The London School of Economics and Political Science

Graduates on the move: knowledge flows and Italian regional disparities.
Migration patterns of 2001 graduates

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Declaration

I certify that the thesis I have presented for examination for the PhD degree of the London School of Economics and Political Science is solely my own work other than where I have clearly indicated that it is the work of others (in which case the extent of any work carried out jointly by me and any other person is clearly identified in it).

I warrant that this authorization does not, to the best of my belief, infringe the rights of any third party.

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Since September 2009 I have joined the Geography and Environment department of the LSE. I have enjoyed tremendously this year and I am grateful for the opportunity to participate in the vibrant academic and social activities held here.

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As an Italian researcher abroad, my concluding thought goes to the whole academic community there. I watch with distress the continuous destruction of our university system. My sincere hope is that the situation gets reversed soon and Italian scholars be able to conduct their work in better conditions.

Abstract

Italy is characterised by large sub-national disparities between the less developed South and the more developed Centre-North. It comes at no surprise, therefore, that it has a complex history of population flows from the South to the rest of the country. This thesis focuses on a new trend in the dynamics of internal population flows: whilst historically unskilled workers constituted the bulk of Italian migrants, in recent years, the high skilled have become increasingly mobile. As the high skilled are a crucial input to both innovative activity and economic growth, their spatial movements can potentially affect the dynamics of local development and as such, deserve thorough investigation.

The work analyses this internal brain drain, focusing on recent university graduates. As a group, they are especially interesting to study: not only because, as they transit between study and work, they are particularly prone to move, but also because they have, so far, largely been neglected by scholars.

Whilst the existing literature has mostly compared spatially mobile to spatially immobile individuals, this thesis distinguishes between *returners* (who leave the region of study to move back to their home region), *migrants* (who leave the region of study to move elsewhere) and *stayers* (who remain in the region of study). This tripartite taxonomy enables us to identify new insights on the dynamics of spatial mobility.

The study draws upon a wide and interdisciplinary literature and builds an original theoretical framework to analyse the knowledge flows generated by mobile graduates. Through this framework, it carries out a comprehensive analysis of the causes and consequences of human capital mobility, at the micro, meso and macro level.

The main contribution of the thesis is to explain the links between graduate flows and regional innovation. In addition, the study also explores the consequences of migration on job-satisfaction and the social nature of spatial mobility itself. Methodologically, it applies a wide array of econometric techniques to a survey on graduates' entry in the labour market, developed by the Italian statistical office (ISTAT).

At the policy level, the study sheds light on the connection between higher education, innovation and regional development, providing a new perspective on the long-standing debate on Italian sub-national inequalities.

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Table of acronyms

2SLS: Two Stage Least Square

3SLS: Three Stage Least Square

ACI: Automobil Club Italia

ASIA: Archivio Storico Imprese Attive (Historical Archive of Active Enterprises, dun by ISTAT)

CATI: Computer Aided Telephone Interview

CIS4: Fourth Community Innovation Survey

CL: Conditional Logit

CNEL: Consiglio Nazionale dell'Economia e del Lavoro

CNVSU: Centro Nazionale per la Valutazione del Sistema Universitario (National Centre for the Evaluation of the University System)

DCM: Discrete Choice Models

EEG: Evolutionary Economic Geography

EU: European Union

EU-15: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden and the United Kingdom.

EU-27: EU-15 + Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, Slovenia.

EURO AREA: Andorra, Austria, Belgium, Cyprus, Finland, France, Germany, Greece, Ireland, Italy, Kosovo, Luxembourg, Malta.

EUROSTAT: European Institute of Statistics

EUROSTAT ECO: Eurostat Economic Statistics

EUROSTAT ST: Eurostat Science, Technology Statistics

GOLOGIT: Generalised Ordered Logit

GREMI: Groupe de Recherche Européen sur les Milieux Innovateurs

ICCVR: Indicatori di Contesto Chiave e Variabili di Rotture (ISTAT database on regional development aspects)

IIA: Independence of Irrelevant Alternatives

ISTAT: Istituto Nazionale di Statistica (Italian National Statistical Institute)

KPF: Knowledge Production Function

ML: Multinomial Logit

MNE: Multinational Enterprise

MP: Multinomial Probit

MRW: Mankiw, Romer and Weil

NEG: New Economic Geography

NGT: New Growth Theory

OECD: Organisation for Economic Co-Operation and Development

OLS: Ordinary Least Square

OR: Odds Ratio

REG_POP: EUROSTAT regional population statistics

REG_ST: EUROSTAT regional science and technology statistics

REG_ECO: EUROSTAT regional economic statistics

RIS: Regional Innovation System

RRR: Relative Risk Ratio

RU: Regional Unit

SEM: Simultaneous Equation Models

SME: Small and Medium Enterprise

SP: Statistiche sulla popolazione

STEM: Science, Technology, Engineering and Mathematics

STI: Science, Technology and Innovation

SVIMEZ: Associazione per lo sviluppo dell'Industria nel Mezzogiorno

TOL: Tolerance

VIF: Variance Inflator Factor

WWI: World War One

WWII: World War Two

Introduction

Graduates on the move: knowledge flows and Italian dualism

Abstract
This introduction provides an overview of the whole doctoral thesis. It describes briefly why the study of the Italian graduate migration is important, the socio-economic and the theoretical background in which it is framed, and the research questions. Furthermore it provides an outline of the dissertation.

I. The objective of the thesis

Italy is characterised by large sub-national disparities between the less developed South and the more developed Centre-North. It comes as no surprise, therefore, that it has a complex history of population flows from the South (or *Mezzogiorno*) to the rest of the country.

This thesis focuses on a dramatically new trend in the dynamics of internal migration. Indeed, whilst historically unskilled workers constituted the bulk of migrants, in recent years, the high skilled have become increasingly more mobile. As human capital[1] is a crucial input to both innovative activity and economic growth, this phenomenon has the potential to exacerbate the already marked Italian regional imbalances, as such, deserves thorough investigation. This study analyses this internal *brain drain*, focussing on recent university graduates, which, as they are transiting between study and work, are especially prone to move.

The thesis draws upon a wide and interdisciplinary literature. It builds a conceptual framework through which the knowledge flows generated by skilled migration can be analysed. Through this framework, it explores in depth the links between graduate mobility and regional innovation, the relationship between mobility and job satisfaction

[1] In this thesis we will use the terms human capital, talent, skills or high-skilled as synonyms.

and the social nature of migration. Methodologically, the thesis applies a wide array of econometric techniques to a survey on graduates' entry in the labour market, developed by the Italian statistical office (ISTAT). At the policy level, the analysis sheds light on the connection between higher education, innovation and regional development.

This preamble gives an overview of the whole work and is organised as follows: section II introduces the theoretical and empirical background of the research, it describes the key ideas that will frame the analysis, the socio-economic situation of Italy and its internal migration trends; section III covers the empirical strategy, the dataset that will be used, the original taxonomy of graduates' mobility and the econometric models that will be applied; section IV gives an outline of the thesis summarising the content of each of the seven following chapters; section V concludes highlighting the original contributions of the study.

II. The theoretical and empirical background

This thesis broadens the traditional approach to skilled migration, whereby the highly educated and highly mobile are seen as job-seekers moving from poorer to richer areas (Sjaastad, 1962).[2] It does so by building upon the literature on regional innovation (e.g. Cooke, 1993, Howells, 1999), on job satisfaction (Clark and Oswald, 1994, 1996), and on the sociology of migration (Vertovec, 2002), and focusing on the knowledge flows generated by mobile graduates. Such knowledge flows form the basis of a new conceptual framework devised to explore how human capital mobility and regional innovation shape each other. In particular the proposed framework stresses that, to understand such link, both the knowledge embodied by graduates and that embedded in geographical areas of origin and destination need to be taken into account.

As will be shown in chapter 1, adopting this perspective sheds lights on new important drivers and consequences of talent flows, at the micro, meso ad macro level. At the micro level it implies that the motivation to learn and apply one's own knowledge influences the decision to move. Furthermore, as remuneration is not the only reward that talent seeks, it also indicates that looking at job satisfaction provides important information on the micro-consequences of migration. At the meso level it explains that

[2] Sjaastad's approach does not refer exclusively to highly skilled migrants, however, as it will be clear in chapter 1, human capital plays a crucial role in her model.

social networks of talent underpin, shape and reinforce human capital flows and therefore are critical to achieve a realistic view of the phenomenon. At the macro level, taking knowledge flows into account means that the direction of migration cannot be captured solely by sub-national economic gaps. Rather, the differentials in knowledge creation capacity need to be brought in: firstly, because more innovative areas attract human capital by offering more learning opportunities, secondly because different innovation systems will be able to integrate different types of skills. This observation, in turn, suggests that human capital mobility may generate a self-reinforcing mechanism of knowledge creation and skilled-concentration on the one hand, and of underdevelopment and skilled-emigration on the other.

Exploring these aspects is especially important in the case of Italy. The country is characterised by strong sub-national disparities in economic and innovative performance as well as in human capital endowments, with the South lagging behind the rest of the country. Furthermore, Italy has experienced a complex history of internal migration, which has only recently involved the highly-skilled. Whilst, in the 1950s and 1960s nearly four million unskilled workers left the South to relocate in the Centre-North, this type of flow has virtually stopped since the mid 1970s. Highly educated individuals, which until then were relatively immobile, have become, since the 1980s, the most prone to migration and such trend has increased strongly the mid 1990s. This doctoral dissertation, therefore, analyses a very recent phenomenon, which poses new research and policy challenges. In particular, it raises questions on the links between education, innovation and regional development policies, and on how the three can be integrated in order to create a virtuous cycle of knowledge-based growth.

III. The empirical analysis

The thesis will analyse graduates' patterns of mobility from the region of university to the next destination. It will go beyond the simple distinction between migrants and non-migrants, and will classify graduates in three groups: *stayers*, those who remain in the region of study, *returners*, those who move back to their home region after having attended university, and *migrants*, those who leave the region of study to relocate somewhere else. As the three groups are likely to choose their region of residence for different reasons, it is interesting to verify whether they have different characteristics and whether their behaviour has different implications.

The study will be based on the survey *Indagine sull'Inserimento Professionale dei Laureati* (ISTAT, 2007A), a survey, run by ISTAT, that covers graduates' entry in the labour market. The survey focuses on graduates of the year 2001, which are interviewed in 2004. Regional data from ISTAT and EUROSTAT is also used to complement the *Indagine*.

The empirical part of the thesis is divided in two blocks. The first block, in chapters 4 and 5, covers the causes of graduate migration, tackling them at the micro, meso and macro level: whilst chapter 4 looks at how individual and regional knowledge determine the decision to move, chapter 5 sheds light on the spatial preferences of graduates and on the role of social networks. The second block, which includes chapters 6 and 7, covers the consequences of the phenomenon, exploring them at the macro and micro level. Specifically, chapter 6 tests whether the patterns of graduate mobility generate a virtuous circle of human capital concentration and innovation in the most developed areas of the country, and one of skilled emigration and stagnation in the least developed ones. Chapter 7 looks at how spatial mobility impacts on job satisfactions and poses particular attention on Southern graduates.

Methodologically, the thesis employs a wide array of Discrete Choice Models (DCMs) and of Simultaneous Equation Models (SEMs). In the former, which include a wide range of techniques, the dependent variable is categorical and represents the choice set. DCMs can be use to study why graduates chose to stay, return or migrate (for instance through a multinomial logit); to understand why they chose a specific region (for instance through a conditional logit); or to explore what drives graduates' level of satisfaction (through the family of ordered logit). SEMs, on the other hand, are used to capture social and economic phenomena in which the dependent variables are endogenously determined. As the regional ability to innovate depends, among other things, on the inflows of human capital, and the inflows of human capital depend, among other things, on the innovative performance of a region, SEMs can be used to test the existence of a cumulative process of graduates' *in*-flows and *out*-flows and innovation.

IV. The outline

The thesis is a monograph organized in 7 chapters (excluding the current introduction and the conclusions of the work). Chapters 1 to 3, give the set-up of the thesis. They introduce respectively the literature review and conceptual framework, the background of Italy, the research questions and the methodology. Chapters 4 to 7 contain the empirical analysis. In particular:

Chapter 1 provides the literature review and the theoretical framework of the thesis. It combines, critically, insights from the study of regional innovation, human capital, migration and job satisfaction. These different streams of research are brought together in a coherent scheme that will guide the empirical analysis of the thesis.

Chapter 2 provides an overview of the socio-economic conditions of Italy and of its internal migration trends. It describes the current macro-economic performance of the country, its lag in knowledge creation and in human capital accumulation. Furthermore it stresses the multi-dimensional nature of the internal geographical disparities, and highlights how highly educated individuals have only recently become more mobile.

Chapter 3 introduces the research questions and the methodology of the empirical part of the thesis (chapter 4 to 7). It describes the survey that will be used, defining rigorously migrants, returners and stayers and depicting their spatial distribution. It also provides an overview of the different econometric techniques to be used.

Chapter 4 analyses the different characteristics of migrants, stayers and returners. It compares, among the others, their academic background and performance, their employment status and their degree of attraction to highly innovative regions. This is done through multinomial logit and probit models, which are described in detail in the chapter.

Chapter 5 sheds light on the spatial preferences of graduates and on the collective dimension of their spatial movements. In other words, it compares the role of different regional features in attracting the highly skilled and assesses the role played by social networks in sustaining migration. This is done through conditional logit and multinomial probit models, which are described in detail in the chapter.

Chapter 6 studies the macro-level consequences of skilled flows, focussing on its impact on spatial inequality. It tests whether the patterns of graduate mobility generate a virtuous circle of human capital concentration and innovation in the most developed areas of the country, and one of skilled emigration and stagnation in the least developed ones. Simultaneous equation models are described and applied in this chapter.

Chapter 7 looks at the job-related wellbeing of migrants, returners and stayers, paying particular attention to those from the South. It focuses on both short term and long term domains of job satisfaction and employs a particular case of ordered logit regression.[3]

After the empirical chapters[4] a short section concludes the thesis. This section summarises the results from the different chapters and their original contributions. Furthermore it identifies the policy implications of the work and the directions for future research.

V. Conclusions

This doctoral dissertation provides an original and comprehensive analysis of the internal spatial mobility of Italian graduates. The study is original because it explores, in a new way, the links between skilled mobility, innovation, social networks and job satisfaction. It is comprehensive because it looks both at the causes and consequences of the phenomenon, highlighting their, micro, meso and macro dimensions.

The thesis contributes to our understanding of graduate mobility (a rather unexplored topic) with new conceptual insights, new empirical findings and new ideas for policy. As of the former it shows how focusing on the knowledge flows generated by mobile graduates, whilst distinguishing between migrants and returners, allows to grasp in more detail the nature of the phenomenon. Empirically, the study points out that

[3] Specifically, the chapter uses a generalised ordered logit regression with partial proportional odds (Williams, 2006).

[4] The empirical chapters (4 to 7) also contain a brief review of the key literature.

graduate mobility mirrors the complex and multi-dimensional Italian sub-national disparities. At the policy level it highlights how understanding graduate migration can help unveil the complex links between higher education, innovation and regional development.

Chapter 1

Skilled mobility, innovation and geography: migration as knowledge flows

Abstract

This chapter provides the literature review and the theoretical framework of the thesis. It is based mainly on the literature on regional innovation, human capital and skilled-migration; however, contributions from the sociology of migration and the economics of job satisfaction are also drawn in. These different approaches are organised in a theoretical framework, through which the causes and consequences of skilled migration can be analysed, tackling the micro, meso and macro levels.

1.1. Introduction

The literature on regional innovation, human capital and skilled-migration are drawn together in this chapter through a critical literature review, which simultaneously serves two purposes. On the one hand, it helps to identify the academic roots of the thesis and the disciplines to which it contributes. On the other, it devises a new comprehensive theoretical framework to analyse the migration patterns of high skilled individuals in terms of *knowledge flows.*

The whole chapter revolves around one simple idea: as skilled individuals are crucial for innovative development and as their inflows or outflows alter the local knowledge creation capacities, our understanding of skilled migration and of regional innovation can be enhanced by taking into account both the knowledge embodied by migrants and that embedded in their areas of origin and destination. However, whilst the main contribution of this chapter is to highlight the links between human capital, migration and innovation, it also advances the study of talent mobility in two more ways: first it includes sociological as well as economic perspectives on the issue; secondly, it points out how the economics of job satisfaction can shed light on the consequences of migration.

The chapter is divided in two parts. The first comprises sections 1.2, 1.3 and 1.4, which constitute the backbone of the framework: section 1.2, discusses the literature on economic geography and regional innovation with the aim of highlighting the social nature of the knowledge creation process. Section 1.3 introduces the literature on human capital and describes the importance of education and training at the individual and macro level. Section 1.4 analyses the intersection between the two, investigating the complementarity between technology and high skills.

The second part of the chapter, its actual core, includes section 1.5, where the literature on skilled migration is reviewed in light of the theories of human capital and regional innovation. The section, mirroring the empirical analysis of chapters 4 to 7, covers separately the causes (1.5.1) and the consequences (1.5.2) of skilled mobility. In 1.5.1 we distinguish between the micro, meso and macro levels and highlight the role of personal characteristics, social networks and regional features in shaping migration. Section 1.5.2 covers the micro and macro dimensions: at the micro level we are interested in understanding the links between mobility and job satisfaction, whilst at the macro level the focus is on the impact of migration on spatial disparities. Section 1.6 will summarise the new conceptual framework and highlight its original features.

Before starting the review it is important to clarify two points. First, the literature on migration is extremely broad and it is out of the scope of this chapter to review it as a whole. In what follows we will focus exclusively on economic migration[1] and, with few exceptions, we will cover contributions regarding mobility in developed countries. Secondly, whilst the framework proposed will be used to analyse graduate mobility, it has a broader scope and is suited to study the movements of other types of skilled migrants too. For this reason, in the rest of this chapter, we will deliberately not refer to graduates.

1.2. Economic geography and innovation

The perspective taken in this thesis is that the regional ability to create, distribute and accumulate knowledge lies at the core of the spatial distribution of the economy and this section reviews the literature on this topic. Specifically, it first compares top-down and

[1] Economic migrants are those who move mainly to improve their material conditions, as opposed to refugees or asylum seekers.

bottom-up views on the economic geography and, building on this debate, explores why the region has been identified as the locus for collective learning.

1.2.1. Top-down or bottom-up geography?

The traditional approach to regional sciences and spatial analysis, rooted in the neoclassical tradition (Garrison, 1959A, 1959B, 1960; Isard, 1960), effectively considered economic processes as a-spatial. Indeed it posited that, under the assumption of flexible prices and mobile factors of production, market forces would lead regions to converge to a common level of income. The persistence of geographical imbalances (e.g. European Commission, 2003), has lead to a questioning this body of work, and rejuvenated the interest in the study of spatial agglomerations and disparities. The debate has developed, throughout the years, both from a bottom-up and a top-down perspective.

Krugman (1991a, 1991b, 1998) and Porter (1990, 2000), who contributed tremendously to renewing interest in geography, are the main examples of top-down approaches. Krugman's *New Economic Geography* (NEG) is concerned with the economic laws that can generate spatial disparities. He develops mathematical models in which industrial agglomerations (and, symmetrically, peripheral areas) arise and sustain themselves trough centripetal and centrifugal forces, which are generated by the interaction of increasing returns, transportation costs, factors' mobility and demand. A simple example is useful to illustrate his point. Increasing returns at the plant level create an incentive for the geographical concentration of production. This, in turn, determines the location of workers (and therefore consumers), who move where production is concentrated. This spatial agglomeration is further fostered by transport costs, which push the location of plants towards where consumers-workers live. Overall, these centripetal forces lead to a spontaneous core-periphery distribution of the economy.[2,3]

Porter's (1990, 2000) approach to geography, on the other hand, is based on the public promotion of clusters, which are defined as geographic concentrations of companies, specialized suppliers, buyers, and associated institutions in a particular industry. He

[2] Under different assumptions, the same forces are used to explain the emergence of other more complex spatial configurations (Fujita, Krugman and Venables, 1999).
[3] On the other hand, centrifugal pushes arise with traditional diseconomies of scale (e.g. congestion or pollution) or increases in house and land prices.

posits that physical, institutional and cultural proximity allow for better information transfer and access to key resources, which give rise to external economies. This, in turn, makes firms' competitiveness depend on the cluster itself and therefore urges governments and other institutions to focus on clusters as local development tools.

Whilst the two authors have been extremely influential in both research and practice, they have also generated a spur of criticism. Regarding the NEG, Martin (1999) argues that it effectively represents a return to the formal, and long discarded, spatial analysis of the 1960s. Because of its own formality, NEG can necessarily focus only on those external economies that can be modelled mathematically and therefore misses out on other critical spatial features. As for Porter, Martin and Sunley (2003) argue that his success is due to a capable branding rather than a thorough theoretical breakthrough. They criticise Porter's work for being generic in character as his attempt to develop a universal theory of clusters results in a shallow analysis of the concept.[4] In this specific sense, together with the NEG, his approach does not differ from theories of neoclassical legacy and has been described as the "*non-geography*" (Martin, 1999).

At the opposite end of the spectrum, and well before the contributions of Krugman and Porter, several scholars have approached economic geography from a "bottom-up" perspective, analysing spatial idiosyncrasies. Among them, Becattini (1979) and Becattini and Bianchi (1984) studied the districts in the *Third Italy*[5] and looked at the social and economic dynamics underpinning them. They place attention to the role of networks of trust, cooperation and competition for local development. Piore and Sabels's (1984) adopt an organisational perspective and argue that industrial districts, which are based on flexible specialisation, are the response to the inability of the mass-production model to cater for segmented markets. Another school of influence studies the different institutional complementarities in the transition from Fordism to Post Fordism at the regional level (Amin and Thrift, 1994). These scholars posit that securing local economic success is not solely determined by a narrow set of economic

[4] For instance, Porter uses the notion of competitiveness interchangeably with competitive advantage, productivity and competition, applying it to a variety of conceptual scales (firm, industry, region and nation) without further specification. Furthermore he does not define the spatial boundaries of clusters and such lack of geographical precision is accompanied by a very vague typology of industrial agglomerations and their evolutionary path (Martin and Sunley, 2003)

[5] The concept of the Third Italy started to be used in the late 1970s to refer to the economic developments of the North-East and Centre of the country.

factors and/or financial inducements, but it also depends on the ability to territorially 'embed' global processes, which itself relies upon social, cultural and institutional features (the so called "institutional thickness"). These bottom-up approaches all highlight that the interaction of local actors is at the core of spatial economic dynamics. As we shall see in the next section, this point has been further developed by scholars who have focussed on innovation.

1.2.2. The region as the locus for innovation and learning

Innovation and knowledge have received increasing attention in explaining spatial dynamics, as the capacity of regions to develop innovation and sustain collective learning has been identified as a key source of competitive advantage (e.g. Morgan, 1997; Storper, 1997; Audretsch, 1998; Cooke and Morgan 1998; Rodriguez-Pose, 1999; Scott, 2000; Rodriguez-Pose and Crescenzi, 2008).

The advances in the study of technological change, have fuelled the theoretical and empirical interest in the topic. The field was pioneered by Schumpeter (1942), who put technological revolutions at the core of long-term economic fluctuations, and was subsequently developed by both Evolutionary and New Growth Theory (NGT) scholars. The former have focussed on the social, institutional and path-dependent character of innovation (e.g. Nelson and Winter, 1982; Freeman, 1987); the latter (e.g. Romer 1986, 1990; Lucas, 1988); the latter have identified technology and knowledge (and human capital) as endogenous sources of economic growth[6]. According to NGT, these intangible factors display increasing returns to scale as they enhance the productivity of labour and capital.[7] These theoretical breakthroughs, coupled with the persistence of economic disparities and the exceptional performance of a few high-tech clusters, have resulted in the proliferation of concepts that put the region at the core of the learning process. These include the notions of *Innovative Milieu* and *New Industrial Spaces*, and the theoretical approaches of *Evolutionary Economic Geography* and *Regional Innovation Systems*.

[6] More details on NGT will be provided in sections 1.3.2 and 1.4 below.
[7] Despite these elements of novelty, knowledge is, in the NGT, still treated as a traditional factor of production in that it affects the economy only from the supply side.

