Chapter 14
Higher Education, Human Capital, and Regional Dynamics in Southern Europe

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14.1 Introduction

Despite the term "human capital" having remote historical roots, being already widespread in the writings of the founding fathers of economic analysis (Teixeira 2005), it was during the second half of the twentieth century that an increasing debate

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around human capital emerged among scholars. New economic theories started suggesting that human capital in general—and education in particular—could work as an engine for the economic growth and development of nations (e.g., Romer 1990; Schultz 1993). The increasing relevance of human capital for economic growth was also associated with the role of technology and its impact in enhancing the demand for more and better qualified workers (e.g., Goldin and Katz 1998). At the same time, the returns on investment to human capital started to be expected to be higher in those contexts where productive learning opportunities existed or could be exploited. However, the capacity of societies to take advantage of those investments has been found to be more complex and uncertain than it was initially portrayed.

A more recent line of research started recognizing the potential role of human capital at the regional level also. Moreover, further developments in econometric methods—particularly in spatial econometrics, pioneered by Anselin (1988)—offered a new way to account for spatial correlation between different variables in regional growth studies, as well as potential spillover effects that can be dependent on the neighbouring relationships between countries and/or regions. Hence, in this chapter we aim to understand the role of human capital on regional convergence for Southern Europe countries, with particular emphasis on recent empirical studies. In the next section we discuss the role of human capital in the framework of growth convergence theories and the issue of human capital migration as a potential factor influencing regional disparities in Europe. In Sect 14.3 we focus on an important component of human capital formation—the role of higher education institutions at the regional level. Then, in Sect. 14.4 we review the empirical findings on these issues in the context of Southern Europe (Greece, Italy, Portugal, and Spain). Section 14.5 provides a brief exploratory analysis of the potential association between the education of the population and the GDP per capita at the regional-level for those four countries. We present some concluding reflections in Sect. 14.6.

14.2 Regional Disparities and Human Capital in Growth Theory

14.2.1 Education and Regional Convergence

The early assessment of growth disparities among nations relied on the concept of "convergence". Convergence studies have become highly influential since the early 1990s, not only due to the renewed interest in economic growth fuelled by endogenous growth theories (e.g., Romer 1990), but also owing to the emergence of reliable macroeconomic data (see Summers and Heston 1988). As a result, empirical works assessing whether or not countries starting with the same structural

conditions (such as human and physical capital, unemployment rates or saving rates) converge to the same level of GDP per capita became abundant.[1]

Convergence analyses were then easily transposed to regional studies (Martin and Sunley 1998). As regional economies tend to diverge from each other due to the spatial unevenness of market forces, economies of scale and agglomeration effects typically result in a strong concentration of labour and capital in some regions, which subsequently lead to (self-reinforcing and persistent) growth disparities among regions. The increasing recognition of this growth heterogeneity within countries, along with the intensified debates about the role of human capital in regional growth and convergence, has thus motivated many studies about this subject.

Neven and Gouyette (1995) analysed 82 NUTS II regions of Northern Europe using school enrolment as a proxy for human capital. Similarly, to Mankiw et al. (1992), they concluded that regions with higher human capital had higher growth rates, and that β-convergence was higher whenever human capital differences were controlled for. Arena et al. (2000) studied 105 British counties and measured human capital through the proportion of the working age population with post compulsory education. They, instead, concluded that controlling for human capital did not significantly change the β-convergence parameter, which implied that human capital differences did not explain counties' growth disparities.

Some authors also attempted to explain regional disparities using endogenous growth model approaches. Rodriguez-Pose and Fratesi (2004) concluded that out of the structural funds of the European Union aimed at reducing regional inequalities, only the investment in human capital and education had a significant effect in achieving this goal, even though this type of investment only represented around one eighth of the aforementioned structural funds. Many studies further showed that the growth of European regions is spatially correlated among them (e.g., Fingleton and McCombie 1998; Lopéz-Bazo et al. 1999; Baumont et al. 2003; Badinger and Tondl 2003; Dall'erba 2005a, b; Digiacinto and Nuzzo 2006; Dall'erba and LeGallo 2008). Overall, they suggest that the geographical location and spillovers can matter more than other "traditional" macroeconomic factors (Quah 1996; Moreno and Trehan 1997). More recently, Basile (2008) concluded that, for a sample of 108 NUTS 2 regions in Europe, the role of human capital in the convergence was non-linear: an increase in the rate of schooling only increased growth rate when the level of investment was above the EU average. Moreover, regions having neighbouring regions with high levels of human capital benefited from externalities, which were materialized into larger rates of economic growth.

