Occupations). The jobs described in this classification are not always and necessarily linked with higher or lower functions, for instance there is no way to understand whether a clerk performs higher or lower functions than a plant operator. There are other occupations, however, which are clearly linked to high level functions performed in the economy. For example, a person employed as physicist in a region implies that there are activities with high technology level and, most likely, innovative ones.

Among all the professions of the ISCO classification, the following ones are theoretically expected to be related to the presence of high level functions in the economy of a region: Legislators and senior officials (ISCO11); Corporate managers (ISCO12); Managers of small enterprises (ISCO13); Physical, mathematical and engineering science professionals (ISCO21); College, university and higher education teaching professionals (ISCO231); Business professionals (ISCO241). To these professions, Writers and creative or performing artists (ISCO245) were also added because of the literature which points out creativity as one aspect which allows places to be competitive by performing creative, innovative and high value added activities (Lee et al. 2004; Lorenz and Lundvall 2010; Marrocu and Paci 2012).

The limitation with the use of these data is that the sample of the Labour Force survey is large but not huge, so that in order to analyse the professions at the regional level, 3 year averages are more reliable; in this case, the most recent period which avoids any bias introduced by the crisis is the one just before it, i.e. 2005–2007.

Table 3.2 presents the presence of high level ISCO occupations in southern European countries and the rest of the EU as a percentage of the total labour force. Again, a distinction was made between poorer and richer regions in these countries, by using the eligibility for Objective 1 cohesion policy support in 2000–2006.

Table 3.2 High level ISCO occupations in southern European countries and the rest of the EU (% of the total). Average over 2005–2007

Group of regions	Number of regions	Legislators and senior officials	Corporate managers	Managers of small enterprises	Physical, mathematical and engineering science professionals	College, university and higher education teaching professionals	Business professionals	Writers and creative or performing artists
ISCO denominations / ISCO codes		11	12	13	21	231	241	245
Old North	142	0.51	5.77	3.31	3.37	0.52	1.40	0.63
Old South non obj1	22	0.69	2.50	3.58	1.65	0.39	0.66	0.61
Old South obj1	33	0.46	1.44	7.47	1.27	0.34	0.60	0.27
New 12	51	0.47	3.32	2.98	1.94	0.36	1.59	0.41
EU mean	248	0.51	4.42	3.86	2.66	0.45	1.25	0.54
Sig		***	***	***	***	***	***	***
F		25.1625	188.5864	75.5542	39.1205	32.5722	64.3482	49.9712

Source of data: elaborations on Labour Force Survey microdata
***, **, *Significant respectively at the 99%, 95%, and 90% confidence level

According to the data, the regions of southern European countries are characterized by a larger share of *Legislators and senior officials* (ISCO11). These are significantly above the levels of the EU mean in the richest non-objective 1 regions, while they are below the mean in the poorer objective 1 regions. This is likely due to a larger overall presence of the public sector in the four countries, with a concentration of the highest levels of these functions in the richest regions of the countries, which are also those with the most important administrative cities. Poorer regions of southern European countries, in fact, are poorly endowed of these professions, meaning that they tend to be dependent on the richer regions of their countries for strategic decision making in the public sector.

Going to the private sector, the share of *Corporate managers* (ISCO12) in southern European countries is significantly lower than the average of northern old members of the EU, and also of new member states. This holds true for both poorer and richer regions, especially for the former as expected. This seems to confirm that the four countries are less reliant on large businesses, less likely to host the headquarters of large firms, including multinationals which tend to follow determinants which are less present there (Basile et al. 2008). It is certainly a problem if a region is in this situation, as the most important economic decisions of the private sector are taken elsewhere and the region is likely dependent on other regions, with all consequences of a relationship in which there is a dominant external operator.

The private sector appears to be stronger concerning the *Managers of small enterprises* (ISCO13), which are slightly over-represented in the richest regions of southern European countries, while in the poorest ones the concentration is so high that it more than doubles the EU15 mean. This is a signal of the presence of a large number of entrepreneurial initiatives; however it is also likely that this very high value is a signal of a weak private sector economy in which small businesses are set-up by the individuals to compensate for the lack of job opportunities, while small initiatives are unable to grow due to the lack of support by a weak socio-economic fabric.