The notions of New Industrial Spaces and Innovative Milieu build upon that of Industrial Districts mentioned above. Whilst the latter focuses on the division of labour between small and medium sized firms specialized in different steps of production and distribution within an industry, the former two look more closely at the local learning processes. According to the theory of New Industrial Spaces (Storper, 1997) industrial spatial agglomerations arise as a result of firms' vertical disintegration strategies. Such externalization of production, in itself a strategic response to increased economic risk and uncertainty, encourages agglomeration in those stages of production where transactions are most frequent, unpredictable and complex. These agglomerating forces are based partly on cost-advantages (as with the NEG) but also on regional specific *untraded interdependencies*, such as conventions, informal rules, and habits that coordinate economic actors under conditions of uncertainty. A similar perspective is offered by the Innovative Milieu literature, developed by the GREMI group (Camagni, 1991). As in the Industrial District literature, attention is placed on the role of the local socio-economic community. However, here the distinctive focus is on the importance of dynamic collective learning processes in supporting innovation and growth within the local milieu. Camagni (1991) highlights how firms facing uncertainty develop a number of new functions and routines relating to searching, screening, selecting and controlling. The local milieu acts as an intermediary 'operator' reducing uncertainty by supporting the interdependence of local firms, which, by cooperating, seek competitive advantage.

Evolutionary Economic Geography (EEG) and the Regional Innovation Systems (RIS) approach also provide critical contributions to the understating of the geography of innovation. The former (Essletzbichler and Rigby, 2007; Frenken and Boschma, 2007), a very young field, explains the spatial evolution of firms, industries, networks, cities and regions, using concepts from evolutionary economics (Nelson and Winter, 1982), such as search, selection, routines, path-dependence, etc. EEG focuses on the historical developments that have produced current spatial patterns and will affect their future. It recognizes that the search for innovation is a social process in which institutions act as routines, steering the path of technology creation in specific directions while obscuring and excluding alternatives. As institutions are relatively stable entities, which evolve slowly and crystallise past social practices, they perpetuate their influence over time by informing individual actions, such as investment decisions or technological search.

Because institutions operate over various spatial scales and are geographically and temporally embedded, their influence will effectively result in region-specific pressures[8].

The concept of Regional Innovation System (RIS) is also relatively new and derives from a spatial application of the notion of Innovation Systems (Edquist, 1997; Freeman, 1988). The literature stresses three main aspects: that innovation is an interactive process among public and private actors and institutions; that the regional system is defined in a localised context involving rules, standards values material resources and that all the economic and knowledge processes created inside and outside the firms are "embedded" in such structure (Cooke, 1993; Cooke, Uranga and Etxebarria, 1998; Howells, 1999). Despite its popularity among scholars and practitioners, the concept is still loosely defined and presents both theoretical and empirical weaknesses. Firstly, geographical innovation systems show a national bias in their conceptualisation as they have been developed and applied by considering components, relationships and attributes which operate and are governed mainly at the national level (Iammarino, 2005); secondly, the geographical scale that defines a regional system has not been clarified, generating a significant degree of confusion in the definition and empirical validation of the concept itself (Doloreux and Parto, 2005). Finally, innovations systems have so far mostly developed as a static tool, capable of identifying a snapshot of the innovation process, but failing to capture its dynamics.

At the core of any theory of the geography of innovation, lies the concept of knowledge spillovers. The notion, which is of Marshallian legacy (Marshall, 1920), refers to the social benefits deriving from the interaction and exchange of ideas among firms and actors involved in the innovative process situated in a common location.[9] The concept captures the dynamic and collective nature of learning and agglomeration.[10] Both

[8] In the evolutionary jargon institutional differences can be interpreted as differences in the regional *selection* environment influencing the action of local agents.

[9] The literature on knowledge spillovers is vast and it is out of the scope of this section to review it. The interested reader is referred to Audretsch and Feldman (2003) and Breschi and Lissoni (2001 and 2003). It is important to notice that the literature has explored thoroughly the relationship between knowledge spillovers and innovation, but less so the nature of knowledge spillovers themselves.

[10] The schools of thought reviewed in this section have all drawn upon the Marshallian agglomeration economies, albeit from different perspectives, to explain the link between geography and economics. On the one hand the New Economic Geography, where agglomerations arise to minimize transport costs and

aspects are crucial to our framework, where human capital is seen as an element of a complex system, which contributes to its evolution by participating in the social process of knowledge creation.

1.3. Human capital: why skills and education matter for individuals and for regions

To study the links between human capital, migration and regional innovation we first need to understand why investment in education and skills, is important. This is done in the following two sections, which analyse the issue at the individual and at the macro (i.e regional) level.

1.3.1. The micro level: skills and the labour market

Human capital refers to the stock of productive skills and technical knowledge embodied in the labour force.[11] It was first defined by Adam Smith (1776) who described it as one of the four types of fixed capital[12], capable of generating both private and social returns.

Human capital theory (Schultz, 1961; Becker, 1964; and Mincer, 1984) is the first formal attempt to analyse these issues from an economic perspective. In particular, it aims to explain earnings distributions within developed economies. The central idea of the theory is that building capacities through education (formal and informal), training, work experience and job mobility bears costs and benefits. The costs include both the direct expenses and consumption incurred by students, trainees or workers, and the foregone earnings (the loss of what the individual could have earned had he/she spent the time devoted to education/training in gainful employment). The benefits are modelled to accrue mostly in the future, in the form of higher earnings. In other words, education is a form of investment and the rise in wages is the return on such investment.

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access larger markets, has focussed on *static externalities*, that is, on externalities based on cost advantages. On the other, disciplines of evolutionary legacy such as the RIS and EEG approaches, as well as NGT have focussed on collective learning as the engine for agglomeration, that is on *dynamic externalities*.

[11] Although the concept of human capital does not refer exclusively to formal education, we will mostly focus on this aspect.

[12]The other three are: useful machines, instruments of the trade, buildings as the means of procuring revenue and improvements of land.

Two key assumptions underlie this theory: first, that education will increase workers' productivity and second, that, in line with neoclassical economics, employers will pay a higher wage for such higher productivity. Both of them have been criticised and challenged. The former has been analysed by Vandenberghe (1999). He points out that the accumulation of human capital goes beyond the individual's effort and depends on the dynamics and structure of the education services (which will not adjust automatically to the demand of skills) and on the individual's personal background. The latter has been tackled by the *screening* and *job competition* models. The screening model (Spence, 1973) is based on the assumption that hiring is an investment decision made under uncertainty, as it takes time for the employer to learn an individual's productive capabilities. It follows that education has no inherent value and simply acts as a sorting mechanism that enables job candidates to be screened.[13] Individuals want to acquire education not because they will become more productive, but because they will provide a better signal to employers. The *job competition* model (Thurow, 1975), on the other hand, is based on the observation that the larger part of workplace skills are acquired on the job, rather than in formal education. The labour market is therefore not the locus where skills are exchanged for a salary, but the one where training opportunities are allocated. In this model individuals compete on the basis of their relative training costs and their wages will be determined by the characteristics of the job, rather than by the individuals' marginal productivity.

A third critique to human capital theory derives from the observation that increases in education levels have not been always mirrored by increases in skills remuneration. This has led to study the phenomenon of overeducation (see McGuinness, 2006, for a review). The main scholar in the field is Rosen (1973) whom, like Thurow (1975), observes that workers demand "learning opportunities" rather than jobs, for which they are willing to pay a price. In particular the difference between the market price of the worker's existing skills and his/her actual wage is the "shadow price" paid for this learning opportunity. Overeducation emerges as workers accept jobs requiring less education than they actually possess, in order to gain experience and improve their chances of a better job match in the future. It is important to notice that the best

[13] In other words, the education system provides a signal to identify more able and motivated individuals to employers and it is needed because the labour market is characterized by imperfect information on the candidates' characteristics.

outcome for the worker is an education-job match. Indeed whilst overeducated workers, *ceteris paribus*, tend to earn higher wages than non-overeducated co-workers, they will earn less than those in jobs with an adequate education match.[14] This theory is particularly relevant for our framework: the fact that an education-job match produces the best economic result for the individual, indeed, means that transferring one's knowledge to the labour market is advantageous and that learning is a crucial element of working. As it will become clear throughout the chapter, this point has far reaching implications.

1.3.2. The macro level: human capital, growth and inequality

Human capital generates social returns across several dimensions: a highly skilled workforce translates in more informed citizenship, more lawful behaviour and higher standards of health (Mincer, 1984)[15]. In what follows, however, we will focus on the economic impact of human capital, in particular on its effects on growth and spatial inequality.[16]

The MRW model, developed by Mankiw *et al.* (1992)[17], is the first attempt to formally analyse the impact of human capital on growth. It was devised to address the limitation of the Solow model (Solow, 1956) whilst respecting its basic structure and the economic mechanisms it identified. In the original model, which failed to explain a large proportion of economic growth,[18] the steady-state level of income per capita is determined by the exogenous population growth and savings rates. In particular, through a neoclassical production function (in which labour and capital are the only two inputs), Solow shows that income per capita increases with the rate of saving and decreases with the rate of population growth. By adding human capital to the factors of

[14] Interestingly, the s*creening* and *job competition* models, can both explain overeducation (McGuinnes, 2006). In the former, acquiring more education provides a better signal to the employer, a consequence, if the jobs requirements do not change, there is a tendency for the labour force to obtain more formal qualifications. In the *job competition* model the decision of other individuals to attain further qualifications affects one's own relative training costs and therefore one's chances of employment. Overeducation arises as a defensive strategy: individuals need to get further qualifications to protect their position in the labour market.

[15] For a recent comprehensive review of the returns to education see McMahon (2009).

[16] The level and distribution of human capital also impacts on wage inequality (e.g. Rodriguez-Pose and Tselios, 2009 and 2010), however this aspect is not explored in the thesis.

[17] The model derives its name from the three authors: Mankiw, Romer and Weil.

[18] This is the so called Solow residual, which was attributed to exogenous technological change.

production and including a human capital accumulation function, the MRW model is able to explain a larger proportion of growth. Indeed, for any given level of human capital, higher saving or lower population growth rates lead to a higher level of income. This, in turn, raises human capital accumulation and, as a consequence, increases income further.

Another way in which human capital enters the study of economic growth is in NGT models. Although various models in the theory take human capital into account (including Romer, 1990, which will be covered in section 1.4 below) Lucas (1988) is the first one to put it at the core of economic dynamics. He posits that human capital has both an *internal effect* -whereby education and learning by doing increase one's own productivity- and an *external effect* whereby the average level of skills (or human capital) also contribute to the productivity of all factors of production (in other words human capital possesses increasing returns). It follows that the higher the level of education of the workforce, the higher the overall productivity of capital because the more educated are more likely to innovate, and thus, affect everyone else's productivity.

Both the Lucas and the MRW models ignore the role of geography and look at human capital exclusively from a supply-side perspective. They implicitly assume that human capital will have the same effects across areas and that regions at different levels of development will have the same incentive to invest in this resource. Redding and Schott (2003) and Lopez-Rodriguez *et al.* (2007) challenge this assumption from a New Economic Geography framework and show that the incentive to invest in education is inherently lower in the periphery. Their key point is that firms in remote locations face higher trade costs for both exports and intermediate imports, therefore the value added left to compensate domestic factors of production, including human capital, is reduced. The premium for goods that are relatively skill-intensive is, therefore, depressed and so is the incentive to accumulate human capital. As a result, the distance between the core and the periphery is widened. Bradley and Taylor (1996), reach similar conclusions though from a different perspective. They take into account the systemic interaction between the education system, human capital stock and flows and the local economy. In their model high skilled workers impact on the economy because they are more able to create and reap the benefits of new ideas produced elsewhere. At the same time the education sector contributes to the local skill level, not only directly, by producing human capital, but also indirectly, as localities with high levels of educational attainment are also more likely to retain and attract highly skilled workers. It follows that whilst areas with an efficient education system are likely to form and retain human capital, and therefore benefit from it, the opposite is true for areas with poor schooling and skill levels.

Whilst these contributions look at human capital mostly in terms of "stocks of highly educated people", recent research has highlighted that other aspects are also important. Rodiguez-Pose and Vilalta-Bufi (2005) have pointed out that, in the case of European regions, factors such as the degree of job satisfaction and the regional balance between the skills demanded and those supplied have a higher influence on economic performance than the size of the human capital stock. The latter point is especially relevant for our analytical framework. Indeed it highlights that a workforce that applies its knowledge (i.e. an education-job match at the macro level) is crucial to economic performance.

1.4. Human capital, technology and innovation

Having introduced the main contributions on human capital and innovation, we can now discuss the overlap among the two.

Human capital and technology have been described, from different theories, as complementary factors. In one of the seminal contributions of the New Growth Theory, Romer (1990) puts the relationship between human capital and technology at the core of economic growth. More precisely he posits that growth is driven by technological change and that human capital is the key input in the research sector, where the new ideas that underlie technological progress are created. As human capital in the R&D sectors has increasing returns, the rate of growth is determined by the stock of human capital that is employed in research. As with all NGT approaches, the main limit of this model is that it looks at the technology from a supply side perspective only and assumes that human capital is an homogenous good.

The perspective of Nelson and Phelps (1965), introduced long before the NGT, is theoretically able to cope with these limitations. Nelson and Phelps contend that jobs are heterogeneous and education is especially important for those that require continuous adaptation to change, where it is necessary to follow and understand new technological developments. In these jobs, the more educated will introduce new techniques of production faster and will speed up the process of technological adoption and diffusion. It follows that the social return of human capital will depend on the level of technological development of the country/region and, symmetrically, that different human capital structures will suit countries and regions at different stages of technological development. In other words, a highly skilled workforce in a less developed area, will generate lower returns than in a technologically advanced one.

Their ideas have been subsequently developed by Benhabib and Spiegel (1994) and Vandenbussche *et al.* (2006). The former posit that human capital does not only facilitate the adaptation to more advanced technologies, but also makes it easier to innovate at the frontier. The latter point out how highly educated individuals are more likely to innovate rather than imitate, and contend that both the composition of human capital and the distance to the technological frontier need to be taken into account to understand the impact of human capital on innovation. In particular, the growth-enhancing impact of skilled labour (tertiary education) increases with a country's proximity to the frontier. Conversely, the growth-enhancing impact of unskilled labour (primary and secondary education) decreases with the proximity to the frontier. More recently, Nielsen (2007) has dug further in the analysis of human capital composition, looking at the contributions of skilled individuals with different backgrounds. He argued that, whilst those with technical and natural sciences qualifications contribute positively to technological innovation, those with other backgrounds can stimulate organisational change. Mahroum (2000, 2007) reaches similar conclusions from an innovation system perspective, he highlights how different innovation systems absorb, complement and benefit from different skills.[19] Understanding the impact of the

[19] Technology has also entered the debate on overeducation. Mendes de Oliveira *et al.* (2000) argue that rapid technological change requires higher skills than those possessed by current employees. However, as replacement of the workforce cannot be made instantaneously both the employer and the employees could be locked into a situation of disequilibrium in which pockets of *undereducation* would arise. This is

composition of human capital on innovation does not only provide a deeper understanding of the links between technology and skills, it also gives new insights on education policy, which the NGT, with its supply side focus, cannot provide (Aghion, 2008).[20]

Overall, this literature highlights that human capital and technological development should be analysed jointly as two sides of the same coin. On the one hand, we have seen that the highly skilled are better able to deal with technological change, as they are quicker in adapting to it and diffusing it. On the other, we have seen that innovative and economic performances are determined by degree of complementarity between the local composition of human capital and the level of technological development. The concept of regional innovation systems, introduced above, is suited to analyse such a relationship, as it can capture the interactions between the productive structure, the education and research systems, and the policy and governance of innovation. This perspective can also enlighten our understanding of spatial inequalities. By looking at the mechanism through which knowledge is created in different areas, and the degree of complementarity between human capital and other elements of the system, it is possible to comprehend how knowledge creation is fostered or hampered, and why certain regions are able to compete and grow and others are not.

1.5. Skilled migration, geography and innovation

Having reviewed the literature on human capital and regional innovation, which serves as the backbone of the thesis, we can explore the third pillar of the thesis: the literature on migration. This section will carry out a critical analysis of the literature on skilled mobility with the aim of defining the theoretical framework for the remaining of the thesis. It will tackle both the drivers and the consequences of migration, analysing them at the micro, meso and macro level. Such structure is not only innovative for its comprehensiveness, but also because it merges contributions that have rarely been brought together systematically. Whilst the core of the framework lies at the intersection

because, as the hiring standards of firms are upgraded, new employees, with educational qualifications higher than their older colleagues, are perceived to be overeducated.

[20] The literature on *skill-biased technological change* should also be mentioned in this section (Sanders and ter Weel, 2000; Violante, 2008). This stream highlights, again from a supply side perspective, how technological development complements skilled labour and substitutes unskilled labour. The literature is mostly concerned with the impact of technology on the labour market.

between the economic analysis of migration, human capital and technology, the framework also integrates findings from the sociology of migration and from the literature on job satisfaction.

In order to guide the reader through future parts of the thesis, the structure of the section, mirrors exactly that of the empirical chapters (4 to 7). Specifically, section 1.5 is divided in two parts: the first (1.5.1), which related to chapters 4 and 5, covers the drivers of migration and tackles them at the micro, meso and macro levels; the second (1.5.2), which related to chapters 6 and 7, covers the consequences of migration, exploring their micro and macro level dimensions.

1.5.1. The drivers of skilled migration

1.5.1.1. The micro level: why the propensity to move increases with education

Several theories have pointed out that the propensity to migrate increases with the level of education.[21] In the neoclassical approach (Sjaastad, 1962), rational economic actors decide to move following a utility maximization process. Migration is therefore an individual voluntary act driven by the comparison of the costs and gains of the present situations and those expected to arise in the future. In other words, it is the result of a self-selection process where skilled individuals will be more likely to move because their higher investment in human capital needs to be compensated.

As pointed out by Molho (1986), the neoclassical theory does not consider information costs in the job market, which have important implications for migration.[22] Indeed, by taking those into account within a *job-search* framework (Lippman and McCall, 1979), Molho provides a new explanation of human flows. Job-search models assume that acquiring information on job opportunities is costly. The job hunt is modelled as a multi-period sequential process in which the worker receives a job offer at the end of each period, which she/he will accept only if the salary is equal or higher than a

[21] The empirical literature largely support this statement (see among the others Greenwood, 1975; Molho, 1987; Ritsila and Ovaskainen, 2001).

[22] See Prothero (1987) for a comprehensive critique of neoclassical migration theory.

personal arbitrary quantity called *reservation wage*[23]. According to the job search theory high skilled migration is more likely to occur because individuals with higher education need to compensate for a higher reservation wage and jobs that pay this wage are more sparsely distributed.[24]

Giannetti (2001, 2003) identifies yet another mechanism which encourages talented workers to migrate. She posits that when human capital concentrates in a location, skill complementarities arise, which increase its productivity and ultimately result in higher wages. This, in turn, induces talent to move and concentrate further generating a self-reinforcing process.

Finally, another approach is proposed by Quinn and Rubb (2005) who are the first to use the concepts of education–occupation matching and of overeducation to the study of migration. As we have mentioned above, those who enjoy an education-job match, are better off than those who are overeducated (Rosen, 1973) and Quinn and Rubb demonstrate that such is the advantage of an education-job match, that those who are overeducated have a significant incentive to migrate.[25]

Whilst all the approaches introduced here point out that individual knowledge is crucial to understand migration, the approach of Quinn and Rubb (2005) is especially relevant to comprehend the nature and impact of the knowledge flows generated by talent mobility. The two scholars effectively find that the desire to apply one's knowledge is, in itself, a reason to move. Given that different regional innovation systems require a different composition of skills, Quinn and Rubb's findings suggest that the specific background of migrants and the RIS of their origins and destinations need to be taken into account to fully grasp their spatial movements.

1.5.1.2. The meso level: the role of social networks

Whilst economic approaches to migration have looked at the phenomenon mostly as an

[23] The reservation wage is defined as the lowest wage rate at which a worker would be willing to accept a particular type of job.

[24] In applying these ideas to the study of migration Molho (1986) stresses the importance of distinguishing between "speculative migration", undertaken in the hope of finding a suitable opportunity and "contracted migration", undertaken after having found the job. In the former, migration is part of the *search process*, in the latter, it is an *outcome.*

[25] Quinn and Rubb (2005) confirm their theory empirically for the case of Mexico.

individual choice, sociologists have highlighted its strong collective component. In particular they have stressed that migrants rely on their social networks, which facilitate the decision to move and the process of relocation itself by providing information, support and assistance (see Vertovec, 2002 for a review of the literature). Indeed, according to Portes and Bach (1985), migration can be defined as a self-reinforcing process of network building.

Networks differ in nature, as they maybe family based (Boyd, 1989), or nationality/community based (Portes *et al.*, 1999), etc. Those of skilled communities have their own distinctive characteristics. In particular different skilled groups rely on different networks, which are characterized by specific recruitment mechanisms and intermediaries (Vertovec, 2002).[26]

Overall, taking networks into account is crucial to achieve a more complete and realistic view of the phenomenon of migration. Whilst the economic approach identifies the (micro and macro) structural drivers of spatial mobility, the sociological one pinpoints the processes and mechanisms that sustain it, in their collective, dynamic and cumulative nature.

1.5.1.3. The macro level: economic performance, quality of life and knowledge

Gravity models and neoclassical migration theory are the traditional frameworks to analyse the macro-level causes of population flows. According to neoclassical theory (Hicks, 1932; Sjaastad, 1962) spatial economic differentials are the main cause of the phenomenon: migrants move from regions with lower wages and employment rates to regions with higher wages and employment rates. On the other hand, gravity models (described in Molho, 1986) posit that the degree of migratory interaction between two places depends on their distance and size, as well as on other *push* and *pull* factors. Other things being equal, population will move form the smaller to the larger regions and such movements will be larger the shorter the distance between the two places.[27]

[26] Remarkably, graduate networks are also important as the links forged at university set the path of future skilled labour circulation (Vartovec, 2002).

[27] The advantage of the gravity model is its generality, as different push and pull factors can be combined in this analytical framework. Indeed, Molho (1986) indicates that the neoclassical view of migration is

Although the neoclassical and gravity model are not specifically concerned with the skill level of migrants, empirical studies of human capital population flows have confirmed their propositions (e.g. Greenwood *et al.* 1986; Ritsila and Ovaskainen, 2001). However, scholars have also highlighted that, when it comes to talent, the story is more complex. For instance, quality of life seems to be playing a crucial role and several studies, including the influential and controversial Florida (2002a, 2002b)[28], have confirmed the importance of amenities and good lifestyle in attracting talent (Cebula, 2005; Di Pietro, 2005; van Dalen and Henkens, 2007).[29] At the same time, many have noted that skilled individuals tend to concentrate geographically in urban richer and more innovative areas (Ritsila and Ovaskainen, 2001; Giannetti, 2001 and 2003; Florida, 2002a, 2002b; Pekkala, 2003; Rutten and Gelissen, 2008). The latter point is crucial for our analysis as it indicates that the innovation system needs to be taken into account to understand the dynamics of human capital mobility. If at the micro level, we have highlighted that the need to apply one's knowledge is an incentive to migrate, at the macro level, we see that the more innovative regions, which provide more learning opportunities, are the most attractive to high skilled migrants. This, together with the aspects highlighted in section 1.4, suggests that the specificities of the systems (its firms, industries, institutions and policies) need to be taken into account to understand which type of skills are most attracted to them.

1.5.2. The consequences of migration

1.5.2.1. Micro level: migration and satisfaction

The bulk of the literature on the micro-economic consequences of migration has focused on its objective labour market outcomes. As summarised in the seminal survey by Greenwood (1975), this literature has shown that migration leads to higher extrinsic and intrinsic job-related rewards. The former include promotion, wages, bonuses, etc.;

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consistent with a gravity model in which the distance function is omitted and the relative wage rate is the principal push/pull factor.

[28] Conceptually, Florida has been criticised for not distinguishing among different types of creative people and not taking into account how different institutions and socio-economic systems influence the decision to migrate (Hansen, Vang and Asheim 2005). Furthermore, his arguments have been described seductive rather than innovative and criticised for being methodologically and empirically not robust (Peck, 2005).

[29] Previous research on migration, although not focusing on skilled individuals in particular, had already investigated the role of quality of life (see among the others Liu, 1975; and Porrell, 1982).

the latter include professional challenges and greater autonomy, etc.

