Chapter 11
Human Capital Formation and the Missing Regional Upgrading in the EU Periphery: The Role of Migration and Education-Job Mismatch

Nicola D. Coniglio and Francesco Prota

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11.1 Introduction

Why does the supply of human capital (in peripheral regions) not create its own demand? This question is the cornerstone of the present chapter. The starting point of our contribution is the observation that although several decades of national and EU-level investments in human capital formation have considerably increased the supply of highly skilled and educated individuals in peripheral regions, in almost all these regions the availability of a relatively cheap and well-educated labour force has not triggered a significant productive upgrading. On the contrary, rather than stimulating the demand of human capital in the periphery, generally the excess supply of highly skilled individuals has been 'absorbed' through internal or international outmigration or has generated what seems to be a colossal 'brain waste' with widespread over-education and job mismatch.

The aim of this chapter is to shed light on the complex channels which link human capital investments, spatial mobility and regional upgrading in peripheral regions. For this purpose we analyse—using original datasets collected by the authors—two different locally funded human capital investment policies implemented by two neighbouring Italian Mezzogiorno regions, Basilicata and

N.D. Coniglio (✉)
Dipartimento di Scienze Economiche e Metodi Matematici, Università degli Studi di Bari "Aldo Moro", Bari, Italy

NHH Norwegian School of Economics, Bergen, Norway
e-mail: nicoladaniele.coniglio@uniba.it

F. Prota (✉)
Dipartimento di Scienze Economiche e Metodi Matematici, Università degli Studi di Bari "Aldo Moro", Bari, Italy
e-mail: francesco.prota@uniba.it

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Apulia. Both policy measures draw resources from the European Social Fund and from the regional fiscal budget.

The first policy is aimed at fostering human capital accumulation in Basilicata, a small region in the South of Italy. The policymakers of Regione Basilicata started to support human capital formation at the beginning of the 1990s, providing generous subsidies to young highly qualified graduates who intended to invest in specialised training and educational activities by attending post-graduate courses inside or outside the region. We analyse, following an early contribution of Coniglio and Prota (2008), the 'leakage' of human capital associated with this regional policy through out-migration. This first 'story' allows us to underline the high risks of failure of policies which push a single 'side' of the human capital market, i.e., its supply, without considering measures that at the same time stimulate its demand. Promoting linkages between the beneficiaries of the regional support and local productive entities—for instance by means of internships—significantly reduces the probability of outmigration.

The second 'story' is drawn from another human capital investment policy implemented by a larger and more industrialized neighbouring region, Apulia (Borse di ricerca). In this case there is an explicit attempt by the regional policymakers to act on both the supply and the demand of qualified workers by linking young beneficiaries with higher education and research institutions, and with (local) firms.[1] An ex post evaluation of this policy shows that only 10% of the individual beneficiaries are working outside the region. In this case human capital leakage through migration is limited, but our empirical analysis shows that there is a rather severe education-job mismatch in terms of both people being engaged in precarious employment forms (flexible or part-time) and a (low) level of competences required in their actual occupation. Somewhat paradoxically, we find that the higher the individual competences (measured by the holding of a PhD degree), the higher the likelihood of not using these skills in the current job or to be unemployed or employed in highly precarious occupations.

These two policy cases indicate, in our opinion, that severe market failures characterize the 'absorption' of human capital in the local economy rather than its formation.

The rest of the chapter is organized as follows: In Sect. 11.2 we discuss the absence of a clear correlation between the economic performance of regions and their human capital endowment. Section 11.3 reports the econometric analysis based on the policy measures aimed at boosting human capital formation in the two Mezzogiorno regions. In the final part of the chapter we discuss the factors which limit the role of human capital in peripheral economies and draw some policy implications.

[1] A requisite for the grant of the financial support, labelled Borse di Ricerca, was the setting up of a triangular partnership between a 'researcher' (the final beneficiary of the policy), a University department or a research institute (scientific partner) and a productive unit (generally an innovative firm). The aim of the policymaker was to enhance the accumulation of competences 'suitable' for direct productive use in the local economy and boost the likelihood that the human capital formed was absorbed by the local economy.

11.2 Human Capital Endowment in the EU Periphery

The evolution of regional income disparities within Europe has received considerable attention both from an academic and a policy point of view. The panorama over the last decade and a half has been one of national convergence and regional stability or even divergence in income levels.[2] Achieving economic and social cohesion by reducing disparities between regions is one of the fundamental objectives laid out in the European Union Treaty. Given the wide scholarly agreement on the fact that human capital is one of the key factors behind economic growth and that, therefore, disparities in human capital endowment across regions can reduce the potential for convergence of the European Union peripheral regions, one of the main fields of investment across all cohesion policy programmes has been human resources (education, training, employment and social inclusion schemes financed by the ESF).

The educational stock, even as result of the policies aimed at fostering human capital accumulation at a regional level, has increased across the European peripheral regions in the last decades. Figure 11.1 shows the growth between 2000 and 2010 of the number of persons aged 25–64 and 20–24 with upper secondary or tertiary education attainment and the growth of the GDP per capita.[3] Interestingly, there does not seem to exist a clear correlation between the economic performance of regions and their human capital endowment.

An adequate educational stock is a necessary but not sufficient condition to foster economic convergence. Adopting a long term perspective, Felice (2012) shows the high degree of regional convergence in human capital across Italian regions and the ups and downs in the process of regional convergence in income levels.[4] Notwithstanding the significant closure of the North-South gap in terms of educational levels, spatial disparities in economic development remain the main open problem in the national history of Italy (Iuzzolino et al. 2011).

Indeed, if human resources in less developed regions are left inactive or not used to the best of their capacity in the workplace (skill mismatch) or 'lost' as a result of migration towards more developed regions, the passage from human capital endowment to economic growth is not achieved.