This interpretation is confirmed by the evidence provided in the various categories of professionals. In all of them, the share of persons with these occupations in southern European countries is lower than the northern old members of the EU. *Physical, mathematical and engineering science professionals* (ISCO21) are clearly under-represented in these regions, which hence more rarely perform advanced production activities or research and development functions. *College, university and higher education teaching professionals* (ISCO231) are also significantly under-represented, even if to a less evident extent than the previous case. The literature is well aware of the importance of the interactions between academia, the private and the public sectors, and of the fact that universities can have many functions in the economy, including providing knowledge through research, forming human capital by teaching and also nurturing potential new ventures (Gunasekara 2006; Leydesdorff and Etzkowitz 1998). Having less of these professions means being, ceteris paribus, weaker in these functions, with significant disadvantages in terms of dynamic regional economic performance.

The occupation of *Business professionals* is also significantly under-represented, and this is also a bad signal, as these professionals tend to be service workers whose presence is needed in advanced economic activities, included innovative

manufacturing because they are increasingly important inputs in the production function (Cuadrado-Roura 2013). It has been estimated that the services make a relatively small share of global exports in gross terms but a much larger one in terms of value added (Low 2013).

Finally, also the creative class appears to be little represented in southern European countries, even if this is mostly due to their poorer regions, which lack employment opportunities for *Writers and creative or performing artists* (ISCO245), while the richest regions are almost at the same levels of the rest of the old member countries.

3.4 Functional Upgrading and Regional Growth in Southern European Countries

At this point it is important to consider whether, as could be assumed by the empirical evidence illustrated so far, the issue of low level functions is related to regional growth. For this reason a first econometric analysis is present henceforth. This analysis follows the same conceptual scheme of the book, presented in the introduction to the volume, and asks itself whether those regions in southern European countries which remain specialized in low-level functions are growing less than the others which were able to improve their role by moving towards upper level functions.

In order to analyse/test/explore this, a panel database with 3 year averages of data has been built for the same 12-year period which was the object of the descriptive analysis. The dependent variable is the growth of total regional real GDP, an indicator consistent with regional competitiveness, and the explanatory variable of interest is the level of high-value functions. Consistent with the previous section of this chapter, the level of functions is proxied through the percentage of workers who report as occupation to be working as Physical, mathematical and engineering science professionals (ISCO21); the results with other proxies are generally similar.

A number of controls are added to the regression in order to avoid an omitted variable bias as much as possible. First of all, in order to account for national and time effects, a set of time-country dummies is added. These account for a region being in a specific country in a specific 3 year period. Moreover, other control variables are added: the percentage of workers in science and technology, and the level of education of the labour force, measured with the percentage of people holding at least a degree. Finally, the level of income per capita is also added to the regressions in order to account for additional socio-economic heterogeneity in the regional structure.

The sample uses regional averages over 3 years for 5 periods (1996–1998, 1999–2001, 2002–2004, 2005–2007, 2008–2010) and adopts the level of Nuts2 as classification. The main source of data is Eurostat and the regressions are run with fixed effects and report robust standard errors (Table 3.3).

Table 3.3 Panel regression results

Dependent variable	(1)	(2)	(3)	(4)	(5)	(6)
Regional real GDP growth						
Income per capita	−345.5***	−344.8***		−365.2***	−606.3***	−593.8***
	(99.22)	(94.28)		(117.1)	(119.6)	(122.9)
High value functions		61.55***	61.87**	47.65**	48.43**	
		(20.23)	(23.35)	(20.10)	(19.81)	
Human resources in science and technology (core definition)				0.248*	0.339**	0.332**
				(0.148)	(0.153)	(0.165)
Education					0.108*	0.0971
					(0.0609)	(0.0620)
Constant	9.134***	8.025***	1.224***	5.716***	6.188**	7.295**
	(1.911)	(1.773)	(0.413)	(2.072)	(2.733)	(2.760)
Time and country dummies	Significant	Significant	Significant	Significant	Significant	Significant
Observations	290	290	290	277	199	199
R-squared	0.682	0.691	0.664	0.700	0.810	0.805
Number of groups	58	58	58	58	58	58

Robust standard errors in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

In order to verify whether the result for the main explanatory variable is due to the presence on the absence of controls, the regressions are run with different combinations of controls and also with no control at all. Additionally, to control for the coefficients of regressors, regressions with only the controls and without the target explanatory variable are also run.

The results of the regressions are presented in Table 3.3. All the coefficients are significant and have the expected sign. The target explanatory variable, i.e., the level of high level functions in the region, is always positively and significantly related to regional growth, independently from whether the controls are included and which set of controls are included. This provides preliminary support to the intuition, coming from the descriptive analysis, that low levels of upgrading in southern European regions are detrimental to growth.