Subjective labour market outcomes, such as self-reported job satisfaction have, on the other hand, been mostly ignored. However, there are both theoretical and empirical reasons to look at these aspects. First, migration and job (or life) satisfaction are theoretically linked by the neoclassical assumption which sees the former resulting from a utility maximisation process, in which the benefits of moving outweigh the costs (Ziegler and Britton, 1981). Secondly, empirical work has found that both extrinsic and intrinsic job-related rewards are important determinants of job-related wellbeing (Gruenberg, 1980; Janson and Martin, 1982).

Despite these clear connections, the literature is so far very limited and inconclusive. Whilst Martin and Litcher (1983) find little evidence that mobility translates in increases in self-reported wellbeing; others have highlighted how various characteristics of the migrants (such as the time since the move occurred, whether the individuals are repeated or first time movers, etc.) do impact on satisfaction (De Jong *et al.*, 2002; Lundholm and Malmberg, 2006). Nonetheless, we argue that focusing on job satisfaction can help assess more comprehensively the consequences of migration, especially in the case of the high skilled, where non-pecuniary factors, such as quality of life and the opportunity to learn, seem to play a prominent role.

1.5.2.2. *Macro level:* migration, innovation and inequality

Analysing the macro-level effects of migration, means, effectively, understanding the consequence of migration on the regions of destination and of origin.

According to mainstream migration theory (Sjaastad, 1962), the flow of people from areas with low wage and high unemployment towards areas with high wage and low unemployment acts as a re-allocation mechanism of the factors of production: skilled or unskilled labour relocates from where it is abundant to where it is scarce. Such a movement narrows the difference in wages between areas and will perpetuate itself until equilibrium is reached. It follows that the ultimate consequence migration is interregional (or international) economic convergence. The theory has been criticised heavily in the past decade for not surviving empirical scrutiny (e.g. Prothero, 1987): not only the predicted convergence has not occurred, but also migratory flows have decreased despite persisting regional inequalities.[30]

Several scholars have therefore tried to explain why migration can coexist with spatial differentials. Reichlin and Rustichini (1998), for instance, do so from a NGT framework. Their model assumes increasing returns, perfect capital mobility and two regions.[31] A larger skilled workforce in region A implies higher wages, as the increasing returns of human capital raise the productivity of the workforce. This induces in-migration from country B and, as the skilled workforce in country A keeps growing (because of internal skill production and in-migration) the wage gap with country B will expand, inducing further population flows.[32] Another interesting example comes from the NEG tradition. Forslid (1999) and Forslid and Ottaviani (2003) augment the basic core-periphery model by distinguishing between mobile skilled workers and immobile unskilled workers. A core-periphery economy arises as the interaction of imperfect competition, transport costs and market size will encourage firms to concentrate and push human capital to migrate to the core, whilst unskilled workers remain in the agricultural periphery. Empirically the links between skilled migration and spatial polarisation have been confirmed repeatedly (Ciriaci, 2007; Etzo, 2008; Ghatak *et al.*, 2008; Peeters, 2008) and scholars agree that migration of human capital reinforces the economic strength of rich areas whilst weakening the poorest ones (for a comprehensive review, see Kanbur and Rapaport, 2005).[33] Indeed, Rodriguez-Pose and Vilalta Bufi' (2005), highlight how the ability to attract (drain) talent is a very important indicator of the ability of a society to exploit (not) the social returns to human capital.

From the perspective adopted in this research, it is interesting to understand whether skilled migration can actually widen disparities in the regional ability to innovate. This

[30] Moreover the model does not explain differentials in migratory behaviour in areas with similar economic structure (Molho, 1986).

[31] Their paper refers to countries, however, the same reasoning can be applied to regions.

[32] However, this effect can, in theory, be counterbalanced. The evolution of the skilled/unskilled composition of the workforce, in fact, can impact on the relative skilled/unskilled wage, altering the incentive to migrate.

[33] Bhagwati and Hamada (1974) looking at the *brain drain* from developing to developed countries, have highlighted a similar point. Their view has been challenged by Mountford (1997) which has posited that the brain drain may affect positively the home countries as the prospect of migration acts as an incentive to invest in education and in so doing raises the enrolment level in the country of origin.

implies understanding firstly, whether skilled migrants can facilitate knowledge diffusion and creation and, secondly, how geography impacts on such process.

There is large empirical evidence on the first point. The studies of Saxenian (1994 and 2002) and Power and Lundmark (2004), among many others, conclude that human capital movements, be them among firms, industries, regions or countries, are likely to speed up knowledge dissemination, to create a new combination of knowledge and to create bonds and linkages between firms and institutions. Similar considerations emerge from scholars who have looked at the issue through a knowledge production function. In such approach, first introduces by Griliches (1979),[34] human capital is, together with R&D expenditures, an input for knowledge creation. Hunt *et al.* (2008) and Nieburh (2006) add migrated talent to the inputs and find, for the US and Germany respectively, that a larger presence of immigrants does result in an increase in patents per capita. Another method is followed by Moen (2005), for Norway, and Magnani (2006), for the US. They show, through a wage regression, that workers leaving firms that invested heavily in R&D tend to experience steep increases in their salaries, precisely because their human capital and their ability to innovate have increased.

Within this context, taking geography into account, means understanding the conditions under which migrants can generate (or not) positive knowledge spillovers. In light of our review we suggest that the impact of talent mobility on innovation depends on the techno-economic development of the area. As the less innovative areas do not offer learning opportunities, they lose skills to the more innovative ones, which benefit from them as they integrate talent in their regional systems. This, in turn, encourages further migration from backward areas, generating a self-reinforcing mechanism, which can actually widen the disparities in knowledge creation capacities.[35]

1.6. Conclusions

Although theoretical and empirical research has highlighted that human capital has a higher propensity to migrate, no theoretical or conceptual framework has been

[34] See Audretsch and Feldman (2003) for a review of the knowledge production function.

[35] This polarising mechanism has been explored (and confirmed empirically) only by Faggian and McCann (2006 and 2009). They have looked at the migration of British graduates and highlighted how skilled mobility and regional innovation reinforce each other.

developed to address the issue in its own specificities. Often, the main theoretical approaches have assumed that skilled and unskilled migrants respond to similar mechanisms. Throughout this chapter we have shown, through a critical literature review, that this is only partly true and that much more can be understood if skilled migration is looked not simply in economic terms, but also in terms of the knowledge flows it generate.

At the core of this chapter lies the idea that the relationship between the skills of the work force and the level of regional technological development are two sides of the same coin, which can be framed within the concept of Regional Innovation System. This chapter has also pointed out how the literature on job satisfaction can shed light on the micro-level consequences of migration. Furthermore, we have suggested that the sociology of migration, which has highlighted the role of networks in driving population flows, can offer important insights on the mechanisms through which human capital moves.

These different ideas and streams of literature are merged here in a comprehensive framework, which will inform our empirical analysis. The framework, summarised in table 1.1 (pg. 48), is divided between the causes and consequences of migration, which are tackled at the micro, meso and macro level. The right column sums up the new theoretical approached emerged from the review. The left one reports its main differences with neoclassical migration theory, which has so far been the standard tool for analysis. The table mirrors chapter 4 to 7 and highlights the key aspects that will be developed in each of them.

Table 1. 1 Summary of theoretical framework

	Neoclassical approach	New comprehensive framework
	Causes of migration	
Micro (ch. 4)	Migrants move to achieve employment or a higher wage. ↓ The highly-skilled are more prone to relocation because their investment in human capital needs to be compensated.	The desire to learn and apply ones' knowledge is itself a driver of migration. ↓ The knowledge embodied by the migrant (and its relationship with that embedded in the areas of origin/destination) has therefore an impact on the propensity to move.
Meso (ch. 5)	Migration is an individual phenomenon and results from a rational utility maximisation process.	Migration relies on social networks. They help the potential migrant throughout the whole process of relocation.
Macro (ch. 5)	Population flows go from areas with lower wages and lower employment to areas with higher wages and higher employment.	Skilled migrants are also attracted to more innovative regions, which offer more learning opportunities and can embed human capital in collective learning processes.
	Consequences of migration	
Micro (ch. 7)	Migrants achieve better objective employment conditions.	Job satisfaction is a better indication of migration outcomes than employment conditions
Macro (ch. 6)	Migration reduces income differentials across areas.	Migration of talent widens the interregional differences in the ability to innovate (and therefore to grow).

At the micro level our framework highlights that, as the will to learn and apply one's own knowledge influences the decision to move, individual's skills and background should be taken into account in the study of migration. At the same time, as economic remuneration is not the only reward that talent seeks, we point out that looking at job satisfaction, rather than objective job-outcomes, provides better information on the micro-consequences of mobility. At the meso level, we explain that social networks underpin, shape and reinforce population flows and therefore are critical to achieve a realistic view of the phenomenon. At the macro level, we show that economic differentials cannot fully explain human capital migration, and that the innovation systems of the regions of origin and destination need to be taken into account. This is not only because more innovative regions offer more learning opportunities, but also because different systems will be able to integrate different types of skills. This observation, in turn, can shed light on an important consequence of talent migration: if the best workers leave backward areas to move to more innovative regions, the gap between the two will increase. In other words, the process can generate a self-reinforcing mechanism of knowledge creation and skill-immigration on the one hand, and underdevelopment and skilled emigration on the other.

To sum up, the ideas expressed in this chapter build upon a several streams of empirical and theoretical research, which are combined in an original way. Overall they confirm that a comprehensive and interdisciplinary approach to human capital migration can enhance our understanding of the phenomenon and that knowledge, in its different dimensions, plays an important role.

Chapter 2

Socio-economic background, innovative performance and internal migration in Italy

Abstract

This chapter provides an overview of the Italian socio-economic background and of its history of internal migration. As for the former, it describes the current macro-economic performance of the country, its lag in knowledge creation and the skill level of the labour force, highlighting. in particular, the strong sub-national disparities. As for the latter, this chapter shows how highly educated individuals have only recently become more mobile.

2.1. Introduction

To understand the phenomenon of graduate migration we need to take into account the current socio-economic conditions in Italy, with its strong internal disparities, and the recent history of internal population flows. Both aspects are tackled in this chapter.

In the first half we describe the Italian situation from the mid 1990s. In this period Italy has been lagging behind other developed economies, it has grown at much slower rates and has lost an increasing share of world trade. Moreover, although certain Southern regions have been quite dynamic, the already marked internal disparities have overall increased. As explained in the following pages, adopting an historical perspective and drawing attention to the country's limited, and spatially concentrated, technological capabilities, is necessary to comprehend these facts.

The disparities in economic and innovative performance between the South and the rest of the country are key to understanding the patterns of graduate migration. As will be clarified through the chapter, the strong spatial mobility of educated individuals is a new phenomenon. Whilst in the aftermath of WWII large numbers of unskilled labour moved from the South to the Centre-North (especially to the North West), interregional flows basically came to a halt in the 1970s. Only in the early 1990s migration started growing again, and this time it was much smaller in magnitude and composed largely of highly educated individuals.

The following pages discuss these aspects in detail. Specifically, section 2.2 describes the Italian economic performance over recent years. Section 2.3 explores the sub-national divide between the richer Centre-North and the laggard South. Section 2.4 reviews the recent trends in interregional migration, focussing on the increased mobility of human capital. Section 2.5 concludes, stressing the policy challenges ahead of Italy, and highlighting the relevance of the present research.

2.2. The macro-economic conditions since the mid 1990s

This section provides an overview the macro-economic conditions and structure of Italy from the mid 1990s onwards. We focus on these years because, in the mid 1990s, the graduates analysed in chapters 4 to 7, started their University degree[1] and were forming their expectations about the future.

During these years, Italy has performed poorly in comparison to other developed countries. Not only has Italian GDP per capita, reported in figure 2.1, been consistently below that of the EU-15 (accounting for less than 90% of the EU-15 average), but its growth has been also consistently slower, as shown in table 2.1.

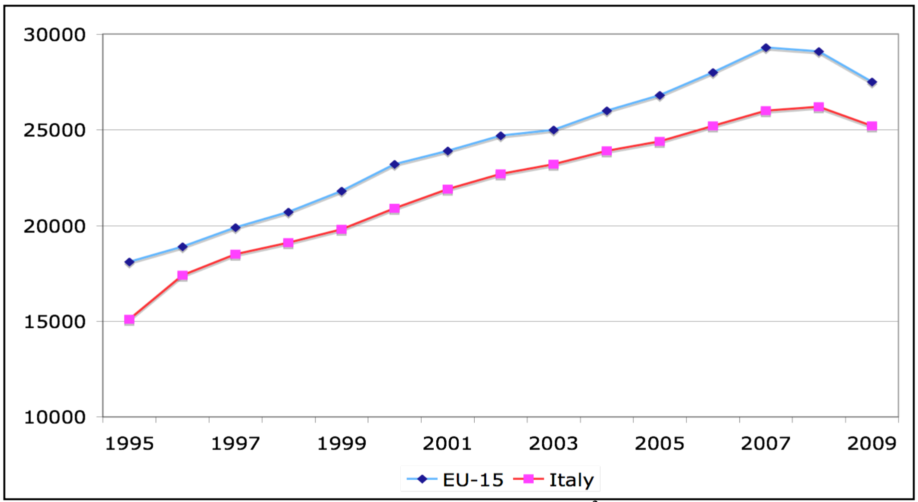
Table 2. 1 GDP Growth rate (%)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
EU-15	1.9	1.2	1.2	2.3	1.8	3.0	2.7	0.5	-4.3	0.9
Italy	1.8	0.5	0.0	1.5	0.7	2.0	1.5	-1.3	-5.0	0.8

Source – EUROSTAT ECO[2]

[1] The empirical analysis in the next chapters refers to graduates who finished their studies in 2001. Given that the average time of completion for a degree is about 7 years (OECD, 2005), in the mid 1990s our graduates were starting higher education.
[2] Eurostat Economic Statistics.

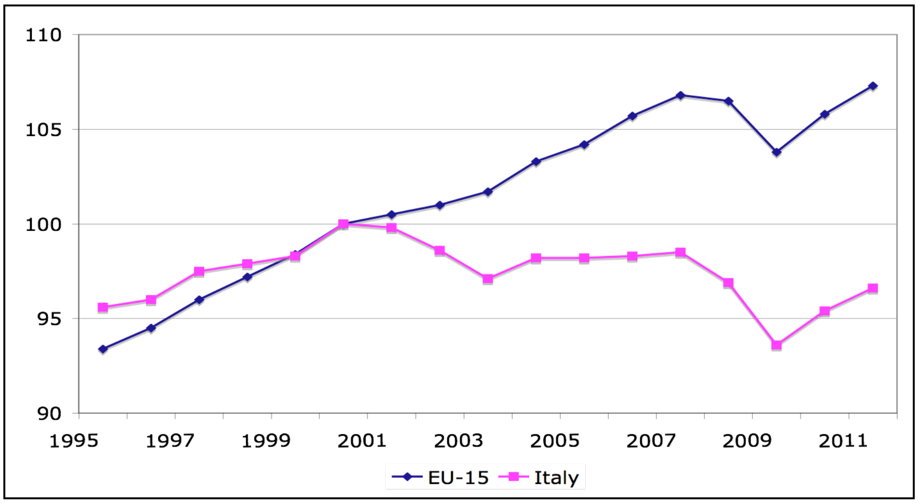
Figure 2. 1 GDP per capita (€)



Source – author's calculations from EUROSTAT ECO[3]

In the same time span productivity growth has slowed down considerably. Figure 2.2 reports productivity levels relative to the year 2000. Whilst in the EU-15 there is a clear increasing trend (with the exception of the years 2008 and 2009), this is not the case for Italy, where productivity has decreased continuously since 2000, reaching a negative peak in 2009.[4]

Figure 2. 2 Work productivity



Source – author's calculations from EUROSTAT ECO

[3] Eurostat Economic Statistics.
[4] Italian productivity, as shown in the figure, is estimated to grow in 2010 and 2011. However, by 2011 it will have not reached the level of the year 2000, accounting for 96.6% of that level.

International trade has also suffered and between 1995 and 2005, nearly 50% of Italy's export market share evaporated (OECD, 2007). This situation is obviously mirrored in a slack labour market: throughout the period considered, the Italian employment rate has been around 9% lower than that of the EU-15. For instance, in 1995 and 2009 the employment rate in Italy was 51% and 57.5% respectively, whilst it was 60.1% and 65.9% in the EU-15.

To understand the origins of such a situation we need to look at the specialisation model of the country and its poor performance in innovation and education, as done in the following subsections.

2.2.1. The specialisation model and its origins

The current Italian situation is the result of deep structural problems, related to its sectoral specialisation in industries with low growth and low skill/technology intensity. The index of revealed comparative advantages (Balassa, 1965) shows that Italian exports are mostly concentrated in textiles, furniture, clothing, shoes and non metallic minerals, whilst Italy is strongly dependent on imports in most advanced sectors (Barba Navaretti *et al.*, 2007). Italy's specialisation diverges widely from that of other advanced countries, and, what is worse, also from that of countries of later industrialisation such as Spain (Onida, 2003; De Cecco, 2007). Furthermore, its model is strongly persistent over time and there is no sign of convergence towards the structure of other rich economies (Faini and Sapir, 2005).

The productive core of the country consists of mainly family-run small and medium enterprises (SMEs) and a small number of large companies.[5] The average size of Italian enterprises is 3.8 employees (ISTAT, 2007b), nearly 60% the size of the average EU firm (Fazio, 2002, quoted in Onida, 2003), with 95% of total businesses consisting of firms of less than 10 employees. In 2006, 47% of the employed people were working for such micro firms, whilst large enterprises[6] (which are less than 0.1% of the total) accounted for only 20% of total employment (ISTAT, 2008a).

[5] As of 2002, only 8 Italian firms ranked among the 500 Fortune listed companies (Onida, 2003), only 4 industrial groups have sales exceeding 20 billion Euros (Fiat, Eni, Enel and Pirelli-Telecom) and only a dozen over 4 billion (Fortis and Carminati, 2004).
[6] Large firms are those employing more than 250 people.

The country has found itself locked into such a structure following the turbulence of the 1970s. In those years, Italy suffered low investment and growth, high rates of inflation and balance of payments difficulties (Lubitz, 1979). This situation was fuelled not only by international events, such as the oil crises of 1974 and 1979, but mostly by internal political and economic shocks. Indeed, in the 1970s the country experienced a quick succession of 13 governments (D'Antonio and Scarlato, 2004) and was stuck in an inefficient system of industrial relationships, which produced wage pressures and rigid labour markets. Furthermore, following the collapse of the Bretton Woods system[7], Italy started (ab)using the policy of currency devaluation as a way to boost exports.

These events influenced heavily the economic evolution of the country, making Italy a peculiar case among advanced economies. Firstly, they encouraged production to shift from large to small firms, as the latter, by law, enjoyed higher employment flexibility. Secondly, economic activity expanded from the traditional industrial triangle of the North West (Lombardia, Piemonte and Liguria) to the regions of the North East and South. This enabled to avoid extra costs of urban congestion and was also favoured by development policies for the Mezzogiorno. At the same time, the devaluation policy impacted heavily on the sectoral specialisation of the country as it allowed small firms to thrive by exporting high-quality goods in traditional industries. These shifts led to the revitalisation of industrial districts[8] where SMEs, enabling production to be fractioned into separate phases, generated a dense network of supplier relations. This in turn, allowed Marshallian externalities to flourish from the combination of flexibility, product specialization and incremental innovation (D'Antonio and Scarlato, 2004; De Cecco, 2007).[9, 10]

This new industrial organisation, however, had deep weaknesses, which have become obvious since the late 1990s when Italy, committing to the Euro, put an end to the devaluation policy and had to face its lack of competitiveness. The downsizing of large

[7] The Bretton Woods treaty, which established a fix exchanged rate for currencies, collapsed in the early 1970s.

[8] A review of the literature on industrial districts is out of the scope of the chapter. The interested reader is referred to Becattini (1979), Becattini and Bianchi (1984) Pyke *et al.* (1990), as well as to Berger and Locker (2000) and Whitford (2001), for an analysis of the challenges faced by districts in recent decades.

[9] See chapter 1 for a description.

[10] This is not to say that industrial districts emerged in the 1970s, indeed, they have much longer historical roots (Belfanti and Maccabelli, 1997).

firms, together with large number of SMEs, prevented large-scale investment in research and development for decades. The diffusion of technology has further been slowed down because SMEs, relying mostly on low skilled employment, do not adopt or adjust to new technology quickly. These events have curbed productivity growth and have effectively exposed Italy to the aggressive competition of emerging industrial countries (D'Antonio and Scarlato, 2004).

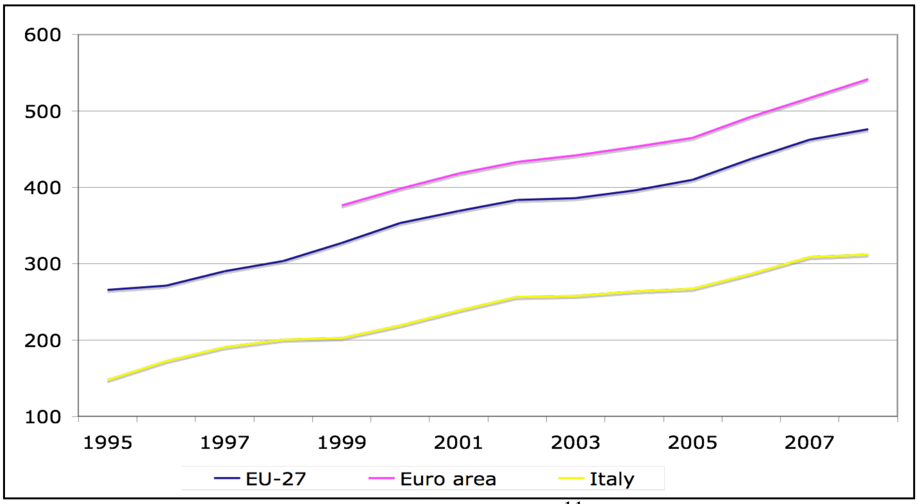
As a result, at the turn of the century, Italy has found itself incapable of facing the pressures of globalization. On the one hand, the competition of low-wage countries and the loss of national monetary policy (upon committing to the Euro) have weakened its advantage on traditional industries. On the other, the competition with developed economies has been undermined by the country's inability to innovate and by the inadequacy of the skill-level of the population. In the next sections we dig further into these aspects, describing in detail the poor innovative performance of the country, its low investment in R&D and in its faulty higher education system. As it will become clear through the chapter, these very aspects are key to understanding graduate spatial mobility.

2.2.2. The Italian innovation gap

Strengthening the innovative capacity represents a strategic priority for the economic development of Italy. Indeed traditional Science, Technology and Innovation (STI) indicators show that the country is lagging behind other European economies.

Figure 2.3 shows that, in the past 15 years, Italy has consistently spent less in R&D than the average for the EU-27 and the Euro area. Moreover, there is no sign of this trend reversing.

Figure 2. 3 R&D Expenditures – Euros per inhabitant



Source – author's elaboration from EUROSTAT ST[11]

The tables below give a bit more detail on the relative position of Italy, showing that it ranks near the bottom of the EU-15 countries in terms of R&D expenditures and patent production. Only Greece, Portugal and Spain rank below Italy.[12]

[11] Eurostat Science and Technology Statistics.
[12] It must be noticed that the practice of patent registration is not deeply embedded in Italian culture, so the data could underestimate Italy's patenting potential (Fortis and Carminati, 2004).

Table 2. 2 R&D expenditures rank

R&D expenditures Euros per inhabitant in 2004	
15. Sweden	1161.6
14. Finland	1006.5
13. Luxembourg	984.0
12. Denmark	907.2
11. Germany	666.0
10. Austria	644.7
9. France	573.0
8. Netherlands	545.9
7. Belgium	519.8
6. United Kingdom	499.8
5. Ireland	456.9
4. Italy	263.5
3. Spain	211.3
2. Portugal	106.0
1. Greece	92.5

Source – EUROSTAT ST

Table 2. 3 Patents rank

High-Tech patents per mln labour force in 2004	
15. Finland	103.6
14. Germany	42.2
13. Netherlands	28.2
12. Belgium	27.5
11. Sweden	27.2
10. Ireland	25.2
9. France	22.8
8. United Kingdom	21.5
7. Austria	19.8
6. Denmark	18.0
5. Luxembourg	16.8
4. Italy	8.4
3. Spain	2.7
2. Greece	2.3
1. Portugal	0.3

Source – EUROSTAT ST

Not only does Italy invest comparatively less in research and technology, but the public sector has an anomalously predominant role in it: public R&D funding accounts for 50.8% of the total versus 34.4% in the EU-15, 27.8% in the US and 18.5% in Japan (Rossi Bernardi, 2005).[13] Furthermore, ICT (Information and Communication Technologies) diffusion is also relatively slow: in 2007 only 15.9% of the population had broadband access, as compared to 18.2% in the EU-27 and 20.8% in the EU-15.