[2]Several authors have pointed towards a growing evidence of the emergence of convergence clubs, resulting in increasing polarization and lower economic cohesion across Europe (López-Bazo et al. 1999).

[3]In order to minimize problems of spatial autocorrelation, all data is standardized nationally (Armstrong 1995; Rodríguez-Pose 1999; Magrini 1999). Thus, the variables indicate how well a region is doing relative to the national average.

[4]The author shows that the association between regional convergence in human capital and income has been discontinuous pointing to the fact that the road moving from the former to the latter is, at best, 'bumpy'.

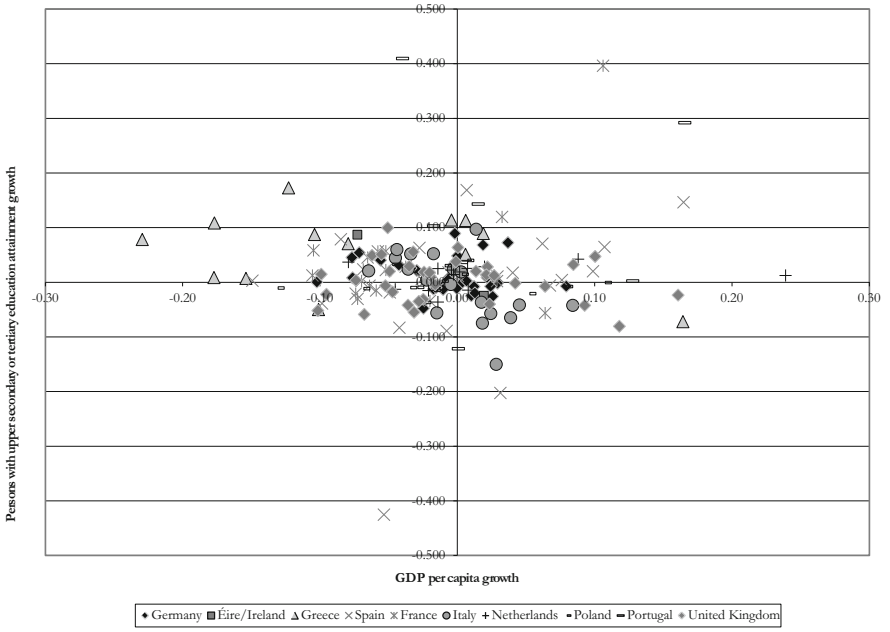

Fig. 11.1 Education attainment and economic performance of European regions, 2000–2010. Source: Authors' elaborations on Eurostat data

Skill mismatch is one of the main challenges faced by modern economies. Empirical evidence suggests that skill underutilization is a widespread phenomenon which has several negative implications: it may lead to skills loss and a waste of the resources that were used to acquire these skills; in addition, over-skilled workers earn less than workers who are well-matched to their jobs and tend to be less satisfied at work. At the same time, workers with low levels of skills are found to be employed in jobs which appear to have relatively high skills demands. Under-skilling is likely to affect productivity and slow the rate at which more efficient technologies and approaches to work can be adopted.

As shown in Table 11.1, job mismatch—defined as employment in a job requiring qualifications and competences below those possessed by the workers—is severe both in Southern and Northern European countries. Overall, job mismatch characterizes 29% of the workforce in the Netherlands—the best performing labour market among the countries included in the table—and a peak of 47% in Italy. With some notable exceptions—Belgium, the Netherlands and, marginally, Spain and France—female workers are generally more likely to be mismatched compared to male workers.

Table 11.1 Job mismatches in Europe—2000

	Incidence of job mismatches by country (%)	Incidence of job mismatches for females (%)	Incidence of job mismatches for males (%)	Incidence of job mismatches by level of education ISCED 3–4 (%)	Incidence of job mismatches by level of education ISCED 5–6 (%)
Belgium	32	28	36	43	26
Denmark	38	41	34	44	30
Greece	40	40	39	47	35
Spain	34	33	34	46	31
France	35	34	35	40	29
Italy	47	48	46	50	36
Hungary	35	39	32	36	33
Netherlands	29	25	33	29	29
Austria	32	34	29	32	31
Slovenia	31	33	29	33	26
Finland	31	32	29	32	29
Sweden	37	38	36	44	27

Source: Authors' elaborations on Eurostat data
Note: ISCED 3–4: Upper secondary education and Post-secondary non-tertiary education; ISED 5–6: Tertiary education (first stage) and Tertiary education (second stage)

The occurrence of mismatch is likely to be more severe in peripheral regions where labour market failures are more severe and hence the allocation of workers in such areas is less efficient compared to core regions. This is particularly true for highly skilled and educated individuals residing in less-developed regions since (given the reduced number of job opportunities) they might be more inclined to accept 'mismatched' jobs in order to avoid the costs of spatial mobility (Hensen et al. 2009).

Another challenge for the accumulation of human capital in peripheral regions is the high net out-mobility of the highly educated individuals. As is well documented in economic literature, highly skilled and educated workers represent a very mobile population group: more talented and skilled individuals have a higher propensity to migrate than the rest of the population (Coniglio and Prota 2008). Regional integration of labour markets may increase workers' incentive to spatially relocate, in particular from peripheral to central regions. Haapanen and Tervo (2012), examining the inter-regional migration of university graduates in Finland, show that out-migration is much higher among graduates in the more peripheral universities than in the metropolitan centres. Flows of graduates towards the economic centre of the country are found in Germany and the Netherlands, too (Busch and Weigert 2010; Venhorst et al. 2011).

In what follows we explore in more detail some 'challenges' for the implementation of human capital accumulation policies in peripheral regions by means of two 'policy cases' drawn from the Italian Mezzogiorno.