The control variables also have the expected sign: there is, ceteris paribus, some degree of internal convergence, as the initial level of GDP per person has negative sign, as is common in the literature. Moreover, the levels of human resources in science and technology and the levels of education are positively and significantly related to growth. As they maintain the same sign and almost the same coefficient in all the regressions which are presented, these results prove to be robust to different specifications. Also in the last case, without high level functions, in which the education levels are no longer significant, they are only very marginally so, as the coefficient is basically the same and so is the standard error.

These regressions could be further reinforced by having other controls which are not available as a panel over the same time span, such as FDI data (see the chapter by Resmini in this volume) or the level of institutions in the regions, which was shown to contribute to explain the lack of transition towards higher level functions in Portugal (Marques 2015). They are however clearly supportive of the idea that the reduced productivity growth in the regions of Southern European countries is correlated with their low level of functions and their inability to rise towards higher level functions.

3.5   Conclusions

This second introductory chapter looked at some important economic problems of southern European countries. In fact, despite starting at levels of income per capita around or below the average of the EU, these countries did not catch up and, especially in the years of the crisis, significantly lost ground with respect to their northern partners.

There are certainly very important national aspects to explain that. For example, problems related to the presence of a currency union, the Eurozone, with different inflation rates, which made the real effective exchange rates of these countries deteriorate significantly. Other important aspects at the national level include the problems of public finances, which has been so important for these countries as to be the main determinant of the second hit of the big crisis. Having a very large

standing debt in an unstable global financial situation is a big problem, since this raises selectively the interest rates for these countries and puts additional strain on the public finances than in a "normal" period of recession, when increased welfare and public investment expenditure is needed.

However, as this chapter pointed out, there is an issue coming from the real supply-side economy in these four countries, which was present well before the crisis, namely the inability to increase productivity at the same rate of other comparable countries. This is an aspect of a weak economic structure, which is more vulnerable to crisis and to new international competition which first generally arise in traditional low-value-added productions.

The chapter showed that the four southern European countries were able to create jobs in the years before the crisis but not to increase their level of production by raising productivity. This problem was common at the national level, but more concentrated in the weakest regions of these countries, those eligible for Objective 1 support by the EU structural funds. In this chapter, this was shown to be due to a problem of functions performed in the various regions of these countries: by looking at the professions performed by workers in the regions of these countries, it clearly emerges that they are specialized in low level functions, apart from public sector command functions in the richest southern European regions (which, however, are normally more related to internal domination) and apart from small and medium enterprise managers, which are, however, more linked to the creation of self-employment and the inability of small firms to grow, than to strong entrepreneurship. The regions of southern European countries lack in functions related to research, to engineering and innovation, in professional support functions and, finally, also in creative ones. And in this aspect there is a significant level of homogeneity between these countries, confirming the evidence provided in the previous chapter by Fonseca (2017).

This inability to upgrade their structure and move towards higher value added functions has been detrimental to growth. As shown by an empirical analysis, those regions which had higher functions were, ceteris paribus, outperforming the others. There is hence an important contribution of regional functions to growth, especially in southern European countries. In general, therefore, southern European peripheral regions specialize in lower-level functions and have not upgraded them, and this can hinder growth and helps explain their difficulties in catching-up.

This evidence raises a large number of questions. First of all, why were these regions unable to upgrade their functions and improve their productive structure? This is not due to a single explanation, but to a number of concurrent causes. This explanation has to be looked for in low level infrastructure, inability to attract FDI, difficult innovative patterns, politics and institutions, and to a large extent to weak human capital and especially to the inability to use it, all coupled with ineffective public policies. The following chapters will cover these aspects in detail.

Finally, the evidence provided in this chapter also raises questions for policies. It appears that, with some localized exceptions, policies have largely been ineffective in bringing development to these places. Normally, these policies were not directly targeting the upgrading of the economic structure, but rather the basic infrastructure

upon which the economy is built, or the set-up of new businesses. Helping firms to rise to an upper level of functions is not an easy task, as this requires them to move from production to ideation, or from local do-it-all-in-house production to growing by keeping only the highest value added phases and relocating those of lower levels. These are processes which are not incremental growth, but involve destructive organizational growth. These are also processes which cannot take place in the short run. However, they will be necessary if the regions of southern European countries want to avoid being squeezed between the advanced and innovative core regions of northern European countries and the cost-effective regions of emerging countries.

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