These distinctive characteristics are explained partly by the economic structure and partly by short-sighted innovation policies. The afore-mentioned decline of large corporations, the specialisation in traditional sectors, the scarce attractiveness to foreign MNEs (Multinational Enterprises) and the massive presence of SMEs have reduced private engagement in R&D. At the same time, this trend has been reinforced by the fact that the few companies active in research were, and partially still are, under public

[13] Although the share of public funding is relatively high, it is low as a proportion of GDP, which reaches 0.53% in Italy, as compared to 0.66% in the EU-15 and 0.76% in the US (Rossi Bernardi, 2005).

control, therefore sheltered from external competition and less pressured to invest in R&D (De Cecco, 2007). Furthermore, Italian STI policies have not been capable of giving a strategic direction to private innovation investment. Through fiscal incentives to buy machineries and transport goods, public policies have stimulated mostly process innovation, discouraged more strategic R&D projects and ultimately reinforced the specialisation of the country in traditional industries (Pianta, 2004).

It is important to notice that the last thirty years constitute a sharp break with the first decades following World War II. At that time, strong research and innovation units were in operation in large companies such as Olivetti, Cise-Enel, and the Montedison-Donegani-Milan Polytechnic axis (just to mention a few cases). Moreover the systems was characterised by a high level of cooperation between industry and university, a tradition that dates back to the late 1800s and early 1900s, when enterprises such as Edison, Pirelli and Montecatini were born as scientific and technological ventures (Fortis and Carminati, 2004)[14].

Whilst the current situation is certainly worrisome, it is important to point out that traditional indicators are unable to capture the innovative essence of Italy's productive system. Scholars agree that incremental and informal innovation carried out in SMEs and not captured by indicators of R&D expenditures, is an important part of the innovative activity of small and medium enterprises (e.g. Santarelli and Sterlacchini, 1990; Belussi, 2003). Whilst it is unrealistic to expect that the country will improve its competitive position unless both public and private failures are tackled, the picture is much more complex than any STI statistics can convey and will be analysed in more detail in section 2.3 below.

2.2.3. The gap in human capital and higher education

Poor innovation performance can be traced back to deficiencies of the education and research system as a skilled workforce is necessary to implement the organisational and technical changes brought about by knowledge creation itself.

[14] A well renowned partnership is that between Montecatini and the Milan Polytechnic Institute in the field of polypropylene, which resulted in the Nobel prize for chemistry to Giulio Natta in 1963 (Fortis and Carminati, 2004).

This is indeed the case in Italy, in which a high share of the workforce has little or no formal qualifications beyond compulsory schooling. Indeed, on average, the adult Italian population has received just over 10 years of schooling, the 4th lower figure among OECD countries (OECD, 2006).

As for tertiary education, which is at the core of this thesis, Italy is characterised by a very low graduation rate: in 2002 the proportion of persons aged 25-34 with a tertiary education degree was only 12%, whilst it was 28% in the OECD as a whole (OECD, 2008a). Most interesting, as shown in OECD (2008a), low graduation rates are accompanied by very high enrolment rates (in 2001-2002, 35.8% of young people aged 19 to 25 were enrolled) and very high drop-out rates (only around 40% of students who matriculate actually complete their studies, as compared to 69% in the OECD). Whilst these figures are destined to improve following the introduction of a 3 years bachelor and a 2 years master degrees instead of the old four years *laurea degree* (OECD, 2006), it is still worrying to notice that a large part of this drop-out rate is explained by family background and type of high school attended. Cingano and Cipollone (2004), in fact, explain that people from disadvantaged backgrounds are less likely to enrol and to complete their studies. Indicators of education quality also highlight the relative weakness of Italy, which has lower expenditures per student and a lower teacher to pupil ratio than the OECD average (OECD, 2005). Last but not least, Italy lags behind other advanced countries in terms of science and technology (S&T) graduates and occupations: only 20.3%[15] of the total population is employed in this type of jobs (as compared to 26% in the EU-27), and the proportion of researchers is one of the lowest in the EU-15 (OECD, 2005).

Scholars agree that the causes of the human capital gap are mostly to be found on the demand side, with employers seeking average, rather than high skilled workers. As shown by Balconi *et al.* (2003) and Varaldo (2003), the Italian productive structure is one in which firms competing for talent and carrying out research are an exception. The small size of firms, their sectoral specialisation and their family based managerial structure all compress the demand for human capital, especially in the manufacturing sector (Arrighetti *et al.* 2003). As a result, Italian labour demand is increasingly

[15] Of the EU-15 countries only Portugal and Greece have a lower share.

polarised towards low skilled professions (Autiero *et al.* 2005) with highly qualified individuals experiencing strong "over education" and being employed in jobs that do not require a degree (Di Pietro and Urwin, 2006). This situation has worrying implications as it discourages the demand for higher education, potentially generating a vicious cycle in which the lack of demand reinforces the lack of supply for human capital (Varaldo, 2003).[16]

To sum up, the Italian human capital gap has a double dimension and presents a double challenge for public policy. On the one hand, the supply of human capital needs to be strengthened, improving completion rates of higher education (especially for S&T degrees); on the other, the demand needs to be boosted and employers encouraged to make use of more highly skilled individuals.

2.3. The internal divide in economic, innovation and higher education performance

Whilst the situation is not good for the country as a whole, the sub-national picture is even more dramatic, with an underdeveloped South still failing to catch up with the rest of the country. As Paci and Saba (1998) have remarked, Italian regional disparities are the highest in Europe in terms of per capita income, and among the highest in terms of labour productivity.

Just to give an idea of the current scale of the divide, the table below reports the GDP per capita in PPP terms (Purchasing Power Parity) as a percentage of the EU-27 average in the Italian macro-regions (North West, North East, Centre and South).[17]

[16] Indeed, if the problem was on the supply side, we would have an inflow of human capital from abroad and high returns on investments on education: however the proportion of in-migrants with a higher education degree is 12%, as compared to 22% in Europe and 44% in the US, whilst the return on investment in education is 6.5% in Italy as compared to 9.1% in Germany, 14.3% in France and 18.5% in the UK (Faini and Sapir, 2005).

[17] The North-East includes Valle d'Aosta, Piemonte, Lombardia e Liguria; the North West includes Trentino-Alto Adige, Veneto, Friuli-Venezia Giulia e Emilia-Romagna; the Centre includes Toscana, Umbria, Marche and Lazio; the South or Mezzogiorno includes Campania, Abruzzo, Molise, Puglia, Basilicata, Calabria, Sicilia and Sardegna.

Table 2. 4 Relative GDP in Italian macro-regions

GDP per inhabitant in PPP terms. Percentage of the EU average	2005
EU-27	100.0%
Italy	104.9%
North West	128.2%
North East	125.0%
Centre	117.6%
South	69.4%

Source – EUROSTAT

The Mezzogiorno is the only macro-region to have a per-capita income well below the EU-27 average, accounting for less than 70% of it. Not only does the South lag behind, but it is also growing more slowly: between 2002 and 2007 the Centre-North has grown cumulatively by 6.4%, whilst in the same period the GDP of the South has grown by 2.4%. At the end of the period, the GDP per capita in the South was only 57.5% of that of the Centre-North, mirroring the large differences in productivity across the areas (SVIMEZ, 2008).

Indicators of the labour market also point consistently to poorer performance in the Mezzogiorno: whilst the North (and to some extent the Centre), was experiencing almost full employment in the year 2000, the South, overall, displayed two-digit unemployment figures, with an even higher proportion for the young people (Mauro, 2004). Moreover a recent study shows that an increasing number of unemployed people in the South have given up searching for work and therefore are not counted in the official unemployment figures. Once this segment is taken into account, the Southern unemployment rate of 2007 reaches 28.2%, as compared to 6.9% in the North (SVIMEZ, 2008).

The dualistic nature of the Italian economic has long historic roots (Vaccaro, 1995) and has caught much scholarly attention (e.g. Paci and Pigliaru, 1998; Viesti, 2003; Barca, 2006).[18] Unsurprisingly, several efforts have been made to understand whether Southern regions have engaged in a process of convergence with Northern areas. The literature has established that the very high dispersion of per capita income at the beginning of the fifties reduced up until the mid 1970s, with the strongest decrease occurring between 1960 and 1975. Since then convergence came to a halt and, in the past decades, the degree of regional disparities in Italy has not substantially declined (see, among the others, Mauro and Podrecca 1994; Carmeci and Mauro 2002; Iona *et al.* 2010).

The large differences between Centre-North and South are certainly still a key feature of the current economic picture of Italy, nevertheless it is important to acknowledge recent patterns of growth within the Mezzogiorno itself. Throughout the 1990s differences in terms of socio-economic development within the Southern areas have become more marked and the distance between the most economically dynamic provinces and the less advanced has increased (Guerrieri and Iammarino, 2006 and 2007). For instance Abruzzo, Campania and Puglia registered a strong increase in their exports/value added ratio, while Sicily and Sardinia showed a worrying stagnation. Productivity trends are similarly differentiated, with Abruzzo, Molise, Campania, Basilicata and Calabria experiencing significant gains as opposed to Puglia, Sicily and Sardinia.

Among the reasons underlying the lack of convergence between regions, the strong gap in innovation capacity is certainly a very important factor, as is the variation in regional human capital. Both these aspects are explored below.

2.3.1. The innovation divide in Italy

Traditional STI indicators depict a strongly polarised situation in terms of technological endowments in the country, with the North West and the Centre hosting most formal R&D investment.[19] The North West accounts for over 37% of total R&D expenditures followed by the Centre (27%) and the North East (19%), with the South accounting for just over 17% of the total. Moreover, more than 50% of R&D expenditures are concentrated in the three regions of Lombardia, Lazio and Piemonte (22.1%, 17.7% and 11.9% respectively), whilst most Southern regions (with the exception of Campania and

[18] It is important to mention an influential school of thought, led by Viesti (2003), which stressed the need to avoid looking at the *Mezzogiorno* as a separate entity from Italy, focussing on common national problems.

[19] Unless otherwise specified, data refer to 2003 and are sourced from EUROSTAT.

Sicily) account for less than 2.5% of national R&D spending. These figures are obviously biased as they are influenced by the size of the regions themselves. However, when looking at the percentage of GDP devoted to R&D, a similar picture emerges with the North West and the Centre spending respectively 1.28% and 1.42% of their GDP and the rest of the areas spending less than 1%.

The distinction between public and private R&D gives further insights on the regional divide and on the heterogeneous nature of regional innovation in Italy: over 50% of total public R&D is conducted in Lazio, whilst Lombardia accounts for nearly 31% of the business sector spending of the whole country.

Further details on the structure of innovation activities can be obtained by looking at the Community Innovation Survey (CIS)[20], as done by Evangelista *et al.* (2001, 2002). Analysing the first CIS (1990-1992), they find that Southern and Central areas have a larger propensity towards process innovation, as opposed to a more balanced product/process mix in the North. This is a rather important result as process innovation is generally associated with a search for cost reduction and flexibility, in other words with a defensive or imitative innovation strategy. The source of technology acquisition also shows relevant disparities: in the South, more than 70% of total innovation costs consist of acquisition of technologically new machinery and equipment, whilst R&D activities absorb little more than 10%. On the contrary, in the North West, R&D activities account for 45% of the total expenditures. Firms located in the Centre show an intermediate profile, whilst those in the North East present a high share of resources spent on design and trial production, indicating a more incremental and less formalised type of innovation.[21]

It is clear from the few lines above that when attempting to understand the various Italian regional innovation patterns, a very complex picture emerges. The differences in industrial structure and production model, in the extent and nature of systemic interactions and, ultimately, in the degree to which the spatial dynamics in place can be

[20] The Community Innovation Surveys (CIS) are executed by national statistical offices throughout the European Union and in Norway and Iceland. They are harmonized surveys designed to give information on innovative activity.
[21] Unfortunately subsequent CIS are not conducted with a regionally representative sample therefore later analysis cannot be reported.

defined as regional innovation systems (RIS) need to be taken into account. The literature agrees on the large heterogeneity and strong historical legacy of the Italian regions' innovation potential (i.e. Evangelista *et al.* 2001, 2002; Iammarino, 2005) and has identified four distinctive territorial patterns:[22]

1. **Well developed RISs in the North West** comprising the regions of Piemonte, Lombardia and, to a lesser extent, Liguria (the so called *triangolo industriale*, the engine of the Italian industrial revolution). Despite having very different industrial specialisations (with Piemonte strongly relying on the automotive and related sectors, Lombardia having a mix of science based, mechanical and traditional industries, and Liguria with a less definite sectoral/technological mix), these areas are characterised by strong interactions among different innovative actors with supportive institutions, good scientific and technological infrastructure and effective innovation policies.
2. **A group of *Learning Regions*** comprising the Centre North and the North East characterised by a strong presence of industrial districts (the so called *Third Italy*). In these areas knowledge flows and systemic interactions occur mostly informally, in the shape of inter-firm user–producer and supplier-customer interactions. Despite the modest R&D efforts and infrastructure, these areas have developed strong endogenous competences, facilitated by spatial proximity, economic and cultural homogeneity and the presence of a plurality of supportive actors (specialised business services, technology transfer agencies, chamber of commerce, etc.).[23]
3. **The Conservative Regions of the Centre**, mostly dominated by the presence of Lazio, the capital-region, which captures a large proportion of the national public R&D. In this area systemic interactions are generally weak with the exception of linkages among a number of science-based firms and public or private research institutes. Support from local governments is neither proactive nor particularly effective and the economic structure not particularly orientated towards technological change.
4. **The peripheral regions** of the South. Firms in these areas are, on average, technologically weak. They are specialised mostly on traditional non

[22] The description follows Iammarino (2005).
[23] Within the North East, it is important to mention Emilia Romagna, which has developed one of the strongest RSI in the country, based on a centralized networks of flexibly specialized small firms and a cohesive local political subculture (e.g. Leonardi, 1990; Cooke and Morgan, 1994; Amin, 1999).

technology-intensive industries and pursue imitative strategy. Systemic interactions are scarce with the industrial structure displaying a low degree of production interdependencies and consequently limited scope for either pecuniary or knowledge externalities. The poor R&D investment and the lack of local R&D capacities have been further worsened by inappropriate industrial and innovation policies. Nonetheless, as mentioned earlier, the picture in the Mezzogiorno is far from homogenous (Guerrieri and Iammarino, 2006 and 2007).

2.3.2. Human capital dualism: declining quantitative but not qualitative gaps

Italy has complex patterns of human capital endowments, with strong qualitative, rather than quantitative, differences between the Mezzogiorno and the rest of the country.

Indeed, although Italy has the highest dispersion of educational attainment in the EU (Lodde, 1999), with the Centre-North having higher education levels than the South (e.g. Piras, 2005 and 2006; Di Liberto, 2007), such dispersion has reduced considerably in the past decades. Whilst in 1961, the North had an average of 6.3 years of education versus 5.2 years in the South, by 1991 the two areas had reached to 9.8 and 9.4 years respectively, with the Centre having the highest average educational attainment of approximately 10 years (Di Liberto, 2007).

Interestingly, the current differences are not driven by disparities in the presence of people with tertiary degrees (which, according to Di Liberto, 2007, were higher in the South than in the North already in 1971), but by the lower proportion of Southerners with primary and secondary education. Indeed, in the South over 10.6% of the population holds no qualification[24], whilst the figure is 6.2% in Central Italy, 4.8% in the North East and the 3.5% in the North West.[25] On the other hand the proportion of graduates across macro regions is much more similar: with the exception of the Centre, where around 9% of the population[26] have university degrees, the proportion ranges between 7% and 7.3% (ISTAT, 2005a). These figures, however, hide interesting sub-

[24] Basilicata and Calabria have the highest proportion: 13.8% and 13.2%, respectively.
[25] Data refer to the population of 11 years or older.
[26] The data refers to the population of 20 years or older.

regional features. Across the country, highly educated individuals tend to locate in the biggest urban areas (*grandi comuni)*: in the 13 towns with more than 250,000 residents[27], in fact, the proportion of graduates is 13.5% as compared to 7.6% in Italy as a whole. Remarkably, all the five Southern towns in this group (Napoli, Bari, Palermo, Messina and Catania) have a share of graduates lower than the average, ranging from 13% in Bari to 10.4% in Palermo. Milan has the highest proportion, reaching 16.7%, whilst in Rome the percentage is 15.2%. In other words, whilst graduates are spread equally across regions, they tend to concentrate more in Northern and Central towns than in Southern ones (*ibid.*).

Despite the relatively equal spread of graduates, other indicators still point to a weaker situation for the South. For instance, a key fact for the present doctoral research is that the proportion of people with S&T degrees is below the Italian average in all the Southern regions, and above the average in all the Centre-North, with the exception of Valle d'Aosta and Trentino (ISTAT, 2008b). Furthermore the Mezzogiorno has a lower number of courses per university and per student, a lower level of students' satisfaction and less financial resources devoted to higher education (Ghignoni 2005). Moreover students from Northern universities tend to finish their studies earlier, attending classes more regularly and receiving high marks less easily (D'Antonio and Scarlato, 2007). These facts seem to indicate either a poorer selection from Southern universities or a major focus on *marks* rather than *speed* from Southern students, possibly induced by poor labour market opportunities (*ibid.*).

The disadvantage of the Mezzogiorno is worsened by the low social mobility of the area, which makes school and university performance strongly dependent on the social origins of the pupil (Di Pietro and Urwin 2003; Brunello and Checchi, 2005; Checchi, 2006). The literature has acknowledged in fact that in Southern Italy, a society generally characterised by lack of trust and cooperation (Putnam, 1993), family and personal networks manage economic and labour market transactions, effectively translating income disparities into inequality of opportunities (Checchi and Peragine, 2005). As a result of this social rigidity, graduates from Southern universities struggle more than their co-nationals when entering the labour market: whilst 80% of *laureati* between 25

[27] These are: Torino, Milano, Verona, Venezia, Genova, Bologna, Firenze, Roma, Napoli, Bari, Palermo, Messina and Catania.

and 34 years old in the North are employed, the proportion is just above 50% in the South (SVIMEZ, 2008). Moreover graduates from Southern universities, three years after finishing their studies, have lower earnings than their Northern colleagues (Brunello and Cappellari, 2008).

Whilst Southern students find it harder than their co-nationals to benefit from their investments in higher education, Southern regions struggle in turn to make the most of their highly educated citizens. According to Di Liberto (2007), who studies the impact of education on regional economies between 1961 and 1991, graduates have had a negative impact on Southern growth whilst the reduction of the illiteracy rate has had the strongest positive effect. Piras (1996), for the years 1970-1992, reaches similar conclusions, highlighting that tertiary education had a much weaker impact on growth than secondary education. Baici and Casalone (2005) confirm these findings for the years 1980-2001. These puzzling results are crucial for the present work as they hint at the fact that the Southern model of specialisation does not enable highly skilled people to find adequate opportunities and that the returns to education might be linked to the level of development of the area. As we shall see in the following section, for an increasing number of graduates, migration seems to be the solution to this problem.

2.4. Migration trends: from *mass flows* to *brain drain*

Having provided a socio-economic background for the country, it is now useful to focus on the patterns of internal migration in Italy, which are at the core of the present research.[28] Population flows mirror the structural evolution of economies and societies, and in fact, in the case of Italy, they have undergone dramatic changes over the past four decades.

In the aftermath of WWII Italy witnessed massive movements of labour from the South towards the Centre-North. Such migration flows have been decreasing steadily since the 1970s despite the persisting economic differentials, which, according to traditional theory, should have stimulated further movements (Padoa Schioppa and Attanasio, 1991; Faini et *al.*, 1997). Interregional population movements have started growing

[28] The thesis focuses exclusively on the internal migration of skilled individuals, nonetheless, the international *diaspora* of Italian human capital is also an important phenomenon. The interested reader is referred to Becker *et al.* (2004).

again only since the mid 1990s. However, these new flows present significant qualitative differences from the previous ones: the numbers involved are much smaller and the migrants are mostly young and highly educated. In other words, the South is currently experiencing a proper *brain drain* towards the rest of Italy (e.g. Piras, 1996, 2005, 2006; D'Antonio and Scarlato, 2007). In this section we will go through this evolution exploring its structural causes and its potential consequences.

2.4.1. The rise and fall of mass migratory flows

Italy experienced strong interregional population flows throughout the whole 20th century. It is estimated that after WWI 7.4% of the Italian population was living in a different region than the one they were born in, and that, after the war, flows grew by 60% (Treves, 1976, quoted in Piras and Melis, 2007). Population flows did not stop in the 1930s, when the Fascist regime limited them by law, in order to control the process of urbanisation. Straight after WWII, the proportion of internal migrants was similar to that of the Fascist years, with the 1951 census showing that 8.3% of the population was moving sub-nationally. However, from 1955 to 1975, internal migration reached levels that make the Italian case unique. Throughout these years over 3,700,000 people left the Mezzogiorno to relocate in other areas (Pugliese, 2002). There is no doubt that these population movements are well explained by mainstream economic theory, with unemployed Southern workers seeking better chances in richer areas of the country.

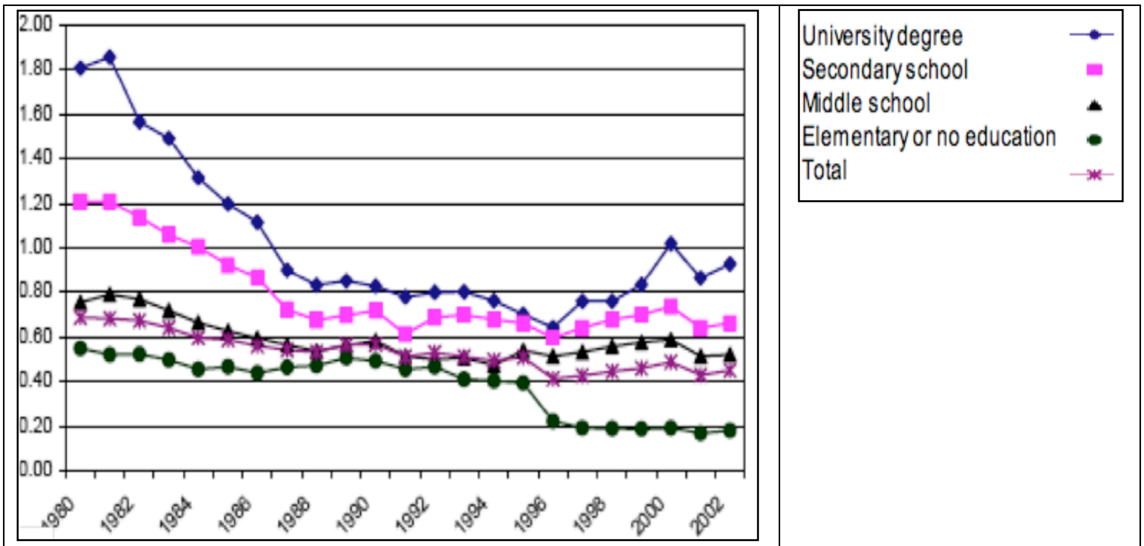
Throughout the years the geography of migration mirrored the development of the country. Whilst from the 1950s to the mid 1960s the flows were mostly directed towards the so called *triangolo industriale*, as well as towards Lazio, from the mid 1960s the regions of the North East and the Centre (the *Third Italy*), which had once experienced net outflows of population, also started attracting migrants from the South. The oil crisis of 1973 represented a turning point for Italy, after which internal migration started decreasing, to rise again only in the mid 1990s. To give a sense of the scale of the phenomenon, suffice here to say that between 1971 and 2002 migration from the South nearly halved going from just over 200,000 to just over 100,000 (Piras and Melis, 2007).