[1]This corresponds to the concept of "conditional convergence". Unconditional convergence, instead, occurs whenever all countries/regions converge to the same level of GDP per capita, independently of their initial structural conditions. Closer to the "conditional convergence" definition is that of "club convergence". It is associated with multiple equilibrium values of GDP per capita to which countries will converge, depending on their initial conditions.

14.2.2 Migration and Regional Convergence

The regional role of human capital is also closely linked to the "brain drain" phenomenon, which is defined as the process of migration of highly educated people, massively or individually, from one geographical location to another. Several factors explain these phenomena, though the main one seems to be the fact that "different societies and cultures tend to generate skills and talents in different proportions and to require talents and skills in different proportions" (Johnson 1965, p. 301). Therefore, some regions may not have the necessary "absorptive capacity" to retain the human capital that was generated in the region. If the region does not have sufficient demand for the high-skills that are created by the universities, it is expected that those high-skilled workers will migrate elsewhere, where they can benefit from better working conditions.

Several studies addressed the effects of human capital migration, both at national and regional levels. Similar to developed and developing countries, regions within a country also have different degrees of development. Consequently, more developed regions may be able to offer better working conditions for skilled workers, so highly educated workers have a greater incentive to migrate to these regions, within the same country. Accordingly, the existence of a dissimilar concentration of human capital may be a reason for significant growth disparities between regions of the same country, even if these regions may benefit from internal labour mobility.

Ritsila and Ovaskainen (2001) analysed the regional distribution of human capital in Finland, based on the argument that workers choose rationally where they want to be located in the country. They concluded that more educated individuals were more prone to migrate. Moreover, migration patterns seem to occur from remote regions to more populated ones. For the EU, Rodriguez-Pose and Vilalta-Bufi (2005) noticed that while the GDP per capita of EU countries might be converging, a closer look at the regional GDP reveals that the regional disparities have been stable or even increased since the 1990s. By analysing the human capital endowments of these regions, the authors argue that regional performance is closely related to human capital factors, namely the stock of human capital, the average level of education, the match between education and the labour market, and migration flows. In particular, they found that regions that were able to attract better-endowed workers were those that grew faster.[2] Later, Ramos et al. (2012) presented valuable extensions of this work, by expanding the dataset and introducing different variables regarding over-education. They concluded that overqualified workers still contribute to the growth of a region.

Also for EU NUTS II regions, Huber and Tondl (2012) studied the relation between GDP per capita and migration flows during 2000–2007. They concluded that migration flows did not accelerate convergence, as receiving regions—which

[2]Similar results about the importance of migration and human capital in generating regional inequalities are shown in Duranton and Monastiriotis (2002), Overman and Puga (2002) and Faggian and McCann (2009).

were already richer—increased their GDP per capita with the flows. Moreover, long-run effects of migration seemed to be more important than immediate effects, which suggested that increasing labour mobility may be a force operating against regional convergence.

14.3 The Effect of HEIs on Regional Development

One critical aspect in the debate about the potential role of human capital in regional economic dynamics concerns the role of higher education institutions (HEIs) in the formation of human capital. Thus, this section reviews prior results on the impact of HEIs on regional development.

It is often argued that HEIs contribute to the economic life of a region due to the direct expenditure-multiplier effects and the jobs provided to local economies (Faggian and McCann 2009). However, we are mainly interested in understanding, based on the existing evidence, whether and how the existence of HEIs in a given region promotes its growth through the increase of human capital levels, accumulation of knowledge and consequent increase of innovation capacity. All of these are important economic dimensions for the establishment of HEIs in a given region.

Universities are expected to enhance Regional Innovation Systems, which in turn play a more important role than ever in regional rates of innovation (Kitagawa 2004). Anselin et al. (1997)'s results pointed out that both high-technology innovative industries and private R&D seem to be positively affected by the presence of a university. Goldstein and Drucker (2006) also argued that knowledge-based university activities such as teaching and research, as well as the existence of spatial spillovers, were crucial to the growth of regions. Moreover, these effects were even more significant in smaller and medium regions, supporting the importance of universities in the reduction of regional inequalities. However, Huggins et al. (2008) underline that, while universities can be a key to regional innovation, their role alone is not sufficient in itself for the development of innovation. They defend that teaching and research activities should be coupled with a system of publicly funded research institutes and laboratories dedicated to applied research.

The formation of human capital is another channel through which HEIs may influence regional economic dynamics, even though subsequent migration may pose important challenges to the upgrading of the human capital of certain regions (see, for instance, Justman and Thisse 1997; Suedekum 2005; Franco et al. 2010; Abel and Deitz 2012). Actually, the existence of higher skill premiums in more developed regions, combined with the fact that migration is more likely to be a choice for the most educated individuals, can create significant barriers to human capital accumulation in less developed regions, regardless the presence of HEIs in these regions.