11.3 On the Effectiveness of Public Investments in Human Capital in the EU Periphery: A Tale from Two Italian Regions[5]

In what follows we discuss how the spatial mobility of human capital and its sub-optimal employment might reduce the role played by publicly-financed measures aimed at boosting regional competitiveness by generating and maintaining human capital. We use individual-level information from two policy experiences implemented in two distinct southern Italian regions, Basilicata and Puglia. Our aim is not that of evaluating the impact of the two policy measures,[6] but to shed light on the factors which lead to the sub-optimal results.

11.3.1 Policy Case 1: On the Out-Migration of Human Capital from Peripheral Regions

Public investments in human capital—whether or not locally financed—are motivated by a clear expected 'trajectory': increase human capital accumulation by augmenting the base of highly qualified individuals and, in turn, promote the upgrading of the regional economic systems. The case for public intervention is justified by the existence of collective (often localized) returns from human capital which go beyond private ones. How effective are these policies in peripheral areas? The 'policy case' analysed here is focused on a first element which might 'derail' the policy from its expected trajectory: out-migration from peripheral regions.

[5]The data used for the empirical analysis contained in this section are derived from two surveys designed and conducted by the authors. The questionnaires were sent to all the individuals who benefited from the two regional policy measures. In the case of the policy measure '*Borse di formazione*' (Region Basilicata) the survey was conducted between 2007 and 2008, while in the case '*Borse di ricerca*' (Region Puglia) it was conducted in 2012. The response rates were, respectively, 40% and 60%. An accurate analysis of the non-responses was conducted in order to investigate the degree of representativeness of the sampled individuals. The non-responding individuals were found to be not significantly different on most of the relevant characteristics—demographics, migration patterns, skills, gender, employment rate etc.—vis à vis the responding ones. Note also that in the case of the '*Borse di formazione*' (Region Basilicata), given the almost automatic access to the funding once the candidate had the formal requirements requested, it is highly plausible that the sample is representative of the entire population of highly educated individuals residing in this Mezzogiorno region.

The survey questionnaires and a detailed description of the survey methodology adopted are available upon request from the authors.

[6]We acknowledge that our analysis cannot shed light on the causal effects of the two policy measures and hence their relative degree of effectiveness. In fact, we lack information about those individuals that could have applied to the measures but did not. Nevertheless, we argue that it is important to investigate the channels through which the (potential) human capital created is depleted: spatial mobility and education-job mismatches of the beneficiaries.

The regional policymaker in Basilicata pursued a policy aimed at fostering human capital in this relatively small Mezzogiorno region starting from the beginning of the 1990s. Since then, several thousand young graduates, in a region of around 600,000 inhabitants, have benefitted from the locally-funded policy and pursued post-graduate studies in all disciplines in Italian and foreign higher education institutions. The financial effort has been substantial: considering only the period 2000–2005, the cost of the policy measure was 26.6 million € for approximately 2.5 thousand beneficiaries. A survey was conducted between 2007 and 2008 in order to gather a rich set of information on the post-policy performances of the beneficiaries.

In what follows we use information on 839 beneficiaries in order to investigate the characteristics of those beneficiaries who left the region (out-migrants). In fact, 45.6% of the beneficiaries of the regional policy resided and worked outside Basilicata at the time of the survey; the number of migrants is lower than that found in our previous study on the policy beneficiaries between 1991 and 2001 (58%; see Coniglio and Prota 2008).

Summary statistics of the variables employed in the analysis are reported in Table 11.2. Table 11.3 shows probit estimates on the probability of residing in the home region (Basilicata). We find that males are more likely to stay in the home region; a finding that confirms a higher likelihood of migration for female highly educated individuals.[7] Evaluated at the baseline group, the likelihood of staying is 9.5% higher for males compared to females. Note that, in line with our findings, an alarmingly low participation rate and a very high unemployment rate is observed across all Mezzogiorno regions for the female component of the workforce. As noted in Faggian et al. (2007), female workers might be more inclined to migrate in order to avoid the consequences of a gender gap in employment opportunities. We do not find significantly different effects of age and of the marks obtained during bachelor studies on the probability of staying in the home region when we consider the whole sample (which includes employed and unemployed individuals). Note that Models 1 and 2 include a dummy variable equal to 1 when the individual beneficiaries are unemployed. The positive and highly significant coefficient of this variable suggests that the unemployed are more likely to stay in the home region. The latter result is in line with the 'contracted' migration hypothesis which suggests that individuals typically move after having already assured a job offer and only seldom migrate to search for job opportunities in other destinations. When only employed individuals are considered (Model 3) we find that a higher age—measured at the time of the postgraduate course financed by the regional authority—is associated with a lower probability of residing in the home region. The effect is non-linear as shown by the positive and significant effect of age square. The results are weaker in Model 4 where the sample excludes a small sub-sample of individuals with a high-school diploma (this type of beneficiary is younger on average).

[7] Similar results were found by Faggian et al. (2007) in their analysis on the spatial mobility of UK graduates.