Such a decline occurred in spite of the persistent economic differentials explained in section 2.2, puzzling scholars and policy makers. Part of the explanation is to be found in the decreased attractiveness of the North West, which was only partially offset by the new developments in the regions of the North East. In fact the model of the *industrial district*, which was now becoming stronger, required high flexibility and a specific "regional human capital", not possessed by the migrants, which discouraged relocation (Murat and Paba, 2002). Several other factors concurred to make migration costs higher: the economic slowdown in the early 1980s, which reduced the North-South employment rate differential, the much higher housing and living costs in the North (Cannari *et al.* 1997), the increased disposable income of Southern families due to government transfers (Padoa Schioppa and Attanasio, 1990), all acted as disincentives to migration.

Whilst total migration flows decreased, individuals with secondary and tertiary education increased their mobility, and the South saw its best educated citizens searching for employment elsewhere. Between 1980 and 2002 all Southern regions with the exception of Abruzzo registered a net loss of human capital to the advantage of the Centre-North. These outflows grew even stronger since the mid 1990s when, for the first time in two decades, the total number of migrants started increasing again. To give an idea of the scale of the *brain drain*, the number of individuals with secondary education who moved from the South to the Centre-North went from 16,537 in 1971 to 35,684 in 2001, whilst for university educated individuals it went from 4,828 in 1971 to 12,176 in 2002, with a constant increase since 1996 (Piras and Melis, 2007).

The picture below, sourced from Piras (2005), reports the migration rate by education level between 1980 and 2002. The rates refer to the country as a whole (not exclusively to the Mezzogiorno) and highlight how the most educated have had the highest propensity to move throughout the period and that they have become increasingly mobile since the mid 1990s.

Figure 2. 4 Migration rates by education level



Source: Piras (2005)

Among migration of individuals with higher education qualifications, a particularly interesting case is that of *recent graduates*, a segment of the population especially prone to mobility. D'Antonio and Scarlato (2007) show that the number of recent graduates[29] that have studied in the South and have then moved to the North has grown dramatically through the years, going from 6.9% of total Southern graduates in 1992 to 22.2% in 2001 (in absolute terms, they went from 1732 to 9899). At the same time, the number of those from the South who have studied in the North and stayed there has also grown, going from 7.0% of the total Southern student population, to 11.5% (in absolute terms the numbers have gone from 2,236 to 6,348). Interestingly, the number of those who have moved from the Centre-North to the South has also increased. Whilst among graduates of 1992 less than 1% moved from the Centre-North to the South, and whilst this proportion was stable until the late 1990s, it was over 7% among graduates of 2001 (*ibid.*).[30]

Certainly, the scale of the phenomenon of skilled migration, and its clear geographical pattern, calls for a thorough analysis of its causes and implications: whilst its links with

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[29] D'Antonio and Scarlato (2007) refer to graduates who have achieved their degree three years before being surveyed.

[30] D'Antonio and Scarlato (2007) do not provide more details on this interesting figure. However, as their analysis is based on the same survey as chapters 4 to 7 of this thesis (ISTAT, 2007a), it is possible for us to provide some information. From our dataset (which, as will be clear in chapter 3, does not include all the information available to D'Antonio and Scarlato and relies on a different classification of graduates) we find that the majority of Centre-North to South migrants move from Lazio and Emilia Romagna to Abruzzo, Puglia and Sicilia.

innovation are at the core of this thesis, its socio-economic causes and consequences are briefly explored in section 2.4.2.

2.4.2. The causes of migration and its effects

Exploring the causes and impact of skilled migration is a rather interesting exercise, in fact, as explained in chapter 1, economic, social and cultural aspects are involved.

Among the economic variables, the interregional difference in job opportunities has certainly played a key role, as the unemployment rate of recent graduates has been growing in the South and reducing in the North (D'Antonio, Scarlato, 2007). Secondly, as suggested by Carillo and Marselli (2003), the Italian industrial demography has also favoured high skilled versus low skilled movements. Small firms, the bulk of the Italian system, recruit mostly through informal channels, and this increases the costs of job search for those living far from the firms' region. Individuals with a high level of human capital are still able to search nationally, whereas individuals with a lower level of human capital will search only locally. A third important economic cause is pointed out by Giannetti (2001, 2003), who focuses on the role of *skill complementarities*. The latter, a type of externality arising when the concentration of human capital improves the productivity of high-qualified workers, generates increases in the wages of human capital and therefore induces skilled mobility and skills concentration.

Among the non-economic variables, in line with the creative class literature of Florida (2002a, 2002b), Di Pietro (2005) finds that local characteristics, such as quality of life, are significant variables in determining migration decisions of Italian graduates. This is confirmed by Dalmazzo and De Blasio (2007), who highlight how the most educated Italians place more weight on amenities available in larger cities. However, these aspects might not necessarily apply to Southern graduates, who, when they migrate to the North, experience worse labour conditions than those that stay in the South. Ciriaci (2005) shows that, 3 years after graduation, 60.3% of Southern graduates employed in the North have temporary jobs and 0.9% work without a contract, as compared to 41.7% and 0.3% of those employed in the South. Moreover, as argued by D'Antonio and Scarlato (2007), the decision to migrate might be linked to the low social mobility in the Southern society, in which relocation to another region (albeit on hard conditions) offers an opportunity to improve personal circumstances and break social barriers.

If understanding the origins of human capital mobility is a complex task, evaluating its consequences is even harder and, perhaps for this reason, the phenomenon has not been much studied. Etzo (2008) is, to the best of our knowledge, the only scholar to have tackled this specific issue for the case of Italy. He explores the impact of migration of different skills levels on regional growth from 1982 to 2002. The results for Italy as a whole show clearly a positive effect of net and gross immigration rate of highly skilled individuals on regional growth. When looking at the South and the Centre-North separately, however, the picture becomes more complex and more interesting. Indeed, whilst the emigration of highly educated individuals has a negative impact on growth in the North, it does not seem to affect growth in the Mezzogiorno. These findings hint at the fact that the different sectoral specialisations of the areas require and benefit from different types of skills and confirm how migration and economic dynamics are two sides of the same coin.

2.5. Conclusions: the value of the present research

This chapter has provided an overview of the economic situation in Italy and of its history of internal migration. This step was necessary both to frame the empirical analysis of the following chapters and to highlight its original contributions to the literature on Italian skilled mobility.

In this review, we have shown how the roots of the poor competitive performance of Italy lie in the public and private inability to carry out innovative activities. The large presence of SMEs operating in traditional sectors with low human capital intensity, and the decline of large firms with financial resources to invest in R&D, are among the core structural problems of the country. These are complemented and reinforced by an inefficient education system producing a low proportion of graduates, and by short-sighted innovation policies.

Whilst the overall profile of the country is not flourishing, the situation is even more critical when the sub-national picture is taken into account. Italy is well renowned for displaying a highly dualistic economy. If we isolate the Centre-North from the South, relative numbers for economic performance, education and innovation show considerable improvement in the former and a serious drop in the latter. Southern regions perform poorly in comparison to the rest of the country and to the rest of Europe with respect to most indicators.

We have also pointed out that an *educational/productive mismatch* is emerging: on the one hand, Italy, and especially the South, is not producing graduates that are ready to participate in innovative industries; on the other, employers do not demand university trained individuals. Migration trends reflect this situation with the most qualified increasingly moving from the South to more dynamic areas of the country. Needless to say, such a phenomenon has the potential to hinder regional growth and contribute to widening even further sub-national disparities. Not only are weaker areas of the country not able to absorb and employ the best-educated individuals but, by losing them to other regions, they become increasingly less prepared to do so.

For Italy as a whole, and especially for the Mezzogiorno, the challenge is to strengthen innovative performance. On the one hand, Italy needs to build upon its SMEs, achieving a critical mass for technology dissemination and making the most of their incremental innovation; on the other, corporate R&D needs to be revitalised targeting the few large industrial companies and encouraging the interaction among innovative actors. The role of highly skilled individuals needs to become more prominent, acting both on the supply side - tackling the limits of the university system - and on the demand side, encouraging firms to employ more graduates and easing the transition from higher education to the labour market. Unless appropriate action is taken, the risk is for the country to stagnate in a circle of low innovation and cost-based competition with developing countries.

The current doctoral research, which focuses specifically on the migration of recent graduates, is to be framed against this background. Whilst the theoretical originality of this work has been pointed out in chapter 1, we will here clarify what this research will add to our knowledge of Italy.

This thesis introduces four main novelties. Firstly, graduates are classified in three categories, stayers, migrants and returners, which have never been compared in the

Italian literature.[31] The latter are those who leave the region of study to move back to their home region, migrants are those who leave the region of study to move somewhere else, whilst stayers are those who remain in the region of study.[32] We hypothesise that these groups are driven by different motives and may have different characteristics, therefore need to be studied separately. Secondly, as explained in chapter 1, the phenomenon of graduate mobility is explored in its links with innovation, a task that has never been carried out in the Italian literature. Thirdly, for the first time, we will compare the role of economic performance, regional knowledge, quality of life and social networks in determining graduate flows in Italy. Finally, we will link the literature on spatial mobility to that of job satisfaction and analyse to what extent spatial relocation leads to a higher work-related wellbeing. This is not only theoretically important (as explained in chapter 1), it is empirically crucial in the case of Italy, where the Mezzogiorno is characterised by lack of meritocracy and a really stiff social environment which may affect satisfaction.

Together, these four novelties point to the overarching contribution of this research. By investigating, in a comprehensive way, why skills move and where they go, this thesis sheds light on the role of higher education in innovation and regional development, providing ideas and evidence for policy decisions.

[31] On the other hand, Faggian (2005) compares, for the UK, a (more articulated) typology of graduates, which includes similar categories.
[32] The technical definition of the groups will be given in chapter 3.

Chapter 3

Towards the empirical analysis: research questions, methodology and graduates' distribution

Abstracts

This chapter bridges the introductory and the empirical part of the thesis. In order to prepare the reader for the following chapters, we here cover three aspects. First we review briefly the theoretical and empirical background to the thesis. Secondly we introduce the methodology and the dataset to be used; in particular we define rigorously *migrants*, *stayers* and *returners*. Finally we describe their spatial distribution.

3.1. Introduction

The objective of this thesis is to understand the patterns of interregional migration of recent university graduates in Italy. As described in the previous pages, highly educated individuals are increasingly leaving the poorer and less innovative South to move to the richer and more innovative Centre-North. Since the loss of human capital can impact heavily on the long-term regional ability to compete and grow, it is important to understand the mechanisms behind these migratory flows, else the risk is for economic differentials to be further reinforced.

Given the novelty of this internal *brain drain*, not much is known about its dynamics, causes and implications and new analytical tools are needed to fully capture its nature. Chapter 1, in fact, has suggested that it is critical to look at graduate mobility in terms of the knowledge flows it generates and that, to do so, the economic and sociological models of migration need to be integrated with the literature on human capital, regional innovation, and job satisfaction.

The thesis examines three types of graduates: returners, migrants and stayers. The former are those who leave the region of university to move back to their home regions, the second are those who leave the region of study to move somewhere new, the latter are those who stay in the regions of study. As the three groups are likely to base their mobility decision on different factors it is interesting to compare them.

The analysis will be based on a survey run by the Italian statistical institute (ISTAT): the *Indagine sull'Inserimento Professionale dei Laureati* (Survey on graduates' entry into the labour market). The survey, which covers graduates three years after the end of their studies, is an extremely rich source of information and will allow us to analyse, through different econometric models, the causes and consequences of graduate mobility at the micro, meso and macro levels.

This chapter prepares the reader for the core empirical part of the thesis. In particular: section 3.2 summarises the theoretical approach that will guide the analysis and the empirical background in which the analysis is framed. Section 3.3 defines the questions to be explored in each chapter and the original insights they provide. Section 3.4 introduces the methodology and is divided into three parts: section 3.4.1 describes the dataset used; section 3.4.2 defines rigorously the three mobility categories to be compared; section 3.4.3 introduces the econometric techniques that will be applied. Section 3.5 describes in detail the spatial distribution of graduates and the direction of the flows of migrants and returners. Section 3.6 sums up all the contents of the chapter, identifying the hypotheses tested, the theory behind them and the methodology used.

3.2. Knowledge flows and Italian dualism

As highlighted in chapter 1, this thesis broadens the traditional approach to skilled migration, whereby the highly educated and highly mobile are seen as job seekers moving from poorer to richer areas. Building upon the innovation studies literature, it analyses graduate mobility in terms of the knowledge flows it generates. Specifically, the thesis revolves around one simple idea: as skilled individuals are crucial for innovative development, and as their inflows or outflows alter the local knowledge creation capacities, our understanding of skilled migration and of regional innovation can be enhanced by taking into account both the knowledge embodied by migrants and that embedded in their areas of origin and destination.

Adopting this new perspective sheds light on new important drivers and implications of talent flows, at the micro, meso and macro level. At the micro level it implies that the will to learn and apply one's own knowledge may influence the decision to move.

Furthermore, as remuneration is not the only reward that talent seeks, it also suggests that looking at job satisfaction, rather than objective employment outcomes (such as wage), provides better information on the micro-consequences of mobility. At the meso level, taking knowledge flows into account means understanding how social networks of talent underpin, shape and reinforce human capital flows. At the macro level, on the other hand, it means that economic differentials cannot fully explain human capital migration and that the innovation systems of the regions of origin and destination need to be brought in. This is not only because more innovative regions offer more learning opportunities, but also because different regional systems will be able to integrate different types of skills. This observation, in turn, sheds light on an important consequence of talent migration: if the best workers leave backward areas to move to more innovative regions, the gap between the two may increase as the process may generate a self-reinforcing mechanism of knowledge creation and skilled-concentration on the one hand, and of underdevelopment and skilled emigration on the other.

In chapter 2 we have defined the context in which the thesis is framed. We have pointed out that skilled internal migration is a new phenomenon in Italy. Indeed, whilst in the 1950s and 1960s large numbers of unskilled workers were leaving the South to relocate in the Centre-North, these flows virtually stopped by the 1970s and, since the 1980s, high skilled individuals have become the most mobile segment. Whilst economic disparities are still crucial in explaining these new talent flows, we have pointed out that the striking differences in innovative performance also need to be taken into account.

Furthermore, we have highlighted that a *perverse educational/productive match* is emerging: whilst Italian (and especially Southern) employers do not demand university-trained individuals, the country is not producing graduates that are ready to participate in innovative industries. This may generate a vicious cycle in which investment in education is discouraged where it is most needed, whilst migration becomes more attractive for those (overeducated) graduates who are unable to find adequate employment opportunities. This suggests that understanding skilled mobility can shed light on how university, innovation and regional development policies need to be integrated to create a virtuous cycle of knowledge based growth.

With these insights in mind, in the following chapters, we will analyse how graduates choose their destination after university and what are the implications of their choices. However, we will go beyond the simple distinction between migrants and non-migrants, and will classify graduates in three groups: *stayers*, those who remain in the region of study, *returners*, those who move back to their home region after having studied elsewhere and *migrants*, those who leave the region of university to relocate somewhere else.[1] As the three groups are likely to chose their regions of destination for different reasons it is interesting to explore their differences.

3.3. Research questions

Our empirical analysis of migration is organized in two parts: the first, composed of chapters 4 and 5, covers the causes of the phenomenon at the micro, meso and macro level; the second, in chapters 6 and 7, analyses its consequences at the macro and micro level. Each of these chapters tackles the phenomenon from a different perspective and, in this section, we explain in detail how this is done.

As highlighted in previous pages, studying migration in terms of "knowledge flows" requires understanding if the opportunity to use one's own knowledge impacts on the decision to move and the choice of the region of destination. This is the task undertaken in chapter 4, which proceeds in two steps: firstly, it examines whether the educational background and performance of the graduate influence the decision to migrate, return or stay. Secondly it explores whether more innovative regions, which offer more learning opportunities, attract or retain high skilled individuals, and, in particular, whether they exert the same effect on migrants, returners and stayers. By looking at the links between migration and knowledge, this analysis provides a new way to assess which skills are most needed in a regional innovation system.

Whilst chapter 4 is mostly concerned with the micro-level differences between migrants, returners and stayers, chapter 5 explores the causes of graduates' mobility at the macro and meso levels.

[1] The categories will be rigorously defined in the section 3.4.2 below.

At the macro level it tests the hypothesis that quality of life and regional innovation, as well as economic performance, shape graduates' locational choices. In other words, it compares the different streams of research (introduced in chapter 1) that explain talent mobility in terms of the spatial characteristics of the areas of origin and destination. Implicit in such approaches is the assumption that migration is an individual process, where perfectly informed actors choose what is best for them, based on their preferences. However, as the sociological literature has shown, migration is a collective rather than individual phenomenon, as it relies on social networks, which sustain the process of mobility itself by providing information, support and assistance (Vertovec, 2002). Chapter 5, therefore, will also take this meso level into account and analyse the collective nature of migration.[2] Such macro-meso analysis is very innovative, as only few studies have taken both levels into account (Haug, 2008). Furthermore, it is relevant for policy makers aiming at attracting or retaining graduates, as it allows us to identify both the structural features and social mechanisms that sustain talent mobility.

If, as tested in chapter 4, mobile graduates are attracted to highly innovative regions where they contribute to local learning, it follows that they may be generating a cumulative process. Indeed, as talent concentrates in innovative areas, it feeds into the local knowledge creation processes, making the areas more innovative and, in turn, more attractive to human capital. Chapter 6 tests the existence of such mechanism, it investigates whether it holds for both migrants and returners and if a distinctive pattern emerges for those with a scientific and engineering background, i.e. those who have the key skills for knowledge creation . The chapter has important implications both at the theoretical and policy level. Indeed, the existence of such cumulative cycle challenges one of the main results of mainstream migration theory, namely, that by responding to market imbalances population flows lead to spatial convergence. At the policy level, this means that unless the regional system can retain talent, higher education will struggle to contribute to local development, and implies that a strategic integration between education and innovation policy is imperative if the less developed areas are to benefit from human capital.

[2] A secondary aspect of the chapter is to evaluate the unobservable costs of migration.

Chapter 7 analyses the consequence of mobility on self-reported job satisfaction, bringing together two bodies of research that have rarely been combined. As highlighted in previous parts of the thesis, not much is known about how spatial mobility affects subjective wellbeing at work. The majority of studies, in fact, have explored the links between relocation and objective labour market outcomes, such as wages, promotions, hours of work, etc. (Greenwood, 1975). At the same time, the study of job-related wellbeing has largely focussed on individual and job characteristics and has not taken into account the influence of geography (e.g. Clark and Oswald, 1994, 1996). Chapter 7 will fill this gap and compare migrants, stayers and returners across several domains of job-related wellbeing, which take into account both long-term and short-term career outcomes. Moreover, chapter 7 will pay particular attention to Southern graduates: as they face harder socio-economic conditions it is interesting to see whether relocating to the Centre-North is, other things being equal, effectively rewarding. Based on this discussion, box 3.1 below sums up the hypotheses tested in each chapter.

Box 3. 1 Hypotheses tested

Ch 4

- *Human capital seeks both the opportunity to learn and to apply his/her knowledge.*
- *Migrants, returners and stayers, differ in both respects.*

Ch 5

- *Economic performance is not the only regional feature attracting skilled individuals. Quality of life as well as regional innovation matter.*
- *Graduate mobility has a strong collective nature as it is sustained through social networks.*
- *Migrants, stayers and returners have different preferences.*

Ch 6

- *Graduate mobility and regional innovation mutually reinforce each other: talent concentrates in the most innovative regions and contributes to their innovative performance, which in turn makes them more attractive.*
- *Graduates with a scientific and engineering background have a distinct effect on regional innovation.*
- *Migrants, stayers and returners have different effects on regional knowledge.*

Ch 7

- *Mobility impacts on job satisfaction, as the environment of the region of origin and destination influences expectations and therefore wellbeing.*
- *Migrants, stayers and returners differ in their levels of wellbeing.*

3.4. Dataset and mobility categories

3.4.1. The "Indagine sull'Inserimento Professionale dei Laureati": a survey on graduates' entry into the labour market

The research questions will be explored through econometric techniques, based on the survey *Indagine sull'Inserimento Professionale dei Laureati* (ISTAT, 2007a) conducted by the Italian national statistical office. The survey investigates the entrance of graduates into the labour market three years after they completed their studies. In what follows, we use the 6th edition of the survey, which was carried out in 2004 and refers to 2001 graduates.[3]

The survey, which is characterised by a one-stage stratification by gender, university and degree, was conducted in two steps. In the first, Italian universities gave to ISTAT the full list of 2001 graduates. The sample was drawn from this list according to the size of the university and to the graduates' subject of study and gender.[4] In the second step the sampled individuals were contacted and asked the full questionnaire through CATI (Computer Aided Telephone Interviews) techniques.[5] To account for the number of people in the population and to correct for missing responses, each interviewee is attributed a sampling weight. This provides indicators representative at the level of the nation, the macro-region, the field of study and, most importantly, the region of study and the current region of residence and work.

The primary scope of the survey is to understand the transition from education to work, focussing specifically on the graduates' occupational condition by degree type, gender and area of study and of current residence. The information is organised in five sections.

- **Curriculum studiorum**: this section explores both the school and university history of the graduate in terms of performance, type of studies and various aspects of university life (attendance to classes, need to relocate to join

[3] The sixth edition, released in 2007, was the most recent available edition at the time this doctoral project started.
[4] The universe of the sample is the total graduates of 2001, in all the Italian universities. This accounts for 155,664 individuals (of which 67,913 men and 87,751 women).
[5] The response rate was of 67.6%, nearly 10% higher than in the previous edition (ISTAT, 2007a).

university, etc.).

- **Work**: this section explores the characteristics of the current and previous jobs of the graduate. Among other things it gives information on the profession, position, type of contract, sector and salary of employment, as well as the length of time for which the job has been performed and the level of education needed and formally required to carry it out.
- **Job hunt:** this section (which involves only unemployed people) explores the process of job search (channels, obstacles, job sought, etc.).
- **Family background:** this section explores the socio-cultural background of the graduate providing information on the education level and employment conditions of her/his parents.
- **Personal details:** this section gives the region of residence/work and the region of study of the interviewee, as well as other information on the current living conditions of the individual.

The *Indagine* presents some potential sources of bias that need to be acknowledged. Firstly, the response rate might be higher amongst the more successful graduates; secondly many graduates have moved without leaving contact details and, if this is not a random process, it may affect the representativeness of the survey (Di Pietro, 2005).

The survey collected a wide range of information, only some of which is relevant to this thesis. Therefore, each chapter will describe exclusively the sections relevant to the analysis and will report, in one of the appendices, the survey questions translated in English).[6]

3.4.2. The mobility categories

The analysis in chapters 4 to 7 is based on the aforementioned classification of migrants, returners and stayers (reported in box 3.2), which are identified through the *Indagine*.

[6] The full questionnaire is reported, in Italian, at the end of the thesis.

Box 3. 2 Mobility categories

Stayers – those who reside in the same region where they studied.
Migrants – those who have left their region of study to pursue their career elsewhere.
Returners – those who have left the region of study to go back to their home region after graduating.

Distinguishing among migrants, returners and stayers is not straightforward as the survey provides the region of study[7] and the region of work[8] and current residence[9] of each graduate, but gives no information on her/his home region (i.e. where she/he used to live before moving to study).

Whilst stayers can be classified unambiguously as those whose region of residence/work is the same as the region of study, to distinguish between returners and migrants other information needed to be used.

Specifically, we look at:

a) Whether the graduate had moved to study at university[10]
b) Whether the graduate is now living with the family of origin[11]

Those who both (a) left their home to go to university and (b) are now living with the family of origin are classified as returners, whilst migrants are identified residually. [12] Table 3.1 below summarises these definitions.

[7] Specifically the survey provides the university of graduation, as the sample is drawn on this information.
[8] In the survey this corresponds to question 5.7b, see appendix 3.1.
[9] In the survey this corresponds to question 5.5, see appendix 3.1.
[10] In the survey this corresponds to question 1.18, see appendix 3.1.
[11] In the survey this corresponds to question 5.6, see appendix 3.1
[12] In some cases, for employed graduates, the region of residence and region of work do not coincide. This is either because the graduate has not complied with the bureaucracy to change residence (9.1% of employed graduates), or because the information on the region of work is missing (8.9% of employed graduates). In the former case we use the region of work to classify the graduate by its mobility category, in the latter, we use the region of residence.