Even so, there are other positive effects associated with the presence of universities. By providing basic research and higher levels of human capital, HEIs can contribute positively to the likelihood of technologic innovation in a given region

and also to an increase in the productivity of the private sector due to the existence of knowledge spillovers (Arrow 1962; Nelson 1959; Bartel and Lichtenberg 1987). Andersson et al. (2004), for instance, found that policies of spatial decentralization of universities in Sweden had a significant and positive effect on workers' productivity, and that these effects were higher in municipalities surrounded by newly created HEIs.

HEIs' presence may also promote new firm creation and their performance. Lindelof and Lofsten (2004) showed that new technology-based firms located in science parks with links to universities have a competitive advantage over other firms of the same type. Audretsch et al.'s (2005) results also indicate that new knowledge-based firms have a higher propensity to be located close to the universities, though this effect may be dependent on the type of spillover mechanism (human capital *versus* research) or the different types of knowledge spillovers (natural sciences *versus* social sciences), which calls for further research. Overall, the literature seems to agree that geographical proximity between HEIs and new firms seems to be a necessary condition for the "quality" of spillovers generated between different agents (Stahlecker and Koschatzky 2004), and that the role of universities tends to be especially important in structurally weak regions where the production of intellectual capital is lacking (Baptista et al. 2011).

Finally, a number of studies also provided evidence on the positive effects that HEIs may have on innovation activities. Fischer and Varga (2003) found that university research generated positive spillovers in Austria in terms of patent applications, while for Sweden, Andersson et al. (2009) found that the number of patents in different regions were significantly linked to the prior creation of new universities and the amount of investment in university research. However, both found that spillovers tend to decrease with the distance from the university. In this regard, Ponds et al. (2010) argue that university-industry links are less geographically bounded than other possible components of the university spillovers, such as labour or the creation of new firms, suggesting that the impact of academic research on regional innovation is not only mediated by geographical proximity, but also by networks stemming from university-industry collaboration.[3]

HEIs are also acknowledged to have different roles in promoting regional development and Regional Innovation Systems (Gunasekara 2006). After the emergence of the "Triple Helix" Model in 1997 (Etzkowitz and Leydesdorff 1997), in which universities, industry and government (the three helices of the model) should interact with each other in an overlapping manner—resembling the helix movements in helicopters—a different role, at least conceptually, has emerged for universities in an innovation system. A different perspective from the Triple Helix model in how this third role of universities should be interpreted is in the "Engaged University" Framework (Chatterton and Goddard 2000). While having some common features with the Triple Helix model, the Engaged University

[3]For recent reviews on the effects of Higher Education Institutions in the Industry, see Casper (2013) and Perkmann et al. (2013).

should involve itself with the Industry and Government beyond the academic entrepreneurialism, focusing on the lifelong learning and adaptation of contents and learning methods to the specificities of the region. According to Gunasekara, (2006), the roles that different universities should play are evaluated according to some of their characteristics, such as the university orientation to regional engagement or the previous history of university–region linkages.

The role of HEIs in promoting regional growth is also acknowledged by the governments and policy frameworks. HEIs are supposed to play a key role in Regional Innovation Systems as well as in the Research and Innovation Smart Specialization Strategies (RIS3). The RIS3 framework is the most recent proof (1301/2013 European Parliament Law) that the role of universities and higher education is still viewed by policymakers as one of the most important determinants for the success in innovation strategies, as stated by the EP Law: "Smart Specialisation Strategies shall be developed through involving national or regional managing authorities and stakeholders, such as universities and other higher education institutions, industry and social partners in an entrepreneurial discovery process".

14.4 Human Capital and Regional Growth in Southern Europe

Regional disparities are an important issue in the context of the European Union, since the rhythm of convergence within the EU has stagnated since the late 1970s and early 1980s (Lopéz-Bazo et al. 1999). The situation is complex, as a different behaviour is observed among the Northern and Southern countries of the EU (Baumont et al. (2003), and different rates of convergence are observed between different NUTS II regions within the same country (Bartkowska and Riedl 2012). Accordingly, in this section, we review the recent efforts developed to explain regional disparities based on the human capital theory, by looking at four Southern European countries: Greece, Italy, Portugal, and Spain.

14.4.1 Human Capital and Regional Convergence in Southern Europe

There is clearly a divide between the two largest and the two smaller countries regarding the amount of research so far available on these topics. For Greece and Portugal, we find a limited number of studies addressing the effects of the distribution or migration of human capital in both countries' regional inequalities. By contrast, there is far more empirical evidence on the two larger countries—Italy and Spain.