Table 11.2 Policy case 1. Human capital investment policy of Regione Basilicata (Italy). Summary statistics of variables employed in the probit analysis

Variable	Description	Mean	Std. dev.
Home region (dependent variable)	Individual residence/work in the home region	0.456	0.498
Male	Male	0.435	0.496
Age	Age at the time of attending the postgraduate course	28.2	3.7
Age squared	Squared value of age	808.3	230.6
Marks	Final mark of the bachelor degree (between 66 and 110)	101.4	10.5
Business studies	Degree in economics or business studies	0.245	0.431
Law studies	Degree in law or political sciences	0.176	0.381
Engineering studies	Degree in engineering or architecture	0.145	0.352
Humanities studies	Degree in humanities	0.244	0.43
Other studies	Degree in other subjects	0.09	0.285
High school diploma	Individual's highest degree at the moment of the scholarship was a high school diploma	0.086	0.28
University away	Undergraduate studies attended outside the home region[a]	0.45	0.5
Master away	Postgraduate studies attended outside the home region[a]	0.63	0.48
University and Master away	Both undergraduate and postgraduate studies outside the home region[a]	0.37	0.48
University home/ Master away	Postgraduate studies only attended outside the home region[a]	0.26	0.44
University away/ Master home	Undergraduate studies only attended outside the home region[a]	0.08	0.27
Internship home	Internship of the financed postgraduate programme was done in the home region	0.24	0.43
Preference home	Basilicata was the preferred location of residence	0.44	0.49
Year of the master programme	The year when the master programme has been attended	5.29	1.9
Unemployed	Unemployed at the time of the survey	0.289	0.453

[a]Home region includes Basilicata and two neighbouring regions (Puglia and Campania)

Those beneficiaries with an educational background in business/economic studies are less likely to reside in the home region; this result confirms the finding of our previous study (Coniglio and Prota 2008) and is related to the lack of employment opportunities for graduates in those disciplines within the region.

The positive and significant coefficient on the high-school diploma dummy suggests that individuals with less education are, ceteris paribus, more likely to stay home: evidence of positive self-selection of out-migration flows often observed in empirical studies on internal migration.

Possibly, the most relevant determinants of the probability of residing in the home region are related to the location where the human capital investment

Table 11.3 Promoting and maintaining human capital: a probit analysis on the probability of staying in the home region of the regional policy beneficiaries

	Mod. 1	Marginal effects	Mod. 2	Marginal effects	Mod. 3—employed	Mod. 4—no diploma
Male	0.382*** (0.127)	0.095*** (0.031)	0.383*** (0.127)	0.096*** (0.031)	0.459*** (0.15)	0.406*** (0.132)
Age	−0.261 (0.179)	−0.065 (0.045)	−0.253 (0.180)	−0.063 (0.045)	−0.617** (0.302)	−0.357* (0.210)
Age squared	0.004 (0.003)	0.001 (0.0007)	0.004 (0.003)	0.001 (0.0007)	0.010** (0.005)	0.005 (0.003)
Marks	0.0097 (0.009)	0.002 (0.002)	0.010 (0.009)	0.0026 (0.0023)	0.011 (0.0106)	0.007 (0.010)
Business studies	−0.296* (0.170)	−0.074* (0.042)	−0.29* (0.17)	−0.073* (0.042)	−0.460** (0.197)	−0.321* (0.172)
Law studies	0.082 (0.180)	0.021 (0.045)	0.086 (0.180)	0.021 (0.045)	−0.052 (0.207)	0.071 (0.182)
Engineering studies	−0.185 (0.191)	−0.046 (0.048)	−0.187 (0.191)	−0.047 (0.047)	−0.214 (0.213)	−0.176 (0.192)
High school diploma	0.718* (0.425)	0.179* (0.105)	0.719* (0.426)	0.180* (0.106)	0.508 (0.508)	
University away	−0.219* (0.130)	−0.055* (0.032)				
Master away	−0.248* (0.145)	−0.062* (0.036)				
University and Master away			−0.49*** (0.176)	−0.12*** (0.043)	−0.561*** (0.20)	−0.489*** (0.18)
University home/Master away			−0.335* (0.176)	−0.084* (0.044)	−0.535*** (0.20)	−0.324* (0.183)
University away/Master home			−0.399* (0.242)	−0.100* (0.060)	−0.218 (0.296)	−0.398 (0.244)
Internship home	1.144*** (0.181)	0.286*** (0.0414)	1.134*** (0.181)	0.283*** (0.041)	1.248*** (0.21)	1.170*** (0.19)
Preference home	0.413*** (0.126)	0.103*** (0.031)	0.414*** (0.126)	0.104*** (0.031)	0.366** (0.145)	0.420*** (0.129)
Year of the master programme	−0.0532 (0.033)	−0.0133 (0.008)	−0.053 (0.033)	−0.013 (0.008)	−0.054 (0.036)	−0.060* (0.03)
Unemployed	1.284*** (0.151)	0.321*** (0.032)	1.287*** (0.152)	0.322*** (0.032)		1.315*** (0.16)
Constant	2.549 (2.976)		2.410 (2.981)		7.826* (4.679)	4.535 (3.509)
Observations	663		663		470	600
LL	−293.4		−293.05		−217.83	−278.55
Pseudo R2	0.358		0.359		0.241	0.314

Note: Standard errors in parenthesis. Significant at: *10%; **5%; ***1%. Marginal effects for dichotomous variables are computed as discrete change from 0 to 1

activities took place. In Model 1 we consider whether individuals' bachelor and post-graduate locations were undertaken outside the region. In addition, we consider the location of the internship period at the end of the postgraduate programme financed by the regional authority. Individuals with a university degree obtained outside the home region are 5.5% less likely to remain home; the effect of pursuing postgraduate courses outside the region is slightly higher (6.2%).[8] It is interesting to note the very strong association between an internship period in the home region and the likelihood to remain (+28.6%). In fact, one possible way to interpret the reduced overall out-mobility found in this study compared to our previous analysis (Coniglio and Prota 2008) is the stronger emphasis given by the region to the facilitation of internships in Basilicata.[9]

Note also that in order to capture individuals' preferences toward the home location, we include in the analysis a dummy variable, 'Preference home', which is equal to 1 when Basilicata was their preferred option during the job market search after the completion of the postgraduate course. These revealed preferences toward the home location are—not surprisingly—positively related with the probability of residing in the home region.