Table 3. 1 Definitions of migration behaviours

Stayers	Returners	Migrants
Region of study = Region of residence	Region of study ≠ Region of residence AND Left the home region to go to university AND Now living with the family of origin.	Region of study ≠ Region of residence AND Did not Leave the home region to go to university
		OR
		Region of study ≠ Region of residence AND Left the home region to go to university AND Now NOT living with the family of origin.

This classification is an original contribution of this research. Previous academic papers based on the same dataset have rarely distinguished between different types of migrants (an exception is Ciriaci, 2006 and 2010) and, even in such cases, they have never adopted this tripartite taxonomy.

3.4.2.1. The limitations of the taxonomy and an estimation of its bias

The classification, although a good approximation, has an important limitation: not all returners will be identified, as those who have moved back to the home region and are not living with their family will be classified as migrants. To interpret correctly the analysis of the following chapters, it is important to understand the magnitude and the geographical dimension of this bias.

To this aim, we, first of all, point out that that the risk of misclassifying returners is higher in small regions without long-rooted academic tradition, such as Calabria, Basilicata and Molise in the South, or Valle d'Aosta[13] in the North. In these areas, school leavers are more likely to move to attend university as not all the degrees are provided locally and as it is culturally more common to relocate to study.

Secondly, it is important to notice that the propensity to live in the parental household, for those aged between 24 and 34 year, is largely determined by marital status (Billari

[13] Indeed in Valle d'Aosta there were no universities at the time of our cohort of graduates.

and Ongaro, 1999).[14] Assuming that marital status does not influence mobility decision (as found by Priester and Haug, 1995)[15], migrants, stayers and returners, if correctly identified, should have the same marriage rates. However, in our case, married returners would be classified as migrants, as they would not be living with their parents. It follows that the difference between the marriage rate of migrants and the national average, can give us a lower-bound estimate of the number of misclassified returners. Table 3.2 reports the proportion of married and co-habiting graduates by mobility category. It shows that for migrants the proportion is 10% higher than the national average (39.3% versus 29.3%), indicating that at least 2900 of them could be misclassified returners.

Table 3. 2 Marriage/cohabitation rates by mobility category

Married or cohabiting graduates	Stayers	Migrants	Returners	Total
N	33926	11416	201	45543
%	28.7	39.3	2.4	29.3
Total	118151	29036	8296	155483

Source – author's calculations from ISTAT (2007a).

Finally, to explore whether the bias of our taxonomy affects different areas in different ways, table 3.3 reports the marriage/cohabitation rate by macro-area of destination, for both graduates as a whole and for migrants. It shows that, whilst for graduates the rate is similar across macro-areas, when it comes to migrants it is much higher in the South (48.9% as compared to 39.3% in Italy as a whole). This suggests that the number of misclassified returners moving to the South is higher than we can identify with our data.

Table 3. 3 Marriage/cohabitation rates by macro-area of destination

% Co-habiting or married	North-West	North-East	Centre	South	Italy
Migrants	38.6	41.2	34.4	48.9	39.3
Total graduates	30.1	31.0	29.3	27.4	29.3

Source – author's calculations from ISTAT (2007a).

3.4.3. Econometric analysis

The empirical analysis makes use of both discrete choice models and simultaneous equation models.

[14] As pointed out by Bonifazi *et al.,* 1999, the propensity to live with one's parents it is also dependent on education. However, our sample is homogeneous in this respect.

[15] Priester and Haug,(1995) find that migration is determined by age, education and life stages, and that once this aspects are controlled for, marital status has no influence.

Discrete Choice Models (DCM) encompass a wide array of techniques in which the dependent variable is categorical and represents the choice set (Greene, 2003). In its simplest formulation a DCM includes two choices, normally indicated with values 0 (the decision of *not doing* something) and 1 (the decision of *doing* something). DCMs can also accommodate larger choice sets. In this case, however, it is necessary that the alternatives are *mutually exclusive* (an individual can chose only one alternative) *and exhaustive* (all the relevant possible alternatives are included in the set).

Irrespective of whether the dependent variable is binary or has more than two choices, all the DCMs can be interpreted as Random Utility Models (or RUMs), as demonstrated by McFadden (1974). In a RUM any decision making unit (such as a firm, a consumer or, in our case, a graduate) needs to choose between J alternatives. As in standard microeconomic theory, the individual is supposed to be a rational utility maximiser and therefore chooses the alternative with the highest utility. If we use the subscript *n* for the individual and *i* and *j* for the alternatives, the above statement can be formalised as follows:

$i \succ j \neq i \text{ if } U_{ni} > U_{nj} \; \forall j \neq i.$ **(Eq. 3.1)**

While each individual knows his/her own utility function, the researcher does not, therefore the utility function is decomposed in two parts. A deterministic part (V_{ni}), which represents the "regularities" in the behaviour of different individuals that the researcher can observe, and a stochastic term (ε_{ni}) which includes what the researcher cannot specify, together with possible idiosyncrasies in individual taste. Formally:

$U_{ni} = V_{ni} + \varepsilon_{ni}$ **(Eq. 3.2)**

The deterministic part of the function, V_{ni}, is generally assumed to be linearly dependent on some observable characteristics, which could be either attributes of the decision making unit or of the choice. The assumption on the distribution of the stochastic term is crucial, as it determines the type of model to be used: if ε_{ni} is independently and identically distributed (i.i.d.) as a double exponential (also called type I extreme value or Gumbel distribution), then the models belongs to the logit family. In this case, the density function of ε_{ni} is equal to:

$$f(\varepsilon_{ni}) = e^{-\varepsilon_{ni}} e^{-e^{-\varepsilon_{ni}}} \qquad \textbf{(Eq. 3.3)}$$

The main advantage of making this assumption is that, as will be clear in the following chapters, it is possible to define a closed form solution for the probability that an individual *n* will choose an alternative over another (McFadden, 1974; Domencich and McFadden, 1975).

If ε_{ni} is normally distributed with average 0 and variance 1, i.e. it is N(0,1), then the model belongs to the probit family and the density function is that expressed by eq. 3.4 below.

$$f(\varepsilon_{ni}) = \frac{1}{\sqrt{2\pi}} e^{\frac{-(\varepsilon_{ni})^2}{2}} \qquad \textbf{(Eq. 3.4)}$$

Probit models have the disadvantage of not allowing a closed form solution and therefore are computationally more onerous. [16]

In the remaining part of the thesis we will use several models belonging to both the probit and logit families, namely multinomial logit and probit (Chapter 4 and 5), conditional logit (Chapter 5) and a particular case of ordered logit (Chapter 7).[17] For the sake of clarity, the theoretical models will be described, separately, in the following chapters. Here, it is sufficient to introduce briefly their characteristics and justify why they are appropriate to answer the research questions.

Multinomial logit (ML) and probit (MP) are used when the choice set includes more than 2 alternatives and the choice is based on the characteristics of the decision maker.

[16] The closed form solution of the logit models and the solution of the probit models will be defined in the following chapters, as they vary across models.
[17] Specifically we will use a generalised ordered logit with partial proportional odds.

They will be used in chapter 5, to understand what makes a graduate chose to migrate, return or stay. The conditional logit, a particular case of multinomial logit, can be used when the choice set includes more than two options and the decision is taken on the basis of the characteristics of the alternatives. It will be applied (together with a multinomial probit[18]) in chapter 5, to understand how graduates choose their regions of destinations based on the local economic performance, innovation system, quality of life and presence of social networks. Finally, the family of ordered logit can be used when the alternatives in the choice set are ordinal variables, as for instance, with a Likert scale measuring the degree of satisfaction. In chapter 7 we will use a particular case of ordered logit to assess the level of job-related wellbeing of migrants, returners and stayers.

As well as DCMs, the thesis will make use of Simultaneous Equation Models (SEM), which were first developed by Haavelmo (1943). SEMs include a set of techniques that can capture social and economic phenomena, in which the dependent variables are endogenously or jointly determined. As the regional ability to innovate depends, among other things, on the inflows of human capital, and the inflows of human capital depend, among other things, on the innovative performance of a region, SEMs are an appropriate technique for the research carried out in chapter 6, where the cumulative process of graduate migration and innovation is tested.[19]

[18] The multinomial probit model can also be used when the choice is based on the characteristics of the alternatives, though some re-organisation of the data is required. This will be clarified in chapter 5.

[19] In particular we will apply Three Stage Least Squares (3SLS), first developed by by Zellner and Theil (1962).

3.5. The direction of graduate flows

This thesis, by comparing migrants and returners to stayers, addresses an important gap in the Italian literature. Indeed, scholars have very rarely considered different types of *movers*. To prepare the reader for the following chapters, this section describes the spatial distribution of the three different types of graduates and highlights how migrants and returners follow very different directions. Table 3.4 provides information on how many graduates, migrants and returners of the 2001 cohort, attended university in each macro-area[20] whilst figure 3.1 gives their distribution across Italy.[21]

Table 3. 4 Italian graduates of 2001 by macro-area of study and mobility category

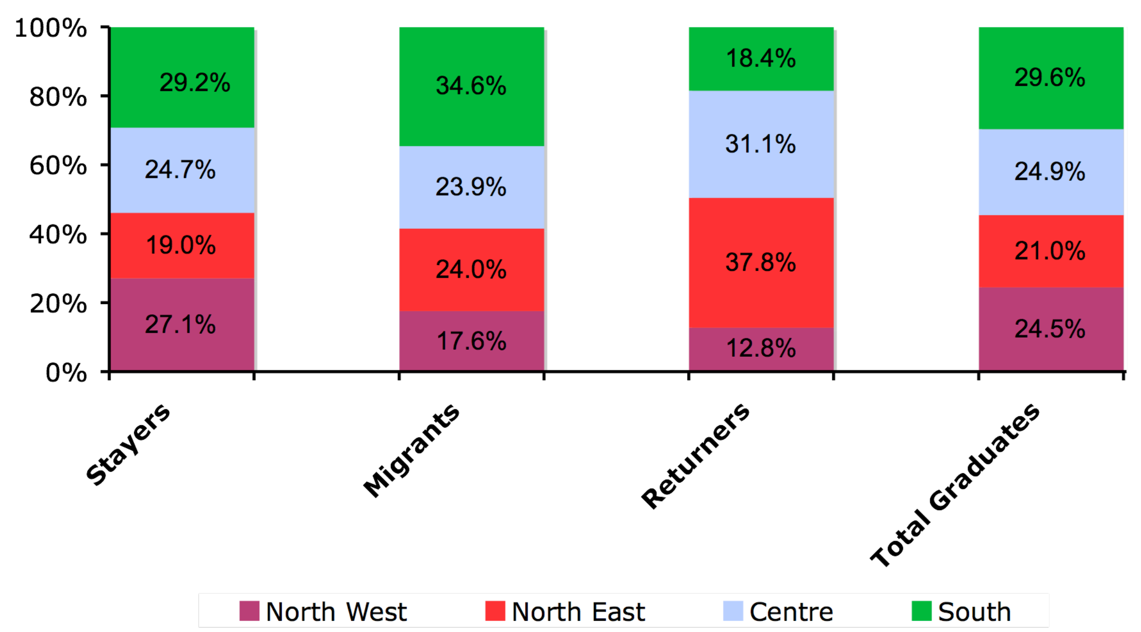
		North West	North East	Centre	South	Italy
Stayers	No.	31,971	22,496	29,230	34,453	118,150
	%	83.8%	69.0%	75.4%	74.9%	76.0%
Migrants	No.	5,107	6,957	6,937	10,035	29,036
	%	13.4%	21.3%	17.9%	21.8%	18.7%
Returners	No.	1,058	3,134	2,576	1,528	8,296
	%	2.8%	9.6%	6.6%	3.3%	5.3%
Total graduates by macro-area of study	No.	38,136	32,587	38,743	46,016	155,482
	%	100%	100%	100%	100%	100%

Source – author's calculations from ISTAT (2007a).

[20] The macro-areas include the following regions: North-West: Lombardia, Piemonte, Vall d'Aosta, Liguria; North-East: Veneto, Trentino Alto Adige, Friuli Venezia Giulia, Emilia Romagna; Centre: Toscana, Umbria, Marche, Lazio; South: Abruzzo, Molise, Campania, Basilicata, Puglia, Calabria, Sicilia and Sardegna.

[21] In figures 3.1 and 3.2 and in tables 3.2 and 3.3, the count of migrants and returners includes also those who moved within each macro-area.

Figure 3. 1 Distribution of graduates by area of study



Source – author's elaborations from ISTAT (2007a).

Table 3.4 shows that migrants and returners, account respectively for 18.7% and 5.3% of the total Italian graduates. Furthermore it highlights that the South produces the largest amount of graduates and migrants in both absolute and relative terms. Of the 155,482 Italian graduates, over 46,000 (29.6% of the total, as shown in figure 3.1) were trained in the South and, of these over 10,000 have migrated. Around 21.8% of those who studied in Southern universities have migrated, a proportion much higher than in the North West, where only 13.4% of graduates leave the region of study, or in the Centre, where migrants are 17.9% of the total. In the North East the proportion of migrants is closer to that the South (21.3%), because, as will be clear from table 3.4, this area loses many graduates to the neighbouring Centre-North. Figure 3.1 gives the distribution of migrants across macro-areas of study: the universities in the South generate 34.6% of the total, whilst those in the Centre, the North-East and the North-West train respectively 24%, 23.9% and 17.6% of Italian migrants.

The largest number of returners is generated in the universities of the North East (3,134 in total, accounting for 9.6% of the local graduate population), where Emilia Romagna, the region with the most attractive universities, is located.[22] The North West is the area generating the lowest number of returners, followed by the South. The universities of these areas lose respectively 1,058 and 1,528 returners, accounting in turn for 2.8% and 3.3% of the local graduate population. However, a fundamental difference exists in these two cases: whilst the North West has a low number of returners because it is likely to retain those who come to study from other regions, Southern universities do not generate returners because they attract a very limited numbers of students from other parts of the country. Figure 3.1 provides the national share of returners by macro-area of study: 37.8% have studied in the North East, 31.1% in the Centre, 18.4% in the South and only 12.8% in the North West.

Table 3.5 and figure 3.2 provide information similar to table 3.4 and figure 3.1, focussing on the macro-regions of destination. Table 3.5 shows how many migrants and returners (graduated in 2001) had moved to each macro-area by 2004, whilst figure 3.2 pictures their distribution.

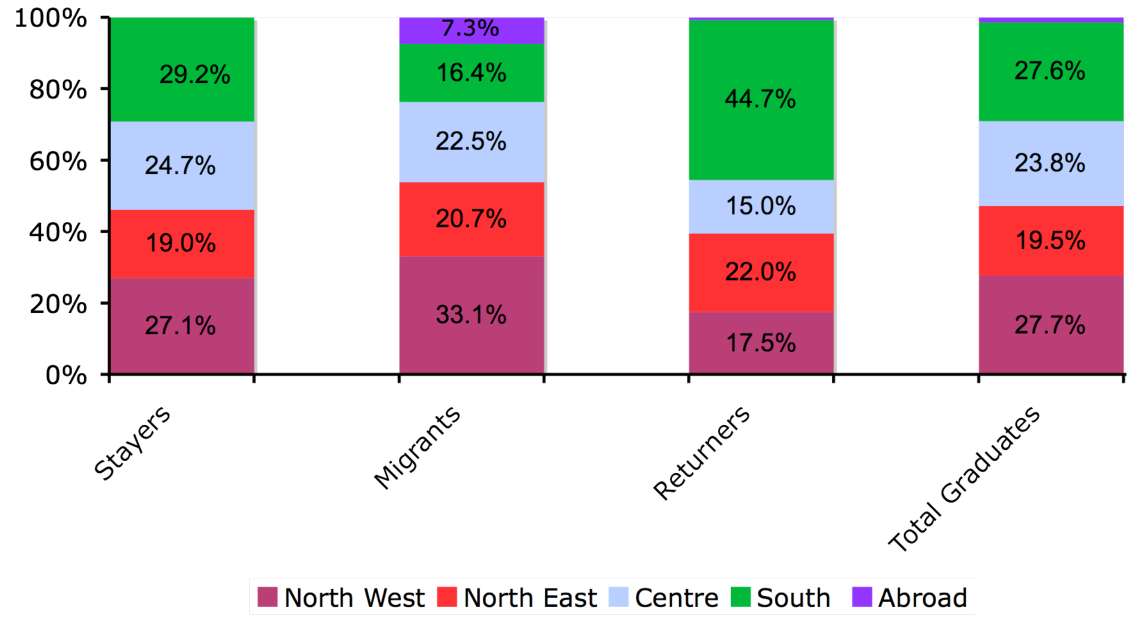
Table 3. 5 Italian migrants and returners by macro-area of destination in 2004

		North West	North East	Centre	South
Migrants	No.	9,617	6,012	6,525	4,751
	%	22.3%	19.8%	17.6%	11.1%
Returners	No.	1,454	1,825	1,245	3,711
	%	3.4%	6.0%	3.4%	8.6%
Total graduates by macro-area of destination	No.	43,042	30,333	37,000	42,915
	%	100%	100%	100%	100%

Source – author's calculations from ISTAT (2007a).

[22] In 2001, which is the year in which the surveyed individuals graduated, 39% of students in Emilia Romagna came from outside the region (ISTAT, 2008).

Figure 3. 2 Distribution of graduates by area of destination[23]



Source – author's elaborations from ISTAT (2007a).

Figure 3.2 highlights that the North West attracts the largest proportion of migrants (33.1%), followed by the Centre (22.5%). However, it must be highlighted that migrants are not distributed equally within these macro-areas: in the North West, Lombardia alone attracts over 23% of migrants, whilst Lazio, in the Centre, attracts 14% of total migrants. The South is the least attractive area for migrants, receiving 16.4% of the total. Moreover, as table 3.5 reports, the proportion of incoming migrants in the local graduate population is much smaller in the South (11.1%) than in the Centre (17.6%), the North East (19.8%) and the North West (22.3%).

On the other hand, the South is the most common destination for returners: Figure 3.2 shows that 44.7% of Italian returners move back to the Mezzogiorno, as compared to 22% in the North East, 17.5% in the North West and 15% in the Centre. In relative terms, the Mezzogiorno is also the area with most returners: they account for 8.6% of local resident graduates, as compare to 6% in the North East and 3.4% in both the North West and the Centre (see table 3.5).

[23] The figure also shows that 7.3% of migrants (1.4% of total graduates) have moved abroad. Whilst this is not the object of the present analysis, it is a topic that future research should investigate.

Table 3.6 provides the proportion (of the national total) of migrants and returners that move between and within each macro-area.

Table 3. 6 Mobility matrices: percentage of migrants and returners on the Italian total

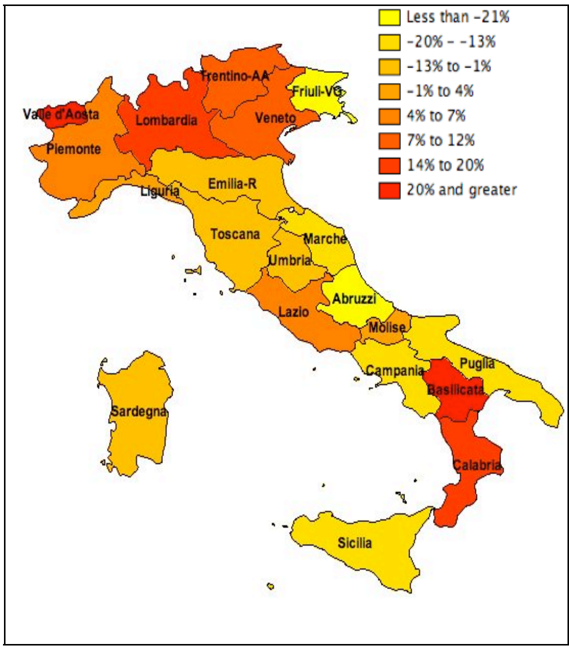
MIGRANTS						
	DESTINATION					
	North-West	North-East	Centre	South	Abroad	Total
ORIGIN						
North-West	7.7%	3.8%	2.7%	0.9%	2.4%	17.6%
North-East	8.9%	8.4%	3.0%	2.0%	1.6%	24.0%
Centre	5.6%	4.4%	6.3%	5.9%	1.7%	23.9%
South	10.9%	4.0%	10.5%	7.5%	1.6%	34.6%
Total	33.1%	20.7%	22.5%	16.4%	7.3%	100%
RETURNERS						
	DESTINATION					
	North-West	North-East	Centre	South	Abroad	Total
ORIGIN						
North-West	6.0%	2.5%	1.5%	2.6%	0.2%	12.7%
North-East	8.7%	17.8%	4.2%	6.8%	0.4%	37.8%
Centre	2.2%	1.4%	6.4%	20.9%	0.2%	31.1%
South	0.6%	0.3%	2.9%	14.5%	0.0%	18.4%
Total	17.5%	22.0%	15.0%	44.7%	0.7%	100%

Source – author's calculations from ISTAT (2007a).

It shows that over a quarter of total migrants move from the South to the Centre-North: in particular 10.9% move to the North West, 4.0% to the North East and 10.5% to the Centre. Remarkably, only 0.9% and 2% move from the North West and North East to the South, whilst those moving from the Centre to the Mezzogiorno are 5.9% of the total. At the same time, those leaving the North East for the North West account for 8.9% of total migrants, whilst only 3.8% of migrants follow the opposite direction. As for returners, 17.8% of the total move within the North East, 20.9% have studied in the Centre and have gone back to the Mezzogiorno, 14.5% move within the South and only 2.6% have studied in the North West and moved back to the South.

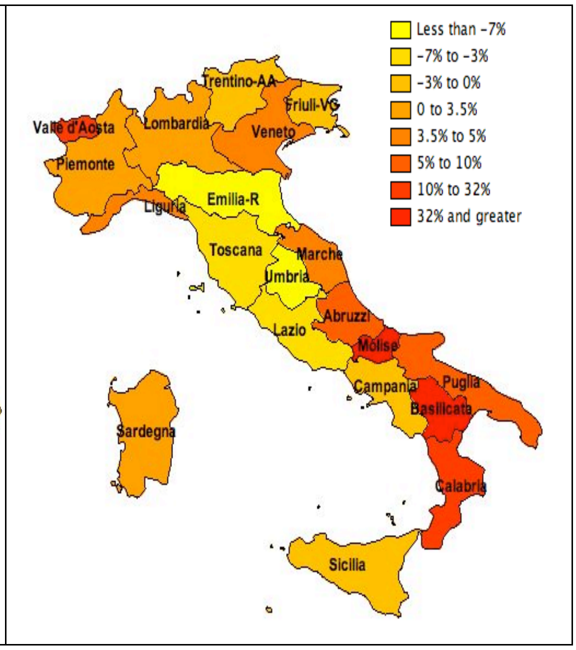
To give a full picture of graduate movements the maps below provide the net migration and net return rates, as well as the proportion of stayers across Italian regions. The regions are color-coded from yellow (losing migrants) to red (gaining migrants).

Map 3. 1 Net migration rates in Italian regions



Source – author's elaboration from ISTAT (2007a)

Map 3. 2 Net return rates in Italian regions



Source – author's elaboration from ISTAT (2007a).

From map 3.1 it clearly emerges that the biggest regions in the South (Campania, Puglia and Sicilia) are those with highest net loss of migrants, whilst Lazio and the biggest regions of the North (Lombardia, Piemonte and Veneto) have among the highest net immigration rates for migrants.[24] Emilia Romagna, Toscana and Umbria, in the Centre-North, have negative migration rates. This is because, as mentioned in previously, they have attractive universities, thereby produce a large number of graduates, migrants and returners. Marche, in the Centre, also loses a relatively large proportion of migrants.