A thorough summary of the Greek experience is provided by Petrakos and Artelaris (2008). Evidence for 2004, based on data for NUTS III regions, reports that the richest regions were clustered in the centre of the country and around the capital city of Athens. In contrast, a clustering of the "poorer" regions did not seem to exist by then (p. 129). Regarding the evolution since the early 1980s, the variation of the GDP per capita of Greek regions was stable in the 1980s and the 1990s, however it rose significantly in the early twenty first century. Though the average GDP per capita of the 10 poorest and the 10 richest regions have been increasing steadily, a faster increase in the former group, however, led to an enlargement of the regional differences.

To the best of our knowledge, only a few articles explore how a different distribution of human capital, or how labour migration affects the regional (in) equality in Greece.[4] Petrakos and Saratsis (2000) evaluated the role of human capital—measured by the share of population with higher education—to the β-convergence between the regions, and showed that it positively affected regional growth. Additionally, after controlling for differences in regional endowments (human capital included), they found conditional convergence between the Greek regions during the period analysed. More recently, Benos and Karagiannis (2013), based on data for Greek NUTS II regions between 1981 and 2003, conclude that higher levels of tertiary education have a strong positive association with higher labour productivity, while secondary education has a negative effect, suggesting that increasing the levels of education in the poorer regions favours convergence.

Although many studies focus on the regional convergence in Italy—given that Italy is one of the best-examples in terms of persistent regional divide (e.g., Paci and Saba 1998; DiGiacinto and Nuzzo 2006; Maffezoli 2006)—not many authors focus on the effects of human capital. Regional disparities in terms of GDP per capita have been characterized by a divide between the northern (relatively richer) and the southern (relatively poorer) regions since the unification of the territory in 1861. Since the 1990s, the divide remained significant though there were some weak signs of improvement (Etzo 2011).

Ciccone (2004) suggested that human capital could be further used as a tool to promote regional equality, since there was evidence that it reduced the existing regional productivity differentials (differences in education accounted for 23–38% of the differences in regional productivity). Maffezzoli (2006) concluded that introducing human capital in their analysis of regional disparities significantly reduced the importance of technological progress, suggesting that these were correlated. Moreover, the introduction of human capital variables amplified the differences between the southern and northern regions, indicating that there were imbalances in the human capital distribution in Italy that favoured the existence of regional disparities. Finally, using long time-series covering data since 1891, Felice (2012) tested the role of human and social capital on the process of regional

[4]Some authors deal instead with the relationship between human capital and growth (e.g., Asteriou and Agiomirgianakis 2001; Tsamadias and Prontzas 2012).

convergence in Italy. The proxies used for human capital were the literacy rates, the gross enrolment rates and a composite index between the two in order to account for the different importance of each factor throughout time. He concluded that, for the entire period, human capital played a small role in the convergence process, though from 1951 on there were signs of convergence conditional on human capital.

Regarding the migration effects, Coniglio and Prota (2008) analysed the decisions of graduates from a peripheral region in Italy (Basilicata) that subsidized the population to complete their degrees. They conclude that more talented workers were more prone to move, as well as younger graduates, graduates in business and engineering, and individuals with previous migration experience. Etzo (2008) also analysed the role of internal migration in Italy, further distinguishing workers' quality. Migration rates seemed only to have an effect on convergence in the second decade (1993–2002). Controlling for the quality of migrants, only the net migration of "high" human capital seemed to affect regional growth. The fact that migration flows became more "educated" in this second decade explains why the first decade did not have much impact on growth. They also conducted more detailed analyses for the centre-north and the "Mezzogiorno" regions, and found that more advanced regions were more in need of better qualities of human capital comparatively to the least developed regions.

More recently, Capasso et al. (2012) added new evidence for Italy by analysing the effect of total (internal and external) migration flows on regional growth. They confirmed that the composition of the migration flows cannot be neglected, as important differences exist in the human capital levels of arriving/departing citizens, though the effects of migration do not seem to depend on regions' development. A similar study by Piras (2013) for the period 1970–2005 also provided evidence of brain drain from the southern to the northern Italian regions.