In Model 2, we assess the combined effects of location choices during the graduate and post-graduate studies. When both university and master studies are carried out outside the region, the beneficiaries are, ceteris paribus, 12.2% more likely to migrate compared to an individual who has completed both courses in the region. Mobility only for the financed postgraduate course translates into an 8.4% higher probability of residing outside the region while mobility for the attainment of the bachelor degree is only associated with a 10% higher likelihood of migration. Obviously one should be careful in interpreting these as causal effects given the fact that past mobility choices might reveal a higher attitude/preference for geographical mobility.

The analysis provides a general message that promoting more (high quality) local opportunities for human capital accumulation and boosting ties with local potential employment (for example, through internship programmes) might translate into a reduced skilled out-migration from peripheral areas.

Although from an individual point of view out-migration is generally highly desirable—in fact those who migrate in our sample are significantly more likely to be employed and get higher wages—often mobility is a constrained choice which entails individual costs. Such costs are generally neglected in the existing literature. In our sample 88.2% of the policy beneficiaries who reside outside the region would be willing to return to the home region if a similar job position was available. How valuable is this 'home attachment'? We asked these beneficiaries to attach a monetary value to the option to relocate in the home region (with similar job

[8]The definition of the home region in this case includes the two neighbouring regions Puglia and Campania as a location for graduate and postgraduate studies. In fact, the institution of a local University in Basilicata is rather recent and not all subjects are covered by this relatively small university.

[9]Only 15% of the beneficiaries in the early phase of the policy attended an internship period in the home region compared with 24% of the beneficiaries between 2000 and 2005.

conditions except the salary). Interestingly, 41% of the migrants would trade a reduction in monthly salary, which is on average equal to 17.1%, with the possibility to return to Basilicata. At sample mean this is equivalent to an annual reduction of approximately 4,000 €. Clearly this 'monthly cut' includes perceived differences not only in amenities but also in real wages between the current residences and the home location; still we believe that this is important information about the possible welfare gains of 'moving jobs' to the periphery.[10] In fact when the (efficiency) cost of moving jobs to the periphery is not substantial and the local supply of qualified individuals is large enough there might be Pareto improvements to be reaped. These Pareto improvements are likely to be (partly or completely) blocked by large coordination costs which prevent private agents (in particular, firms) to 'move' jobs to the periphery; one corollary of this consideration is the need to reinforce human capital accumulation policies with investment attraction policies which leverage the local supply of skilled and qualified individuals.

11.3.2 Policy Case 2: On the Education-Job Mismatch in Peripheral Regions

The second 'policy case' we analyse is about the second element which might 'derail' human capital accumulation policies from their expected trajectory: education-job mismatch.

In this analysis, we examine the factors correlated with mismatch in the case of a sample of highly skilled individuals who received financial support from the Apulian regional government to realize an applied research project in cooperation with a firm and a research centre within the region. A survey of the beneficiaries of this policy measure was conducted by the authors during 2012 in order to evaluate the performances of the beneficiaries.[11]

In order to measure the match between education level and current job we focus on two specific aspects of the education-job mismatch: (i) flexible or part-time job versus permanent and full-time job (an aspect less studied in the literature); (ii) the usefulness of acquired competences in the current occupation.

Summary statistics of the variables employed in both the analyses are reported in Table 11.4. For the first exercise, our dependent variable is, therefore, a mismatch indicator we order from completely/severely mismatched (unemployed/in training) to matched (permanent and full-time job). The rationale is the consideration that

[10] Admittedly moving some type of jobs to the periphery might entail significant efficiency costs when agglomeration effects are at work. Nevertheless, it must be recognized that improvements in transportation and communication infrastructures and technologies have changed the geography of production in many sectors and have reduced the costs of relocating some jobs/tasks out of core regions.

[11] See footnote 5.

Table 11.4 Policy case 2. Human capital investment policy of Regione Puglia (Italy). Summary statistics of variables employed in the ordered probit analysis

Variable	Description	Mean	Std. dev.
Mismatch_indicator_1 (*dependent variable in Table 10.5*)	1 = unemployed (completely mismatched); 2 = in training (severely mismatched); 3 = flexible or part-time job (moderately mismatched); 4 = permanent and full-time job (matched)	2.427	1.043
Mismatch_indicator_2 (*dependent variable in Table 10.6*)	The usefulness of acquired competences in the current occupation (1= useless; 2 = less useful; 3 = useful; 4 = very useful)	2.299	1.335
age_ln	Age at the time of the research project (log)	3.530	0.156
sex	Male = 1; female = 0	0.433	0.496
marks	Final mark of the bachelor degree	106.175	5.396
Engineering_d	Degree in engineering or architecture	0.352	0.478
agriculture_d	Degree in agricultural sciences	0.157	0.364
biology_d	Degree in biology	0.229	0.421
chemistry_d	Degree in chemistry	0.027	0.163
law_d	Degree in law or political sciences	0.048	0.214
business_d	Degree in economics or business studies	0.044	0.206
other_d	Degree in other subjects	0.140	0.348
phd	Individual holding a PhD	0.369	0.483
migrant	Individual not resident in Apulia	0.027	0.163
borsa_year	The year when the research project was realized (2006 = 1; 2009 = 0)	0.553	0.498
Pub_StrongRole	Interaction effect between a measure of the quality of the research project (publication) and a measure of the involvement of the two partners in the project	0.061	0.241
emp_partner_company	The employer is the firm partner of the project	0.141	0.349
emp_partner_research_center	The employer is the research centre partner of the project	0.215	0.412
public_sector	The employer is in the public sector	0.514	0.502
research_network	The research centre played a leading role in creating the network	0.863	0.344
skills_evaluation	Beneficiaries evaluation of the research project in terms of accumulation of competence	4.242	0.798

returns on human capital investments are maximized in permanent and full-time jobs, while precarious work is associated with less security, career prospects and lower salaries [see Hensen et al. (2009) for a similar analysis on Dutch graduates].