An interesting finding regards Basilicata and Molise, the two smallest regions of the South,[25] as well as Calabria[26], which have positive immigration rates. These large immigration rates may, as noted above, result from a misclassification of returners as

[24] Valle d'Aosta, in the North West, has the highest immigration rate because until 2001, it did not have any regional university, therefore did non generate any emigrants.
[25] The two regions, together, produce less than 0.56% of 2001 graduates and in 2004 they host less than 1.5% of the Italian 2001 cohort.
[26] Calabria produces around 1.6% of 2001 graduates and, in 2004, hosts around 2.5% of them.

migrants: in fact the three regions have relatively small and relatively new universities and traditionally students leave these areas to attend tertiary education elsewhere. Secondly, given that the universities in the two regions offer a limited amount of courses, the large rate of immigrants may also reflect the fact that the local market lacks certain skills, which have to be sourced from other regions. To support this point, we notice that in 2001 none of the graduates from Molise had studied engineering, medicine or humanities; none of those from Basilicata had graduated in medicine, architecture, economics or law; none from Calabria had a degree in pedagogical and psychological disciplines. [27]

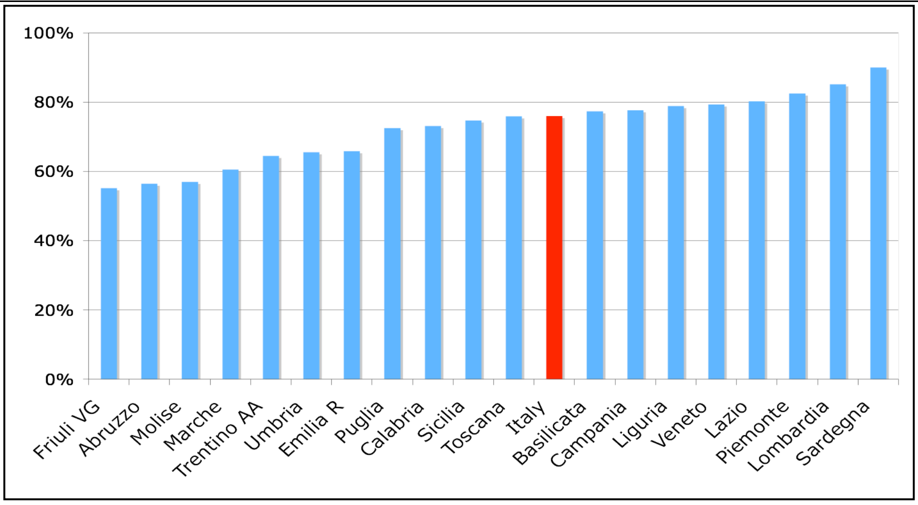
Map 3.2 shows that all the regions of the South, with the exception of Campania, are net recipient of returners.[28] Emilia Romagna, Toscana and Umbria, have the highest negative return rate precisely because they have good universities, which attract many students that leave upon graduation. Lazio and Lombardia also have a negative return rate, though smaller in magnitude. Marche, in the Centre gains more returners than it loses, displaying a pattern more similar to the regions of the South than to those of the Centre.

Finally, Figure 3.3 below reports the regional rates of graduate retention, i.e. the proportion of stayers among graduates from local universities.

[27] Furthermore, we notice that the inflows of graduates to these three regions come for the vast majority from the South.

[28] Calabria, Basilicata and Molise have a very high net intake of returners (19%, 34% and 31% respectively), which supports, as indicated above, the idea that the high migration rates to these regions are partly driven by mis-classified returners.

Figure 3. 3 Regional retention rates



Source – author's elaborations from ISTAT (2007a).

Interestingly, the region with the highest retention of graduates is Sardegna, where the rate is just over 90%. All the regions of the North West (excluding Valle d'Aosta, which at the time had no universities, therefore no stayers), have a higher than average retention rate, as do Lazio, in the Centre, Veneto in the North East and Campania and Basilicata in the South.

From these descriptive statistics (notwithstanding the noted exceptions) it is possible to classify, three macro-regional patterns of graduate mobility:

- The regions of the North, together with Lazio, are overall net recipients of migrants and are either gaining or losing moderate amounts of returners.
- Toscana and Umbria in the Centre, together with Emilia Romagna in the North West, are mostly producers of human capital. Both migrants and returners leave these regions
- The non-innovative regions of the South, together with Marche in the Centre, are overall losing migrants and gaining large proportions of returners.

These trends confirm that migrants and returners have distinct spatial patterns, and suggest that comparing their behaviour is indeed relevant.

3.6. Conclusions

The aim of this thesis is to give a comprehensive view of graduate mobility, highlighting its implications for regional innovation. Theoretically, the analysis will draw upon the study of human capital, migration, regional innovation and job satisfaction. Together, these different streams of literature contribute to understanding both the causes and consequences of the phenomenon. This is especially important in the case of Italy, where graduate flows follow a peculiar pattern. Indeed, whilst migrants tend to leave the Mezzogiorno, returners (which are a much smaller group) tend to move back to the South. As human capital is a crucial resource for regional development, it is important to understand its migratory movements, identifying the conditions that can foster a virtuous cycle of knowledge based growth.

To this aim, the empirical block of the thesis is organised in two parts. The first, which includes chapters 4 and 5, covers the causes of graduate migration, tackling them at the micro, meso and macro level. Whilst chapter 4 deepens our understanding of the role of individual and regional knowledge in driving population flows, chapter 5 sheds light on the spatial preferences of graduates and on the collective dimension of their movements. These contributions widen the traditional view of migration as driven purely by economic factors. The second part, including chapters 6 and 7, covers the macro and micro consequences of the phenomenon. Specifically chapter 6 tests whether the patterns of graduate mobility generate a virtuous circle of human capital concentration and innovation in the most developed areas of the country, and one of skilled emigration and stagnation in the least developed ones. In so doing, it challenges the neoclassical assumption that population flows tend to facilitate convergence across regions. Chapter 7 looks at the job-related wellbeing of migrants, returners and stayers, paying particular attention to those from the South. By taking into account self-reported satisfaction, it gives new insights on the implications of mobility. The distinctive characteristics of each chapter are summarised in table 3.7 below, which reports the hypotheses tested (already noted above) and links them with the theoretical contributions and the methodology in each of them.

Table 3. 7 Summary of research strategy

Ch	Hypotheses tested	Theoretical Contribution	Methodology
	The causes of graduate mobility		
4	Human capital seeks both the opportunity to learn and to apply his/her knowledge. Migrants, returners and stayers, differ in both respects.	The chapter extends the traditional economic approach to mobility to include the role of personal and spatial knowledge.	Multinomial logit and probit are used to compare migrants, returners and stayers
5	Economic performance, quality of life and regional innovation matter shape the locational preferences of graduates. Graduate mobility has a strong collective nature as it is sustained through social networks. Migrants, stayers and returners have different preferences	The chapter integrates sociological and economic perspectives on migration, giving a more realistic view of the phenomenon.	Conditional Logit and Multinomial Probit are used to evaluate how different regional characteristics impact on the choice of a destination.
	The consequences of graduate mobility		
6	Graduate mobility and regional innovation mutually reinforce each other: talent concentrates in the most innovative regions and contribute to their innovative performance, which in turn makes them more attractive. Graduates with a scientific and engineering background have a distinct effect on regional innovation. Migrants, stayers and returners have different effects on regional knowledge.	When it comes to highly skilled individuals, population flows, rather than reducing spatial inequalities increase them.	Simultaneous Equation Models are used to analyse the mutual relationship between graduate mobility and regional innovation.
7	Mobility impacts on job satisfaction, as the environment of the region of origin and destination influences expectations and therefore wellbeing. Migrants, stayers and returners differ in their levels of wellbeing.	Job satisfaction does not depend on the individual and job characteristics only, but also on geography.	Generalised ordered logit with partial-proportional odds are used to evaluate the level of satisfaction of graduates.

To sum up, the empirical analysis of the thesis will provide a comprehensive and original analysis of graduate mobility in Italy, based on a novel conceptual approach and on a new distinction between migrants, stayers and returners. The latter will add a new layer of complexity to the discussion, showing how different mobility choices generate different knowledge flows. Furthermore, by providing new insights on the links between innovation, regional development and skills, this analysis will shed new light on the long standing debate on Italian regional disparities.

Appendix 3.1 – Survey questions

This appendix reports the translation of the survey questions through which the mobility categories are defined.

Q 1.18
To attend university did you move to the city where the university was located?
- No
- Yes
- Does not answer

Q 5.5
In what city do you reside?

The information on the city is not released by ISTAT, which instead provides the region of residence.

Q 5.6
Who do you normally live with? You can give more than one answer.
- alone
- with my family of origin (parents and or siblings)
- with friends
- with spouse or partners
- with children
- with other relatives
- other
- does not answer.

Q 5.7b
In which city do you work?

The information on the city is not released by ISTAT, which instead provides the region of work.

Chapter 4

Moving to learn? Graduate mobility and innovation in Italian regions

Abstract

This chapter compares the geographical location, behaviour and characteristics of three types of graduates: *returners*, who go from the region of study back to the home region, *migrants*, who move from the area of study to a region that is not the home-region and *stayers,* who remain in the region of study. In particular it explores whether migrants, returners and stayers chose to live in an innovative region, in order to use their knowledge and benefit from local learning processes.

4.1. Introduction

Since the early 1990s, Italian graduates have been increasingly relocating from the poorer and less innovative *Mezzogiorno* to the richer and more innovative Centre-North. As human capital is a crucial input to both innovative activity and economic growth, this phenomenon has the potential to exacerbate the already marked regional imbalances that characterise the country. Recent literature has therefore paid attention to this trend, exploring its social and economic origins (Carillo and Marselli, 2003; Di Pietro, 2005; D'Antonio and Scarlato, 2007; Mocetti and Porello, 2010). However, these contributions suffer from two limitations: first, scholars have not distinguished among different mobility patterns and have mostly compared migrants to non-migrants; secondly they have not looked at graduate migration in terms of the knowledge flows it generates.

Chapter 4 tackles both limitations, in light of the theoretical discussion of chapter 1. As for the former, we distinguish between stayers (who remain in the region of study) and two types of mobile graduates: returners (who move from the region of study back to their home region) and migrants (who move from the region of study to another region). As for the latter, we explore whether and how graduates' mobility decisions are related to the educational background possessed, and to the type of use that can be made of it in different regions.

The chapter is based on the ISTAT (2007a) survey *Indagine sull'Inserimento Professionale dei Laureati* and is organized as follows: section 4.2 summarises the historical trends in interregional migration and the geographical distribution of the three groups of graduates; section 4.3 introduces the theoretical framework; section 4.4 reports the research questions; section 4.5 and 4.6 cover the methodology and describe respectively the econometric techniques used and the actual implementation of the analysis; section 4.7 provides some descriptive statistics, section 4.8 presents the econometric results. Section 4.9 concludes with some policy implications.

4.2. Interregional migration of skills in Italy

In the past four decades, Italy has experienced dramatic changes in the dimension and composition (though not so much in the geographical direction) of its internal population flows. Whilst in the aftermath of WWII Italy witnessed massive movements of labour from the South towards the Centre-North, such flows have been decreasing steadily since the 1970s despite the persisting economic differentials which, according to traditional theory, should have stimulated further movements (Padoa Schioppa and Attanasio, 1991). Interregional movements have started growing again only since the mid 1990s, and, albeit following largely the same direction, show two important differences: the numbers involved are much smaller and the migrants are mostly young and highly educated. In other words, the South is currently experiencing a *brain drain* towards the rest of the country (Piras, 2005 and 2006; D'Antonio and Scarlato, 2007).

Between 1980 and 2002 all Southern regions (with the exception of Abruzzo) registered a net loss of human capital, which grew even stronger since the mid 1990s when, for the first time in two decades, the total number of migrants started increasing again. To give an idea of the scale of the *brain drain*, the loss of University tertiary educated individuals in the South has gone from 4,828 in 1971 to 12,176 in 2002, with a constant increase since 1996 (Piras and Melis, 2007).[1] Focusing specifically on recent graduates, D'Antonio and Scarlato (2007) show that the percentage of those who have studied in

[1] Their analysis is based on the ISTAT time series on interregional migration by education level which, unfortunately, have not been updated after 2002.

the South and have then moved to the North has gone from 5.4% in 1992 to 18% in 2001. At the same time, the number of those from the South who have studied in the North and stayed there has also grown, from 7.0% to 11.5%. The situation is further aggravated by the fact that Southern universities do not attract students from other parts of Italy (CNVSU, 2008).

Several aspects have been explored to better grasp this intense skilled mobility. Among the economic variables, the interregional difference in job opportunities has certainly played a key role, as the unemployment rate for graduates has been growing in the South and reducing in North (D'Antonio and Scarlato, 2007). Secondly, as suggested by Carillo and Marselli (2003), the Italian industrial structure has also favoured high skilled over low skilled movements. Small firms, the bulk of the Italian production system, recruit mostly through informal channels therefore increasing the costs of job search for those living far from the firms' location. Individuals with a high level of human capital are still able to search nationally, whereas those with a low level of human capital will search only locally. Among the non-economic variables, in line with the creative class literature of Florida (2002a, 2002b), Di Pietro (2005) and Dalmazzo and De Blasio (2007) find that local characteristics, such as quality of life or other urban amenities attract highly skilled individuals. However, it is important to notice that this may not apply to Southern graduates: as argued by D'Antonio and Scarlato (2007), the decision to migrate might be linked to the low social mobility in the Southern society (Putnam, 2003), in which relocation to another region, offers an opportunity to improve personal circumstances and break social barriers.

Whilst this literature has contributed significantly to understanding the phenomenon, it suffers from the limitations of treating mobile graduates as a homogeneous group. Once this assumption is challenged, for instance, through our distinction between *migrants* and *returners*, the picture becomes more complex. Indeed, as shown chapter 3, migrants and returners have very different spatial distributions and Italian regions vary in their ability to attract or lose either group. In particular, we have shown that the regions of the North, together with Lazio, are overall net recipients of migrants, whilst the regions of the Centre (together with Emilia Romagna in the North East), which host attractive universities, lose both types of movers. Finally the non-innovative regions of the South (together with Marche, in the Centre) are overall losing migrants and gaining large proportions of returners. Given these patterns, it seems crucial to widen the analysis of human capital mobility by taking into account different mobility behaviours.

4.3. Skills, migration and regional innovation systems

Whilst the bulk of the literature on skilled migration has focussed on economic explanations of the process, where the highly educated (and highly mobile) are seen basically as job-seekers moving from poorer to richer areas, this chapter broadens this perspective and analyses graduate mobility in terms of the knowledge flows it generates. Graduates are not only seen as high-skilled job hunters but also, and mostly, as carriers of knowledge.

In order to look at migration through these new lenses, this section summarises and links together the literature on the intrinsic higher mobility of human capital, on the role of technology-skill complementarity and on regional innovation systems.[2] At the intersection of these three branches of literature lies a largely unexplored area of research that this chapter contributes to.

It is generally expected that economic migrants[3] undergo a process of self-selection, whereby more educated individuals are more likely to relocate (see Molho, 1986, 1987; Ritsila and Ovaskainen, 2001). This favourable selectivity is related to the higher capacity of high-skilled migrants to reap the benefits of the labour market in the area of destination and is explained by different theoretical perspectives, including neoclassical economics (Sjaastad, 1962), the information costs and job search framework (Hall *et al.*, 1979; Molho, 1986) and the literature on skill complementarities (Giannetti, 2001 and 2003). A more recent approach focuses on the role of *education–occupation matching*: Quinn and Rubb (2005) show theoretically and empirically that individuals whose jobs require a level of education lower than the one they possess, face a strong incentive to migrate as they are generally less satisfied (Allen and Van der Velden, 2001) and are confident that they have high possibilities of promotion.[4] All these

[2] See chapter 1 for a more extensive review of the relevant literature.
[3] Economic migrants are those who migrate to improve their economic conditions as a primary reason, as opposed to refugees or asylum seekers.
[4] Their theory is based on the concept of *overeducation* introduced by Rosen (1973), who posits that overeducated workers (those who accept jobs requiring less education than that they actually possess) tend to earn wages that are higher than non overeducated co-workers, but lower than workers in jobs matching their education.

different contributions, which are supported by a large empirical body of research (e.g. Molho, 1987; Owen and Green, 1992; Ritsila and Ovaskainen, 2001), confirm that the likelihood of migration increases with education.

If, as posed by Quinn and Rubb (2005), a match between skills possessed and job requirements is the best outcome for an individual, some scholars have contended that a match between the technological development of a region and the quality of its human capital is necessary for the latter to generate growth. This proposition derives as a corollary of Nelson and Phelps (1965), who stress that jobs are heterogeneous and that education is especially important in those jobs that require continuous adaptation to change, where it is necessary to understand new technological developments. In such jobs, the more educated workers will introduce new techniques of production faster and will speed up the process of technological adoption and diffusion. As a consequence, different human capital structures will suit countries and regions at different stages of technological development; furthermore, the rate of return to education will be greater the more technologically advanced is the economy. More recently the work by Vandenbussche *et al.*, (2006) reaches similar conclusions. They contend that both the national (regional) composition of human capital and the country's (region's) distance to the technological frontier need to be taken into account to understand the impact of human capital on local innovation and growth. In particular, whilst the growth-enhancing impact of skilled labour increases with a country's (region's) proximity to the frontier, that of unskilled labour decreases with such proximity.

The relationship between the skills of the work force and the level of regional technological development can be fruitfully framed within the concept of regional innovation system (RIS). This literature, of evolutionary legacy, stresses three main aspects: (i) that innovation is an interactive process among public and private actors and institutions, (ii) that the regional system is defined in a localised context involving rules, standards, values and material resources, and (iii) that all the economic and knowledge processes created inside and outside the firms are "embedded" in such system (Cooke, 1992; Cooke *et al.*, 1998; Asheim and Isaksen, 2002; Iammarino, 2005). Through the RIS framework one can understand the interdependencies (or lack thereof) of spatial innovation processes, as well as the mechanisms that allow all the elements in the system to reinforce each other (or not) in promoting knowledge creation and diffusion. Graduates, as a vehicle transferring academic knowledge from the university to other sectors, are a relevant part of the system. It is therefore important to understand the role they play in it and explore to what extent migration is a mechanism through which regional learning is enhanced.

4.4. Research questions

Looking at human capital mobility in terms of knowledge flow, as explained in chapter 1, ultimately implies that the decision to move is related to the knowledge embedded in the regions of origin and destination and to that embodied by the mobile graduate.

This chapter explores this point empirically. In particular it tests the hypothesis that the choice to relocate depends, among other factors, on the opportunity to learn by contributing to collective learning processes. However, following our considerations in section 4.2, it also posits that not all mobile graduates share the same motives and therefore compares the behaviour and characteristics of migrants and returners to those of stayers'.

To test such hypotheses the chapter takes three aspects into account. First, it analyses whether a stronger (weaker) innovation system, where the opportunities to participate in collective learning processes are higher, attracts (loses) migrants, returners and (retains) stayers to the same degree; secondly it explores whether the educational background and performance (i.e. the knowledge embodied by the graduate) influence the decision to migrate, return or stay; thirdly it analyses whether the three groups differ in the formal and effective educational requirements of their jobs.

By investigating the links between graduate mobility and regional innovation chapter 4 contributes to a largely unexplored area of research,[5] rich in policy implications. Not only can studying these aspects shed light on the dynamics of regional knowledge creation but, in the specific case of Italy, it can also help evaluate the impact of graduate flows on sub-national disparities.

[5] Faggian (2005), Faggian and McCann (2006, 2009) are among the few to have tackled these issues.

4.5. Methodology I: the econometric techniques

4.5.1. Multinomial logit and multinomial probit models

To answer our research questions the chapter applies multinomial logit (ML) and, as a form of robustness check, multinomial probit (MP) regressions (reported appendix 4.5). These discrete choice models can be used when the dependent variable is nominal and consists of more than two categories (Greene, 2003).

An ML or MP can be formalised as follows. Suppose an individual *n* has to choose from *J* alternatives (i=1,2,…,J), the utility function associated with each alternative will be:

$$U_{n1} = V_{n1} + \varepsilon_{n1}$$

$$\ldots \qquad \textbf{(Eqs. 4.1)}$$

$$U_{nJ} = V_{nJ} + \varepsilon_{nJ}$$

The value of V_{ni} is a function only of individual characteristics so:

$$V_{ni} = \beta_i^{(k)} X_n^{(k)} \qquad \textbf{(Eq. 4.2)}$$

where *n* is the individual, *i* is the alternative (i=1,2,…,J) and *k* is the number of individual specific characteristics (k=1,2,…,M).

The ML and the MP (as all the logit and probit models), differ on the assumptions on their errors. In the ML the error terms (ε_{ni}), are assumed to be independent and identically distributed as a double exponential, with density function equal to:

$$f(\varepsilon_{ni}) = e^{-\varepsilon_{ni}} e^{-e^{-\varepsilon_{ni}}} \qquad \textbf{(Eq. 4.3)}$$

Based on these assumption Domencich and McFadden (1975) prove that the probability that an individual *n* will choose an alternative *i* becomes:

$$P_{ni} = \frac{e^{V_{ni}}}{\sum_j e^{V_{nj}}} \qquad \textbf{(Eq. 4.4)}$$

In the MP the errors are multivariate normal, with mean 0 and covariance matrix:

$$\sum = \begin{bmatrix} \sigma_1^2 & \sigma_{12} & & \sigma_{1n} \\ \sigma_{12} & \sigma_2^2 & & \\ . & . & . & . \\ \sigma_{1n} & \sigma & \sigma & \sigma_n^2 \end{bmatrix} \qquad \textbf{(Eq. 4.5)}$$

and the probability of choice j occurring is:

$$P(y = j \mid \beta, \alpha_j, X_{ij}, Z_i, \Sigma^*) = \int^{\beta^* X_1^* + \alpha_1^* Z^*} \ldots \ldots \int^{\beta^* X_{j-1}^* + \alpha_{j-1}^* Z^*} \ldots \; f(\varepsilon_{i1}^* .. \varepsilon_{ij-1}^*) \partial\varepsilon_{i1}^* .. \partial\varepsilon_{ij-1}^* \qquad \textbf{(Eq. 4.6)}$$

where *f*(…) is the density function of the multivariate normal distribution.

The above is a multi-dimensional integral, which must be solved through simulation, as it does not have a closed-form solution.

In both the MP and the ML it is necessary to choose one alternative as a “base category” and compare the other alternatives to it.

4.5.2. Advantages and disadvantages of the multinomial logit

The ML is relatively easy to estimate as standard econometric software provide commands to run it. Furthermore, it is easy to interpret as the exponentiated coefficients can be interpreted in terms of Relative Risk Ratios (RRR), which represents the change in the odds of one outcome occurring (relative to the base category), associated with a one-unit change on the independent variable. More precisely a RRR of 1+x indicates than the odds of choosing a destination increases by x%, whilst an RRR of 1-x indicates that the odds of choosing a destination decreases by x%.

One of its main limitations, however, lies in the Independence of Irrelevant Alternatives (IIA) requirement, which posits that the ratio between the probabilities of choosing two different alternatives does not change when including a new alternative in the choice set. This can be easily shown by transforming equation 4.2, dividing the probability of the outcome *i* by the probability of the outcome *k*.

$$P_{ni} / P_{nk} = \frac{e^{V_{ni}}}{\sum_j e^{V_{nj}}} \frac{\sum_j e^{V_{nj}}}{e^{V_{nk}}} = \frac{e^{V_{ni}}}{e^{V_{nk}}} \qquad \textbf{(Eq. 4.7)}$$

What the IIA effectively means is that adding another alternative in the choice set does not affect the relative odds between any two alternatives considered.[6]

The IIA hypothesis is quite restrictive and many modelling advances have been motivated by a desire to avoid the problems it raises. However, such new models, which include multinomial probit, often have assumptions of their own that may be difficult to meet, and are computationally infeasible leading to estimates that are less accurate than ML (Kropko, 2008).[7] Furthermore it has been acknowledged that the IIA assumption is not restrictive in a situation where the alternatives in the choice set are very different (so that they are not close substitutes) or exhibit the same degree of substitution with the new alternative. Overall, as McFadden (1974), the father of discrete choice models has stated, in cases where the outcome categories "can plausibly be assumed to be distinct and weighed independently in the eyes of each decision maker", a multinomial logit model can be safely used. Since the three alternative migration behaviours studied in this paper are quite distinct we will apply the ML. Nonetheless, as mentioned earlier, we will run also MPs as a form of robustness check, and will report them in appendix 4.5.

[6] The famous red/blue bus example, introduced by McFadden (1974), should clarify this point. In the basic scenario commuters initially face a decision between two modes of transportation: car and red bus, and choose between these two options with equal probability (0.5). The odds ratio between the two alternatives is therefore equal to one. If we add a blue bus as a third mode of transportation, the IIA requires that the ratio between the probability of choosing a car and a red bus should still equal one. In other words, the probabilities of choosing a blue bus, a red bus or a car, would equal one third each, even though, effectively, assuming bus commuters do not care about the colour of the bus, consumers are expected to choose between bus and car still with equal probability (i.e. 0.5).