In Portugal, the regional divide in terms of GDP per capita is also visible—the closer to the coast, the richer the regions tend to be. Similar to Greece, there is a limited number of authors that deal with the Portuguese experience. The connection between human capital and regional growth disparities has been mainly addressed by Cardoso and Pentecost (2011a, b). The authors analysed the role of human capital in the regional growth and found conditional convergence in the Portuguese NUTS III regions. Moreover, all the several human capital measures considered (the proportion of secondary and tertiary graduates and the average years of schooling) were found to improve regional economic growth. In Cardoso and Pentecost (2011b), the authors introduced elements of spatial analysis in their empirical study and analysed both Portuguese and Spanish NUTS III regions. Their results showed that there were two "convergence clubs" in the peninsula and that those in the "periphery" were converging, while those in the "core" were not. In addition, human capital only seemed to have an effect on the economic growth of the core regions, suggesting that a minimum threshold of income and economic activity was necessary before human capital became relevant.

In the case of Spain there is also an identified pattern of regional disparities. The richest provinces are clustered in three different positions: the Basque Country; the provinces surrounding Barcelona; and the province of Madrid. The poorest regions

are in the southern and southwest regions (Andalucía and Extremadura), as well as in the northwest (Galicia).

According to De la Fuente and Vives (1995), if the human capital differences in Spain were eliminated, the regional disparities would decrease by one sixth, confirming that imbalances in human capital endowments were favouring regional divergences. For the period of 1980–2007, Ramos et al. (2011) found that only the proportion of tertiary graduates helped convergence, while alternative human capital measures had no effect. Similarly, for the period 1960–1997, Manca (2012) concluded that Spanish regions that increased the share of workers with tertiary education were able to close the gap between the richest regions at a faster pace.

Regarding the effects of labour migration, Raymond and Garcia (1996) found that the convergence process observed in Spain since the 1960s slowed down and eventually stopped due to an increase in the internal migration rates from the poorest to the richest regions. A similar result was obtained by Maza (2006) for the period 1995–2002, who concluded that the internal migration trends have offset the regional convergence of GDP per capita. Focusing on the movements of the foreign-born, Hierro and Maza (2010) demonstrated that the movements of these individuals were significantly different from other migration flows and that foreign-born flows contributed positively to the regional convergence among Spanish regions, though at a reduced scale.

Summing up, our review identifies some significant trends, bearing in mind the aforementioned limitations regarding the amount of research on the two larger and on the two smaller countries under analysis. Although for both Greece and Portugal there is limited knowledge on the role that human capital has been playing in regional convergence, the existing evidence suggests a positive influence of human capital endowments and flows and documents the existence of convergence clubs. We have far more evidence regarding Italy and Spain. For Italy, available research suggests that the current distribution of human capital across the country does not seem to favour the convergence between regions. Regarding the migration flows, these do not seem to be balancing the differences in human capital endowments between the least and the most developed regions. Overall, the distribution and adjustments of human capital seem to be contributing to the divergence found among Italian regions. In the Spanish case, the current scenario also seems to favour divergence. The ability of regions to obtain higher levels of human capital is predicted to reduce the development gaps observed across the country. Similar to the Italian experience, the current internal migration rates seem to be blocking the convergence process among Spanish regions. In conclusion, although human capital seems to play a relevant role in regional dynamics, further research is needed in order to better understand the links between the formation of human capital and regional development in Southern European countries.

14.4.2 HEIs and Human Capital Growth Effects in Southern Europe

The analysis of the role of HEIs for regional growth is still largely unstudied in Southern Europe. Part of the explanation comes from the limited communication between higher education research and regional development studies (Pinheiro et al. 2012). Moreover, most of the work about the contribution of human capital has been done at the national level. Nevertheless, there are a few studies that may help us to build a preliminary picture on those interactions and their significance for Southern Europe.

Regarding the effects of HEIs in new firm creation and performance, Piergiovanni et al. (1997) investigated the source of innovative inputs for small Italian firms and concluded that while bigger firms benefited more from the presence of industrial R&D, smaller firms benefited more from university research. Similar evidence had also been found by Link and Rees for the United States (1990). More recently, Colombo et al. (2010) studied how new technology-based firms located close to Italian universities react to university research and they concluded that the quality of research undertaken by HEIs was important for the growth of academic based start-ups, but not for the growth of non-academic new technology-based firms.

For Spain, Barrio-Castro and Garcia-Quevedo (2005) showed that university research impacted positively on regional innovation output, in a context of regional expansion of the higher education system. Acosta et al. (2011) analysed the effect of three channels of spillovers on the location of new businesses: knowledge-based graduates, research activities, and technological knowledge. Their overall conclusion confirmed that the positive externalities that may arise from the proximity to HEIs—namely through the easier access to knowledge-based graduates—were crucial to the location decisions of new businesses. Though there is also limited evidence about Portugal, Baptista and Mendonça (2010) provided some results suggesting that a higher presence of universities in a municipality, as well as a larger number of students and graduates, had positive and significant effects on new knowledge-based firm creation at the regional-level.