An ordered probit model is used to estimate the determinants of the mismatch. The marginal effects of the estimates on the probability of being in the matched category are summarized in Table 11.5.

Table 11.5 Education-job mismatch: flexible or part-time job versus permanent and full-time job (ordered probit regression)

	Completely mismatched	Severely mismatched			Moderately mismatched			Matched		
	Mod. 1—mfx	Mod. 1—mfx	Mod. 2—mfx	Mod. 3—mfx	Mod. 1—mfx	Mod. 2—mfx	Mod. 3—mfx	Mod. 1—mfx	Mod. 2—mfx	Mod. 3—mfx
age_ln	0.085 (0.161)	0.013 (0.024)	0.029 (0.037)	−0.003 (0.013)	−0.055 (0.104)	0.134 (0.162)	−0.054 (0.258)	−0.043 (0.081)	−0.163 (0.195)	0.056 (0.271)
sex	−0.018 (0.047)	−0.003 (0.007)	0.000 (0.010)	0.000 (0.003)	0.012 (0.030)	0.001 (0.045)	0.002 (0.065)	0.009 (0.024)	−0.001 (0.055)	−0.002 (0.068)
marks	−0.008* (0.005)	−0.001 (0.001)	−0.001 (0.001)	−0.001 (0.001)	0.005* (0.003)	−0.005 (0.004)	−0.014** (0.007)	0.004* (0.002)	0.006 (0.005)	0.015** (0.007)
engineering_d	−0.235*** (0.063)	−0.043*** (0.016)	−0.016 (0.016)	−0.007 (0.008)	0.126*** (0.033)	−0.083 (0.086)	−0.162 (0.129)	0.151*** (0.053)	0.099 (0.100)	0.169 (0.134)
chemistry_d	−0.264*** (0.038)	−0.091*** (0.027)	−0.003 (0.023)	0.000 (0.009)	−0.068 (0.128)	−0.014 (0.130)	0.005 (0.158)	0.423** (0.177)	0.017 (0.153)	−0.005 (0.166)
biology_d	−0.081 (0.072)	−0.014 (0.015)	0.012 (0.024)	0.006 (0.011)	0.049 (0.040)	0.041 (0.064)	0.076 (0.091)	0.047 (0.048)	−0.053 (0.087)	−0.082 (0.101)
agriculture_d	−0.123* (0.070)	−0.024 (0.018)	−0.011 (0.013)	−0.003 (0.005)	0.067** (0.031)	−0.070 (0.116)	−0.093 (0.159)	0.081 (0.060)	0.080 (0.129)	0.096 (0.163)
law_d	−0.127 (0.089)	−0.028 (0.027)	−0.006 (0.018)	−0.002 (0.005)	0.061** (0.025)	−0.037 (0.137)	−0.076 (0.216)	0.093 (0.095)	0.043 (0.154)	0.079 (0.220)
business_d	−0.068 (0.111)	−0.012 (0.025)	−0.016 (0.010)	−0.004 (0.004)	0.039 (0.055)	−0.194 (0.240)	−0.193 (0.253)	0.041 (0.081)	0.209 (0.246)	0.196 (0.254)
phd	0.109** (0.053)	0.014** (0.007)	0.006 (0.012)	0.003 (0.005)	−0.072** (0.037)	0.027 (0.046)	0.058 (0.066)	−0.051** (0.024)	−0.033 (0.058)	−0.061 (0.070)
migrant	−0.228*** (0.056)	−0.070** (0.032)	−0.012 (0.011)	−0.004 (0.004)	0.021 (0.082)	−0.102 (0.155)	−0.194 (0.214)	0.276* (0.160)	0.114 (0.165)	0.198 (0.216)
borsa_year	−0.257*** (0.050)	−0.032*** (0.010)	−0.016 (0.015)	−0.004 (0.006)	0.166*** (0.038)	−0.057 (0.042)	−0.061 (0.064)	0.124*** (0.027)	0.072 (0.055)	0.065 (0.069)
Pub_StrongRole			−0.020** (0.010)	−0.005 (0.005)		−0.324** (0.154)	−0.379* (0.221)		0.344** (0.156)	0.384* (0.222)
emp_partner_company			−0.021** (0.011)	−0.003 (0.004)		−0.240** (0.112)	−0.067 (0.103)		0.261** (0.115)	0.070 (0.106)

(continued)

Table 11.5 (continued)

	Completely mismatched	Severely mismatched			Moderately mismatched			Matched		
	Mod. 1—mfx	Mod. 1—mfx	Mod. 2—mfx	Mod. 3—mfx	Mod. 1—mfx	Mod. 2—mfx	Mod. 3—mfx	Mod. 1—mfx	Mod. 2—mfx	Mod. 3—mfx
emp_partner_research_center			0.047 (0.031)	0.023 (0.020)		0.086*** (0.031)	0.158*** (0.052)		−0.133*** (0.047)	−0.181*** (0.061)
public_sector				0.010 (0.010)			0.183** (0.080)			−0.194** (0.084)
Observations	284	284	175	138	284	175	138	284	175	138
Pseudo R-squared	0.084	0.084	0.154	0.254	0.084	0.154	0.254	0.084	0.154	0.254

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The set of control variables include: (i) individual characteristics such as age, sex and migrant status, (ii) detailed information on educational background (marks obtained, subject of study, education level, location of studies), (iii) information on the research project (degree of involvement of the two partners, nature of the network, beneficiaries' evaluation of the project, results produced by the project), (iv) (if employed) job characteristics (sector and employer).