Overall, and despite the limitations regarding the number of studies, the literature suggests a positive effect of university activities on regional dynamics in Southern Europe. Either by promoting the creation of new firms (more specifically, knowledge-based firms), or by enhancing worker productivity and inducing higher innovation rates, HEIs have been found to play a beneficial role to the regions where they are established.

14.5 Higher Education's Role in the Formation of Human Capital in Southern Europe: A Brief Look at the Regional Distribution of Enrolments

In an attempt to analyse in a very exploratory way the potential role of higher education as an engine for the production of human capital and, indirectly, for regional growth, we now provide some descriptive statistics for the NUTS II regions of the four countries covered in this book. We look at the proportion of enrolled students in higher education (in total regional population) and regional GDP per capita, in order to find whether (or not) any significant association exists between these indicators.

Our data comes from two sources. GDP per capita and population for each NUTS II regions were obtained from EUROSTAT. The number of enrolled students was collected from the EUMIDA project, which covers the academic year of 2008/2009. Since we are focusing on the potential role that public HEIs might have in the reduction of regional inequalities in terms of human capital, we only consider public HEIs in this analysis.[5]

We compared the association between the two variables—the proportion of enrolled students in the region and regional GDP per capita—for each of the four Southern European countries under study. Table 14.1 reports and compares these statistics for all NUTS II regions.

Given that it is hard to identify any patterns in the association between both variables from Table 14.1, we have calculated the correlation coefficients between those variables. Additionally, we present the respective scatterplots for each country, in an attempt to find any association between public HEIs' role as human capital generators and regional disparities inducers.

Some NUTS II regions could possibly be excluded from this exercise due to their special characteristics. In Spain, two regions (Ceuta and Melilla) are actually excluded, being two autonomous cities with small population and with no presence of HEIs. In Italy, we also exclude the regions of Valle d'Aosta and South-Tyrol given their small populations, lack of presence of HEIs, mountainous

[5]The EUMIDA Project (EUMIDA 2010) was carried out under the European Commission (Directorate General [DG] Research, DG Education and Culture, and EUROSTAT). Data collections were performed at the country level and included 1518 public and 931 private HEIs in the academic year of 2008/09. Data cover HEIs from 27 countries: the European Union member states (excluding Croatia, Denmark and France) plus Norway and Switzerland. The dataset includes information on the regions where each HEI is located. However, only the total number of enrolled students is provided, and this number is not divided by regions. Therefore, for institutions present in multiple regions, we cannot distinguish the actual number of enrolled students per region. For simplicity, we assume that the number of students is equally divided between the different regions, though we will bear in mind possible implications of this assumption. The weight of the private sectors varies significantly between the different countries in our analysis, being very small in Greece and much more significant in Portugal. Removing the private sector will result in a bias favoring the less developed regions, since it is documented that private institutions are usually located in the richest regions of the country (Teixeira et al. 2014).

Table 14.1 Proportion of enrolled students in the regional population and GDP per capita indexes in the NUTS II regions of the countries in analysis

Regions	Proportion of Enrolled (country = 100)	GDP per Capita (country = 100)	Regions	Proportion of Enrolled (country = 100)	GDP per Capita (country = 100)
Portugal			Lombardia	67.67	128.57
Norte	86.61	79.49	South Tyrol	0.81	137.14
Algarve	76.64	110.26	Veneto	80.86	115.24
Centro	105.30	82.05	Friuli-Venezia Giulia	100.55	113.33
Lisboa	129.96	139.74	Emilia-Romagna	N/A	N/A
Alentejo	83.29	91.03	Toscana	122.87	106.67
Açores	54.94	93.59	Umbria	133.51	93.33
Madeira	47.42	132.05	Marche	N/A	N/A
Spain			Lazio	140.73	114.29
Galicia	101.87	88.46	Abruzzo	159.20	82.86
Asturias	101.30	93.27	Molise	105.82	78.10
Cantabria	76.63	96.15	Campania	112.44	62.86
Basque Community	84.29	128.85	Puglia	87.87	64.76
Navarre	48.95	125.00	Basilicata	51.47	70.48
La Rioja	81.69	109.62	Calabria	99.56	63.81
Aragon	97.51	110.58	Sicilia	110.26	64.76
Madrid	131.86	128.85	Sardegna	108.43	75.24
Castille–Leon	121.12	94.23	*Greece*		
Castille-La Mancha	55.08	81.73	Anatoliki Makedonia	90.00	73.12
Extremadura	84.72	68.27	Kentriki Makedonia	122.56	79.57

(continued)

Table 14.1 (continued)

Regions	Proportion of Enrolled (country = 100)	GDP per Capita (country = 100)	Regions	Proportion of Enrolled (country = 100)	GDP per Capita (country = 100)
Catalonia	85.94	115.38	Dytiki Makedonia	147.07	91.40
Valencian Community	104.86	90.38	Thessalia	67.55	76.34
Balearic Islands	50.58	106.73	Ipeiros	149.64	68.82
Andalusia	114.57	76.92	Ionia Nisia	48.46	93.55
Region of Murcia	90.70	84.62	Dytiki Ellada	163.20	72.04
Canary Islands	87.93	85.58	Sterea Ellada	62.06	91.40
Ceuta	0.00	87.50	Peloponnisos	30.01	80.65
Melilla	0.00	81.73	Attiki	101.95	130.11
Italy			Voreio Aigaio	83.28	82.80
Piemonte	78.38	108.57	Notio Aigaio	1.32	122.58
Valle d'Aosta	0	126.67	Kriti	113.69	90.32
Liguria	76.41	105.71			

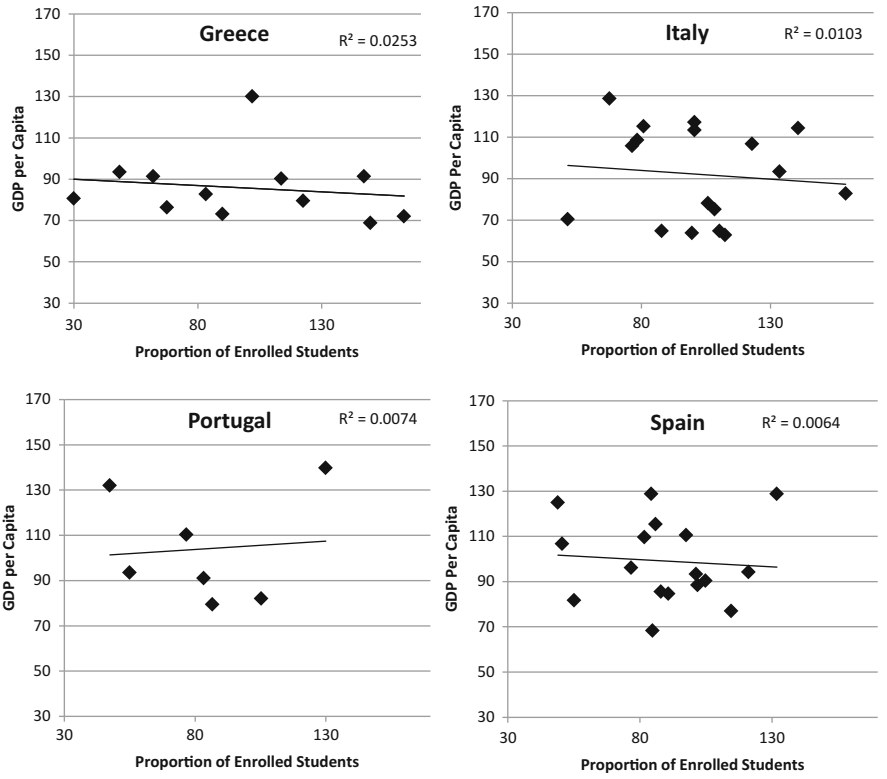

Fig. 14.1 Scatterplots between the proportion of enrolled students and GDP per capita indexes

characteristics, and huge bordering influences with the neighbouring countries. Emilia-Romagna and Marche are also excluded due to the lack of information from the EUROSTAT on their GDP per capita. For Greece, we exclude the region of Notio Aigaio because it is composed of a huge number of islands, which raises some challenges in the establishment of HEIs, resulting in a low number of enrolled students. The inclusion of these regions significantly affects the results, confirming that their inclusion could represent an important source of distortion due to these regions' characteristics.

From the scatterplots (Fig. 14.1), we clearly see that the correlation (measured by the R-Squared, which in this case coincides with the square of the correlation coefficient) between the potential human capital formation and current GDP per capita is weak and statistically irrelevant.[6,7] In other words, richer and poorer

[6]The global significance tests for the regression yielded $p = 0.748$ for Spain; $p = 0.611$ for Greece, $p = 0.695$ for Italy and $p = 0.855$ for Portugal.

[7]Table 14.2 in the Appendix shows the sensitivity of the results towards the presence of certain regions.

regions with public HEIs do not seem to have a significantly different proportion of enrolled students in tertiary education.