The percentage of people with a permanent and full-time job is slightly more than 12%, while around 60% of the respondent are engaged in a flexible or part-time job (another 30% is unemployed or in training).

According to our estimates, gender and age of beneficiaries are not significantly correlated with mismatch. Marks obtained during bachelor studies have a (weak) positive effect on the likelihood of being in the matched category. The individuals with an educational background in engineering or chemistry are more likely to be engaged in a permanent and full-time job[12]. This result confirms the heterogeneity of mismatch by subject of degree. One possibility for skill mismatching is that individuals are not studying the 'right' type of graduate studies. In other words, the choice of higher education made by individuals does not correspond to the needs of the labour market in terms of field of study.

Somewhat surprisingly, we find that the higher the individual competences (measured by holding a PhD degree), the higher the likelihood of being unemployed or employed in highly precarious occupations. As documented in other studies (Hensen et al. 2009), geographic mobility seems to reduce education-job mismatches, even if it is important to underline that in our sample the percentage of people working outside the region is small.

Interestingly, if the beneficiary works at the firm which was the partner of the research project (emp_partner_company), her probability of being in the matched category increases by 26%, while on the contrary this probability decreases by 13% if her employer is the research centre partner of the project (emp_partner_research_center). This negative effect is stronger (-18%) when controlling for the possibility that the employer is in the public sector (public_sector).

Another way to look at the determinants of mismatch is to examine the answer to the question "in your current job, how useful are the skills acquired during the financed research project?". The dependent variable is ordered in increasing usefulness of the skills acquired (from 1, useless, to 4, very useful). An ordered probit model is used to estimate the determinants of mismatch. The marginal effects are reported in Table 11.6.

As for the previous analysis, gender and age of beneficiaries are not significantly correlated with mismatch, while marks obtained during bachelor studies have a (weak) positive effect on the likelihood of declaring that the skills have been very useful. The individuals with an educational background in engineering are more

[12]Note that this finding might be related to a higher propensity in this sector to use full-time contracts. We acknowledge an anonymous referee for suggesting this interpretation.

Table 11.6 Education-job mismatch: the usefulness of the skills acquired (ordered probit regression)

	Useless		Less useful		Useful		Very useful	
	Mod. 1—mfx	Mod. 2—mfx	Mod. 1—mfx	Mod. 2—mfx	Mod. 1—mfx	Mod. 2—mfx	Mod. 1—mfx	Mod. 2—mfx
age_ln	−0.069	−0.011	0.000	0.000	0.008	0.001	0.061	0.010
	(0.199)	(0.199)	(0.002)	(0.001)	(0.023)	(0.023)	(0.175)	(0.175)
sex	−0.058	−0.058	0.000	0.000	0.006	0.007	0.052	0.051
	(0.058)	(0.058)	(0.001)	(0.001)	(0.006)	(0.007)	(0.052)	(0.052)
marks	−0.008	−0.010*	0.000	0.000	0.001	0.001	0.007	0.009*
	(0.006)	(0.006)	(0.000)	(0.000)	(0.001)	(0.001)	(0.005)	(0.005)
Engineering_d	−0.259***	−0.268***	−0.003	−0.004	0.020**	0.021**	0.242***	0.251***
	(0.086)	(0.086)	(0.005)	(0.005)	(0.008)	(0.008)	(0.086)	(0.086)
chemistiy_d	−0.214	−0.245	−0.010	−0.014	0.004	0.000	0.219	0.259
	(0.164)	(0.154)	(0.018)	(0.021)	(0.017)	(0.024)	(0.197)	(0.197)
biology_d	−0.083	−0.108	−0.000	−0.001	0.008	0.010	0.076	0.099
	(0.096)	(0.096)	(0.002)	(0.003)	(0.008)	(0.007)	(0.090)	(0.092)
agricultuie_d	−0.172*	−0.168*	−0.004	−0.004	0.011**	0.011**	0.165	0.160
	(0.098)	(0.098)	(0.006)	(0.006)	(0.005)	(0.005)	(0.102)	(0.103)
law_d	−0.091	−0.053	−0.001	−0.000	0.007	0.005	0.085	0.048
	(0.149)	(0.154)	(0.005)	(0.003)	(0.007)	(0.012)	(0.148)	(0.145)
business_d	0.048	0.033	−0.001	−0.000	−0.006	−0.004	−0.041	−0.029
	(0.164)	(0.165)	(0.005)	(0.003)	(0.024)	(0.023)	(0.136)	(0.138)
phd	0.067	0.045	−0.001	−0.000	−0.008	−0.006	−0.058	−0.039
	(0.063)	(0.064)	(0.001)	(0.001)	(0.008)	(0.008)	(0.054)	(0.055)
migrant	−0.300**	−0.306***	−0.021	−0.023	−0.009	−0.012	0.330**	0.341**
	(0.119)	(0.117)	(0.020)	(0.021)	(0.029)	(0.031)	(0.166)	(0.167)
borsa_yeai	−0.120**	−0.116*	0.001	0.001	0.014*	0.014*	0.105**	0.101*
	(0.060)	(0.060)	(0.002)	(0.002)	(0.008)	(0.008)	(0.052)	(0.052)
skills_evaluation		−0.074**		0.000		0.009*		0.065**
		(0.037)		(0.001)		(0.005)		(0.033)

research_network		0.159** (0.079)		0.004 (0.005)		−0.010** (0.005)		−0.153* (0.083)
Observations	282	282	282	282	282	282	282	282
Pseudo R-squared	0.038	0.049	0.038	0.049	0.038	0.049	0.038	0.049

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

likely to be associated with a positive evaluation of the skills acquired as well as people who migrated (with respect to this variable, the previous caveat still holds).

The scientific side of the triangular partnership seems to be the weak one; in fact, when the leading role in creating the network has been played by the research centre (research_network), the evaluation of the usefulness of the skills is more likely to be negative. One possible explanation of this finding can be found in the recent difficulties of the Italian public research system (mainly the Universities) to absorb the young highly educated and skilled people. The increasing supply of labour at the post-graduate level does not meet the low demand of labour in research departments as a consequence of low investments in research. A complementary explanation might be related to the tendency of research institutions to prioritize abstract and theoretical knowledge over more applied knowledge and hence reduce, at least in the short term, the direct employability of the newly-acquired human capital.

Finally, we find a positive correlation with the 'quality' of the research project as perceived by the beneficiaries in terms of accumulation of competences (skill_evaluation).

The analysis of this second case provides further support, in terms of policy implications, to the previous consideration that it is necessary to reinforce human capital accumulation policies with investment attraction and startup promotion policies which leverage the local supply of skilled and qualified individuals.

11.4 The Missing Regional Upgrading and the Low Absorptive Capacity of the Peripheral Regions: Concluding Remarks

Human capital is a fundamental ingredient for the upgrading of the regional production structure and, in turn, for the competitiveness of peripheral regions. Policies at regional, national and EU levels have devoted substantial efforts to boost the 'stock' of this necessary but, unfortunately, not sufficient ingredient. The tale of the two stories presented in this work points to the need to work jointly on both sides of the human capital market: promote the demand of human capital at least as much as its supply. The emphasis on the demand side—and its coordination with supply side interventions—has been, in our opinion, weak and in many cases lacking so far in the policy arena. Without linking the two sides there is a very high risk of 'human capital leakages' through out-migration of highly skilled and qualified individuals from the peripheries. In addition, the policy implemented by Apulia Region—where an explicit attempt to involve the 'demand side' (firms and research institutions) was made—highlights how relevant another risk of failure is: that of generating a 'human capital waste' due to a mismatch between the competences acquired and those required by the local economy.

Boosting the demand for highly qualified workers of firms in the economic periphery is possible but it is likely to be, like all processes which involve a 'cultural' change, a rather slow process. Firms are highly heterogeneous in their response to these 'policy stimuli' and hence the policy design should be made in a way to target the more 'receptive firms' rather than being too broad. In fact, the case study on Apulia shows that when a firm was strongly involved in the definition of the research project financed by the policymaker, the likelihood of a mismatch was substantially reduced. Participation of firms at 'zero costs' (and effort) in the partnership with an individual beneficiary was not a key to success.

Are human capital promotion policies in the EU periphery predestined to be ineffective in terms of upgrading the productive system? In our opinion, in order to boost the effectiveness of these measures, policymakers should start to leverage the availability of abundant (and even relatively cheap) qualified workforce for 'moving' qualified job opportunities in the periphery. In several cases inducing behavioural changes in local firms which have a structural low demand of qualified workers might be more difficult than attracting new players and/or boosting the creation of new innovative firms. Investing millions of Euros in educating new scientists and engineers and not using the results of this policy measure as a tool for attracting firms that make use of this scarce factor of production is a common policy failure.[13] Many potential investors would value much more this kind of location incentive rather than the transitory financial support that is the cornerstone of investment attraction policies in the EU periphery.

Several observers claim that migration out of the periphery toward core regions is 'efficient' both at macro and at individual levels. At the macro level, while this is true for jobs/tasks characterized by increasing returns to scale in production and positive agglomeration externalities, not all 'qualified jobs' are characterized by these features. Individual migrants do benefit from migration but geographical relocation towards a core region is not a 'cause' for an improved job market outcome but a 'venue' that leads to it. One element which is often under-evaluated in the existing literature is the individual cost of out-migration. In fact, for many individuals, migration is not a choice but a necessity. In our study on Basilicata, 88.2% of those actually residing outside the region would be willing to return to the home region if a similar job position was available. Interestingly, among them 46.7% would even accept a lower salary in the home region. Moving some of these jobs back to the periphery—those for which a peripheral location will not imply severe reduction in production efficiency—might lead to a conspicuous Pareto improvement for firms, workers and local communities.

[13]In both policy cases analysed in this study, the contribution of the regional authorities has helped human capital formation of several thousands of brilliant young graduates; many of them have completed their studies in the best higher education and research institutes around the globe.

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Nicola D. Coniglio obtained a PhD in Economics from the University of Glasgow (UK) and a doctorate at the University of Milan—Bicocca. Nicola is currently associate professor in Economics at the University of Bari (Italy). He is the Italian director of the Erasmus Mundus—Master in Economics of Globalisation and European Integration. His research interests include urban and regional economics, industrial policy, economics of migration, international trade and factor mobility and the economic consequences of climatic changes. He was awarded with the EPAINOS prize for the best research work presented by a young scholar at the European Regional Science Association meetings in 2003 and 2004.

Francesco Prota (PhD in Agricultural and Environmental Economics) is Lecturer in Economics at the University of Bari "Aldo Moro". His research interests include regional economics and international economic integration, development economics, public policy evaluation and innovation economics. Francesco is the author of several articles in economics journals. He has also written two books: *Senza cassa. Le politiche di sviluppo del Mezzogiorno dopo l'Intervento straordinario* (Il Mulino, 2012; coauthor G. Viesti) and *Le nuove politiche regionali dell'Unione Europea* (Il Mulino, 2008; coauthor G. Viesti). Besides serving as referee for international journals, he is Associate Editor for *Regional Studies, Regional Science*. Since 2011, Francesco has been acting as consultant to UNIDO (United Nations Industrial Development Organization) on cluster development and FDI in Africa. He has also a long track record of collaboration with different Italian government departments and agencies.