This result could signal a possible divide between policy aims and the results already well-established in the literature: whereas human capital may be an important force driving regions to economic growth and possibly reducing regional disparities, the attention every region is given regarding the proportion of their population currently acquiring higher education does not seem to be associated with its GDP per capita levels. This, combined with the potentially undesired effects of human capital migration, may point out that current efforts to reduce the human capital disparities within countries—and consequently, to reduce the existing GDP per capita differences—are not enough.

We must however highlight a number of limitations that may have a significant influence on the results obtained from this preliminary analysis. This exercise may be biased towards a convergent behaviour and therefore, the real results may be hiding that most developed regions are actually capturing most of the benefits from the overall human capital formation in the country. The first limitation concerns the data constraints. Equally dividing the students between regions where the HEIs are located favours the least developed regions in our study, because larger HEIs, which tend to be located in richer regions, usually open smaller establishments away from their region of origin. Therefore, the equal proportion of students we have allocated to the poorer regions may actually be favouring them in this example.

A second limitation is the exclusion of the private sector in our study. Private HEIs are usually located in richer regions, where they find a larger potential demand for higher education, which is an important driver of these for-profit institutions (Teixeira et al. 2014). Therefore, in countries where the private sector is relevant—as happens in Portugal, Spain and Italy—the actual weight of enrolled students is higher in richer regions than shown in our analysis.

Another limitation concerns the effect of post-graduation migration movements. The fact that a region generates human capital is not *per se* a condition for the human capital levels to increase in the region. Finally, there are particular specificities of NUTS II regions, which cannot be entirely captured by this preliminary analysis, such as their political setting, demographic and economic structure. The/A research agenda should thus try to cover these issues.

A final limitation of our exercise is the inability to disaggregate the enrolled students by field of study. The field of studies is naturally critical in determining the relative value of tertiary graduates to its region, given that there is an increasing pressure to have programs that are adapted to the regional context where the HEI is inserted. Unfortunately, our exercise does not capture these differences, leaving this question open for additional future research.

14.6 Concluding Remarks

In this chapter we reviewed prior evidence of the role that human capital formation and HEIs may play in regional convergence, focusing on four Southern European countries. Available results point out that universities and other HEIs have a relevant effect on some variables related to regional economic dynamics, by promoting human capital formation, new venture creation and productivity improvements. This was a first exploration into the complex relationship between higher education and regional economic dynamics, since there is an important set of factors that may change human capital patterns in a given region, and consequently its impact on regional economic growth and development. Nonetheless, despite some limitations, we believe that this preliminary analysis provides a snapshot of the regional disparities in human capital creation and development, identifying a number of issues that future research can consider in their empirical analyses.

Our main finding from this review underlines the influence that HEIs may play at the regional scale, especially if coupled with other favourable characteristics of the region. In particular, regions will only benefit with the presence of high human capital levels if there are the minimum conditions to absorb those high-skill individuals. Otherwise, most of the educated labour force may migrate, and most of the regional investments in human capital upgrading may end up favouring other regions (typically, the richer ones) and potentially reinforcing existing regional disparities. Policy incentives towards new firm formation, especially among recent graduates, may be part of the strategy aimed at reducing regional disparities and mitigating human capital imbalances caused by migration. The promotion of stronger university-industry links and funding support for new R&D projects based on specific regional industries may also be possible routes. Improving these conditions would directly and indirectly imply the creation of opportunities for graduates to work and stay in the given region, and for the benefits of the presence of high human capital to be internalized there.

The challenges and the complexities suggested by the analysis indicate that HEIs are a necessary but insufficient condition and that their presence needs to be articulated through a broader strategy which needs to be coordinated at a more aggregated level. It also highlights how intertwined higher education and regional policies are in this respect and the need to devise congruent policies for both dimensions, especially in more peripheral economic regions. Looking at the higher education side, without an efficient regional policy there is a risk that graduates will move elsewhere as the local economic dynamics will be insufficient to retain and take advantage of the human capital's potential. Looking at the regional policy, not coordinating it with the particular dynamics of HEIs also risks being ineffective, as they need to internalize those objectives in order to contribute to a successful growth path at the regional level. Thus, this points towards the need for greater interaction and coordination between leading actors in higher education and regional policies in order to promote more cohesive and effective economic policies through the qualification of human capital.

Appendix

Table 14.2 Sensitivity of correlation coefficients to the inclusion of specific regions

Spain		Italy		Greece	
All Regions	0.1534	All Regions	−0.4468	All Regions	−0.4135
Without Ceuta; Melilla	−0.0802	Without South Tyrol; Valle d'Aosta	−0.1016	Without Notio Aigaio	−0.1592

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