[7] The debate on the advantages and disadvantages of the MP and ML will be covered in more detail in the next chapter, where we apply a particular case of ML, the Conditional Logit, which requires special considerations regarding the IIA.

4.6. Methodology II: econometric analysis

The three mobility categories (stayer, returner or migrant) represent the choice set (i.e. our dependent variables), that graduates confront when finishing their studies. Their mobility decision is a function of individual and regional level variables. The former are derived from the ISTAT (2007a) survey *Indagine sull'Inserimento Professionale dei Laureati*, introduced in chapter 3. The latter are derived from both EUROSTAT and the regionalised Italian Fourth Community Innovation Survey (CIS4). At the individual level we include indicators of academic background and performance, employment status and educational requirements, social background and personal situation, as well as other demographic and geographical control variables. At the regional level we include indicators of economic performance and population density, to control for traditional explanations of migration[8], and indicators capturing the innovation system, to account for the role of knowledge in attracting graduates.

We estimate a total of five models, three for the sample as a whole (models 1, 2a, 3a) and two for employed graduates only (models 3a and 3b). By separating employed graduates from the rest we can analyse whether they are transferring their knowledge gained at university in the labour market.

Below we introduce the list of variables used. The survey question from which each variable is derived is provided in parenthesis (variables derived from the introductory part of the survey are identified through an "I").[9]

4.6.1. Econometric specification: individual level variables

1. Variables that account for academic background and performance:

BACKG (I.4) – a categorical variable that identifies the academic background of graduates and can take three values: (1) for Science, Engineering and Architecture;[10] (2) for Social Sciences, Law and Humanities (BACKG_SSLH); and (3) for Medicine (BACKG_M).

GRADE (q.1.10 and q.1.12) – the graduation mark, which goes from 60 to 110 with

[8] I.e. economic migration theory and gravity models (see chapter 1).

[9] Appendix 4.1 and 4.2 report respectively a synopsis of the variables and the translation of the original survey questions, explaining how the variable have been modified for the analysis.

[10] This is the base category to which, in the econometric models, the other two responses are compared.

distinction.

MULTIPLE (q.1.3a and q.1.3b) – a dummy that identifies graduates who have achieved (or are currently studying for) other qualifications.

ONTIME (q.1.7) – a dummy that identifies graduates that finished their degree within the expected time frame.

2. Variables that capture graduates' employment status and the educational requirements of their jobs

The regressions covering the whole group of graduates (models 1, 2a and 3a) include:

EMP_STATUS_E (q.2.1) – a dummy that identifies employed graduates.

The regressions on the sub-sample comprising only graduates in employment (models 2b and 3b) include the following three variables instead of EMP_STATUS:

WAGE (q.2.22a) – the monthly wage of the graduate

DEGREE_REQ (q.2.26) – a dummy that identifies whether the degree was required by the employer to apply for the job.

DEGREE_NEC (q.2.29) – a dummy that identifies whether the graduate feels that her/his degree is effectively needed for her/his job.

The latter two variables inform us on the use of graduates' knowledge in the labour market and can help us understand its role on their mobility decision.

3. Social background and personal situation

SEC_PAR (q.4.3 and q.4.4) – a dummy that identifies whether at least one of the parents of the graduate was educated to secondary level or above. This variable captures the effect of social background on the graduates' choices.

CHILDREN (q.5.11) – a dummy that identifies whether the graduate has children.

4. Control variables:

AGE (q.5.9) – the age of the graduate.

FEMALE (I.6) – a dummy that identifies female graduates.

LAZLOMD (q.5.5 and q.5.7b) – a dummy that captures whether the graduate is currently residing in Lazio or Lombardia, to control for the fact that these two regions are the most common destinations for migrants and retain the majority of stayers.

SOUTHD (q.5.5 and q.5.7b) – a dummy that captures whether the graduate is currently in the South, to control for the fact that the Mezzogiorno is the most common destination for returners.

These two variables are needed to control for the geographical direction of mobility flows. By including these dummies we can better isolate the behaviour of migrants and returners. [11]

4.6.2. Econometric specification: regional level variables[12]

To study the two types of mobility we take into account indicators of economic performance, population density and regional innovation in the regions of origin. In particular, the following regional indicators are used (the source of the indicators is reported in the parenthesis):

1. RIS indicators

ORI_HTKIEMP (EUROSTAT REG_ST[13]) – the percentage, in the region of origin, of employment in high-tech sectors (knowledge intensive services and high-technology manufacturing), used to account for the economic structure of the region.[14]

ORI_RDGOV (EUROSTAT REG_ST) – the percentage, in the region of origin, of Public R&D expenditures on GDP.

ORI_RDBUS (EUROSTAT REG_ST) – the percentage, in the region of origin, of Private R&D expenditures on GDP.

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[11] Different sets of spatial controls have been used in specifications not reported in this chapter (including fixed effects for the regions of origin or destination). As the results were overall similar, the most parsimonious specification was chosen.

[12] Unless otherwise specified, regional variables refer to 2003.

[13] Eurostat Regional Science and Technology Statistics.

[14] Knowledge intensive services include (according to EUROSTAT) the following NACE REV 1.1 categories: 64 Post and telecommunications; 72 Computer and related activities; 73 Research and development. High technology manufacturing include the following NACE REV 1.1 categories: High-technology products; 30 Manufacture of office machinery and computers; 32 Manufacture of radio, television and communication equipment and apparatus; 33 Manufacture of medical, precision and optical instruments, watches and clocks; 35.3 Manufacture of aircraft and spacecraft.

ORI_INNPP (ISTAT CIS4) – the percentage, in the region of origin, of *regional units* that have introduced both product and process innovation.

This variable is derived from the Regionalised CIS4, an experimental extension of the Italian CIS4, conducted by ISTAT (Perani, Prisco and Sirilli, 2006).[15] The regional unit is a statistical subject composed of all the production units of a firm localised in a specific region. This means that such unit of analysis overlaps fully with the firm if the enterprise is "uni-localised" (i.e. the firm fully coincides with the head quarters) or if it is "multi-localised" within just one region (i.e. the firm has several units located within the same NUTS 2 region); on the other hand, if one firm has its branches distributed in two different regions, these will be recorded as two different regional units.

The RIS indicators have been selected, in order to capture different aspects of the system: ORI_HTKIEMP gives information on key features of the local economic structure, ORI_RDGOV and ORI_RDBUS control for the role of public and private actors, and capture formal research activities, ORI_INNPP accounts for non-formal innovation happening in regional units. Nonetheless, as it is well known from the literature on RIS indicators (IAREG, 2008), they are not able to able to measure the level of interaction among actors and provide only a static and partial picture of the system.

2. Control variables

ORI_EMP (EUROSTAT REG_ECO[16]) –the region of origin employment rate, this is used to control for the economic performance of the region.

ORI_DEN (EUROSTAT REG_POP[17]) – the region of origin population density, used to control for the fact that larger and more densely populated cities, as such, attract more movers.

By taking into account economic performance and population density, these variables control for two traditional explanations of migration: the mainstream economic

[15] The process of regionalisation of the data is described in appendix 4.3 of this chapter.
[16] Eurostat Regional Economic Statistics.
[17] Eurostat Regional Population Statistics.

approach and the gravity model approach.[18]

4.6.2.1. Variables selection: detecting multicollinearity

The above regional variables have been selected from a larger pool of economic and innovation indicators with the aim to avoid multicollinearity, whist capturing key regional features. In particular, three steps were undertaken. A first screening was done through an examination of the correlation matrix: the presence of multicollinearity was excluded if the coefficient between a pair of variables was lower than 0.60. When the coefficient was higher than 0.60 we proceeded to the second step, which involved running the models with both the suspected multicollinear variables and with each one of them separately. This was done to examine whether the sign and significance of the coefficients were stable and how large were the standard errors. If the coefficients sign and significance changed and the standard errors were larger than 2, we concluded that the two variables were multicollinear and dropped one of them. If only one of the two conditions under step 2 was verified we proceeded to the third step, based on indicators of tolerance (TOL) and variance inflator factors (VIF), described in appendix 4.4.[19] Whilst in OLS regressions a VIF exceeding 10 (i.e. a TOL lower than 0.1) are regarded as indicating multicollinearity, for logistic regressions it is advised to use more restrictive thresholds and Allison (2002) suggests that the VIF be lower than 2.5. Table 4.1 reports the correlation matrix of the selected indicators.[20]

[18] As reviewed by Faggian (2005) it is debated whether a multinomial logit model should include explanatory variables related to the "choice set" (i.e. the mobility behaviour) or only to the decision-making unit (i.e. the graduate). In this study, we follow Faggian (2005) and introduce only variables related to the decision maker. For this reason, we avoid indicators describing the regions of destination, as they would effectively capture characteristics of the mobility choice. In other (unreported) specifications we have used a multinomial probit model with the destination values or the destination-to-origin (D-O) ratio of the variables described above. The results are extremely consistent with those reported in this chapter. Remarkably, this confirms that there is symmetry between the factors that push graduates out of a region (captured through the characteristics of the region of origin) and those that attract graduates into a region (captured through the characteristics of the region of destination or through a D-O ratio).

[19] The VIF and TOL are normally used in OLS regressions to evaluate multicollinearity. However, Menard (2002) notes that they can be used for logistic regressions by calculating an OLS regression model using the same dependent and independent variables.

[20] Among the excluded variables is the average regional wage, which is highly correlated with the variable capturing economic structure (ORI_HTKIEMP). In our specifications we have kept the latter, because it was less correlated with the remaining variables.

Table 4. 1 Correlation matrix for regional variables

	ORI_EMP	ORI_DEN	ORI_HTEMP	ORI_RDGOV	ORI_RDBUS	ORI_INNPP
ORI_EMP	1.00					
ORI_DEN	-0.10	1.00				
ORI_HTKIEMP	0.35	0.28	1.00			
ORI_RDGOV	-0.11	0.18	0.64	1.00		
ORI_RDBUS	0.61	0.26	0.61	-0.05	1.00	
ORI_INNPP	0.69	0.05	0.37	-0.17	0.68	1.00

Source – author's calculations from ISTAT (2007a).

4.6.3. Estimation strategy

As mentioned earlier, we estimate a total of five models, three for the sample as a whole (models 1, 2a, 3a) and two for employed graduates only (models 3a and 3b). The models capture different aspects of the mobility decision, making it possible to compare traditional explanations of migration with the new perspective adopted in the chapter. In particular, the first model includes, as explanatory variables, only economic performance, population density and the other individual control variables. We use it to compare whether the basic assumptions of migration theory and gravity models hold for graduates, migrants and returners. Models 2a and 2b include all the individual characteristics. Through them we compare the three groups with respect to their socio-economic background and (mostly) the knowledge they embody. Model 2a covers the whole population and takes into account graduates' employment status. Model 2b covers the population of working graduates only and explores the educational requirements of their jobs. Models 3a and 3b add the regional innovation and economic variables to models 2a and 2b respectively. In model 3a and 3b we test whether more (less) innovative regions, i.e. regions that offer more (less) learning opportunities, attract (lose) skilled migrants, returners and stayers. In model 3b we explore whether the ability to apply one's knowledge within the RIS is an incentive to migrate. Table 4.2 below summarises the specifications and aims of the different models.

Table 4. 2 Summary of econometric analysis

Model	Variables	Aim
Full sample		
1	Individual control variables Regional control variables	Verify the basic assumptions of mainstream migration theory and of gravity models.
2a	All individual variables	Compare the individual characteristics of migrants, stayers and returners.
3a	All individual and regional variables	Test whether graduates are attracted to regions that offer more learning opportunities.
Employed graduates only		
2b	All individual variables	Compare the individual characteristics of employed migrants, stayers and returners.
3b	All individual and regional variables	Test whether: a. graduates are attracted to regions that offer more learning opportunities. b. the ability to apply one's own knowledge in the RIS is a motivation to migrate

4.7. Descriptive statistics

In this section we provide some descriptive statistics on the key regional and individual variables introduced above.

Table 4.3 gives an indication of the academic performance of Italian graduates. It shows that stayers and migrants have a similar graduation mark (103.1 and 102.8 respectively), which is slightly higher than that of returners (101.6). At the same time, stayers and migrants have also finished their studies on time more often than returners (19.0% and 19.2%, as compared to 18.1%). Finally, migrants have most often achieved or pursued multiple qualifications (47.0%, followed by returners 41.9% and stayers 40.2%). The Pearson Chi-2 indicates the null hypothesis that the variables MULTIPLE and ONTIME are independent from the mobility category is rejected.

Table 4. 3 Academic performance of graduates

	GRADE Average Grade	MULTIPLE Multiple qualifications	ONTIME On time graduation
MIGRANTS	102.8	47.0%	19.2%
RETURNERS	101.6	41.9%	18.1%
STAYERS	103.1	40.2%	19.4%
Pearson Chi-2		0.0000	0.0130

Source – author's calculations from ISTAT (2007a)

Table 4.4 provides some information on the academic background. Stayers are those more likely to study scientific and engineering disciplines (31.0%), followed by migrants (28.4%) and returners (27.1%). Returners are most common among graduates in social sciences and law (69.9%), followed by migrants (67.9%) and stayers (63.7%). Finally, 5.3% of stayers graduated in medicine, as compared to 3.7% migrants and 3.0% of returners. The Pearson Chi-2 indicates the null hypothesis that the variable BACKG is independent from the mobility category is rejected.

Table 4. 4 Academic background of graduates

	BACKG_SEA Science, Engineering and Architecture	BACKG_SSHL Social Sciences, Humanities and Law	BACKG_M Medicine
MIGRANTS	28.4%	67.9%	3.7%
RETURNERS	27.1%	69.9%	3.0%
STAYERS	31.0%	63.7%	5.3%
Pearson Chi-2	0.0000		

Source – author's calculations from ISTAT (2007a)

Table 4.5 below reports some information regarding the employment status of graduates. Migrants have the highest employment rate (77.7%), followed by stayers (73.6%) and returners (68.6%). It also shows that the proportion of migrants in jobs for which a degree is formally required is 66.8%, higher than for returners (65.8%) but lower than for stayers (68.7%). At the same time, the proportion of migrants for which the university classification is effectively needed in the job is 68.8%, in line with that of stayers, but lower than that of returners (70.4%).

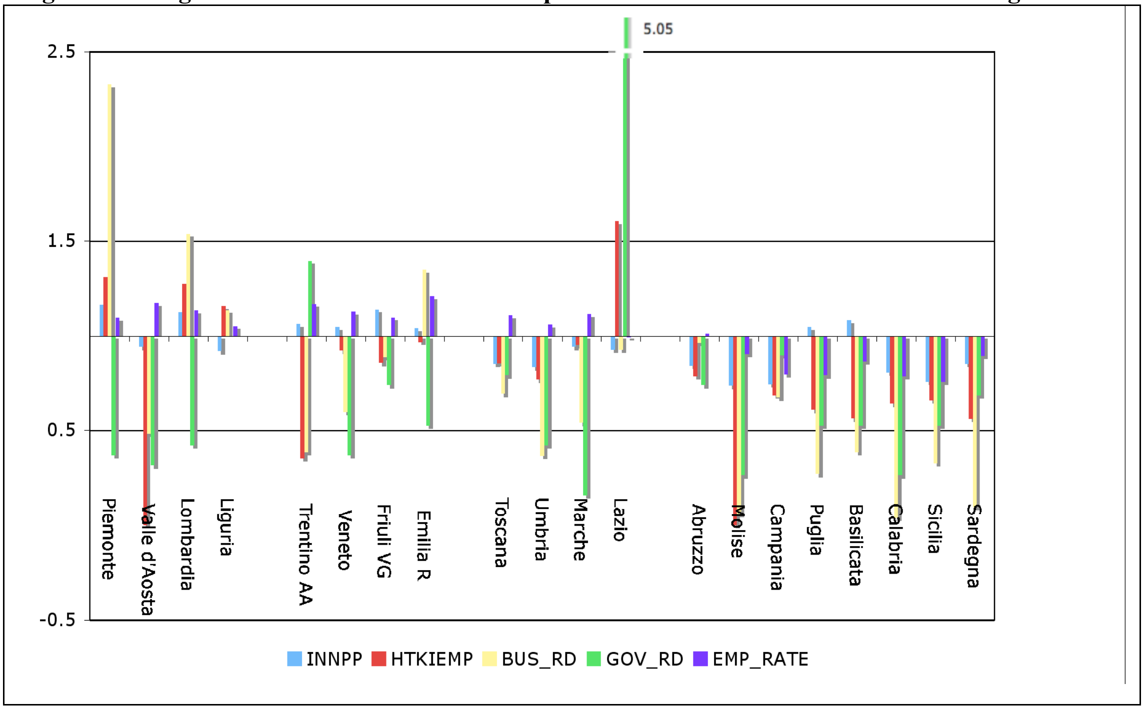
Table 4. 5 Employment status of migrants

	EMP_STATUS Employed	DEGREE_REQ Degree required	DEGREE_NED Degree needed
MIGRANTS	77.7%	66.8%	68.8%
RETURNERS	68.6%	65.8%	70.4%
STAYERS	73.6%	68.7%	68.8%
Pearson Chi-2	0.000	0.000	0.002

Source – author's calculations from ISTAT (2007a)

Finally the figure below reports the regional-to-national ratio of all the economic and innovation variables taken into account. A value higher than one indicates that the region outperforms the country as a whole, a value lower than one indicates that the region lags behind the Italian average.

Figure 4. 1 Regional economic and innovative performance relative to the Italian average[21]



Source – author's calculations from ISTAT CIS4 and EUROSTAT REG_ECO and REG_ST.

It clearly emerges from the graph that all the regions of the South, with the exception of Basilicata and Puglia, lag behind the Italian average on all indicators (Basilicata and Puglia have an higher than average proportion of regional units with product and process innovation).

The regions of the centre, with the exception of Lazio, have a higher than average employment rate and a lower than average innovative performance. Lazio, as mentioned in previous chapters, has very specific characteristics: most of the national public R&D expenditures are concentrated here. At the same time, whilst its employment rate is just below the Italian average, the share of work in high technology sectors is more than 1.5 times that of Italy as a whole.

The regions of the North East all outperform Italy in terms of employment rate and of presence of innovative regional units. Finally in the North West, Piemonte, Lombardia

[21] The regions in the graph are grouped by macro-areas. Specifically Lombardia, Piemonte, Valle d'Aosta and Liguria are in the North West; The North East includes Veneto, Trentino Alto Adige, Friuli Venezia Giulia, Emilia Romagna; the Centre includes Toscana, Umbria, Marche, Lazio; the South includes Abruzzo, Molise, Campania, Basilicata, Puglia, Calabria, Sicilia and Sardegna.

and Liguria have a higher than average business R&D spending, employment in high-tech industries and employment rate.

4.8. Econometric results

Tables 4.6 and 4.7 present the results of the five models. They provide the significance and t-statistics of each variable and, for the regional variables, the relative risk ratios (RRR). In both tables stayers are the reference outcome, against which migrants and returners are compared.

Table 4.6 presents the results for models 1, 2a and 3a, referring to the whole sample.

Table 4. 6 MLogit models 1, 2a and 3a. All graduates

	Model 1		Model 2a		Model 3a	
	MIGR	RET	MIGR	RET	MIGR	RET
ORI_EMP	-0.0699***	0.145***			-0.0695***	0.167***
	(-10.71)	(14.88)			(-9.27)	(12.22)
RRR	0.93	1.16			0.93	1.18
ORI_DEN	-0.00325***	0.000164			-0.00284***	0.000548
	(-8.64)	(0.27)			(-7.04)	(0.76)
RRR	1.00	1.00			1.00	1.00
ORI_HTKIEMP					-0.112**	0.105
					(-2.18)	(1.25)
RRR					0.89	1.11
ORI_RDGOV					-0.778***	0.998***
					(-3.75)	(3.15)
RRR					0.46	2.71
ORI_RDBUS					0.0686	-1.030***
					(0.33)	(-2.66)
RRR					1.07	0.36
ORI_INNPP					-0.0745**	-0.0124
					(-2.52)	(-0.19)
RRR					0.93	0.99
GRADE			-0.00134	-0.0383***	-0.00923**	-0.0294***
			(-0.34)	(-5.65)	(-2.34)	(-3.98)
MULTIPLE			0.473***	0.110	0.390***	0.105
			(8.12)	(0.99)	(6.78)	(0.94)
ONTIME			0.00228	-0.0644	0.0811	-0.129
			(0.03)	(-0.46)	(1.12)	(-0.93)
BACKG_SSLH			0.218***	0.145	0.202***	0.0643
			(3.84)	(1.51)	(3.60)	(0.64)
BACKG_M			-0.336***	-0.697***	-0.251***	-0.672***
			(-3.93)	(-4.35)	(-2.88)	(-4.17)
EMP_STATUS_			0.139**	-0.134	0.140**	-0.226*
			(2.03)	(-1.09)	(2.02)	(-1.82)
SEC_PAR			0.0519	0.0828	0.106*	-0.0161
			(0.87)	(0.79)	(1.81)	(-0.15)
CHILDREN			0.486***	-1.882***	0.489***	-2.067***
			(5.57)	(-4.70)	(5.41)	(-5.16)
FEMALE	-0.0447	-0.231**	-0.133**	-0.163	-0.105*	-0.145
	(-0.82)	(-2.29)	(-2.27)	(-1.52)	(-1.80)	(-1.33)
AGE	0.0329***	-0.0940***	0.0362***	-0.0908***	0.0286**	-0.0906***
	(3.17)	(-4.56)	(2.91)	(-3.45)	(2.24)	(-3.42)
SOUTHD	-1.717***	2.411***	-0.773***	0.448***	-1.966***	2.346***
	(-11.35)	(15.54)	(-10.63)	(3.93)	(-11.79)	(14.55)
LAZLOMD	0.0731	-0.747***	-0.0388	-1.053***	0.399***	-0.941***
	(0.78)	(-3.76)	(-0.62)	(-7.15)	(3.19)	(-3.69)
cons	2.980***	-9.426***	-2.544***	3.876***	4.644***	-7.666***
	(5.99)	(-11.00)	(-4.35)	(3.49)	(6.16)	(-5.21)
Pseudo-R2		0.08		0.04		0.11
No of obs.		19814		19069		19069

* p<0.10, ** p<0.05, *** p<0.01; t-statistics in parenthesis

Model 1 shows that a low employment rate in the region of study pushes migrants out of a region, whilst reduces the propensity to return (ORI_EMP is negative and significant for migrants and positive and significant for returners). At the same time, whilst migrants tend to leave regions that are sparsely populated (ORI_DEN is negative and significant), population density has no effect on the choice of returning. As of the individual control variables, we find that FEMALE is negative and significant for returners, indicating that women are less likely to return, but not significant for migrants. At the same time, we see that older graduates tend to migrate (AGE is positive and significant for migrants), whilst younger graduates tend to return (AGE is negative and significant returners). SOUTHD is, as expected, negative and significant for migrants and positive and significant for returners. LAZLOMD is negative and significant for returners but not significant for migrants, indicating that those who are currently in Lazio and Lombardia are more likely to be migrants or stayers than returners. The pseudo-R2 of model 1 is 0.08.

Model 2a includes only individual characteristics. It emerges that migrants, stayers and returners differ in important ways. In terms of academic background and performance the former are more likely than stayers and than returners to have achieved (or to pursue currently) multiple qualifications and to have graduated in social sciences, humanities and law (MULTIPLE and BACKG_SSHL are positive and significant). At the same time, returners tend to have lower grades than migrants and stayers. Furthermore, model 2a shows that graduates in medicine tend to remain in the region of graduation (BACKG_M is negative and significant for both migrants and returners). The dummy variable identifying employed graduates (EMP_STATUS_E) is positive and significant for migrants (as expected from the literature) and negative and not significant for returners. We find that the level of parental education bares no effect on the mobility decision (SEC_PAR is not significant), whilst having children does: those who have them are more likely to migrate and less likely to return (CHILDREN is positive and significant for migrants and negative and significant for returners). In this model being female makes migration less likely (FEMALE is negative and significant for migrants), as opposed to what we have seen in model 1. AGE has the same effect than in model 1. LAZLOMD is significant and negative for returners and not significant for migrants. SOUTHD has the expected sign for both migrants and returners: it is positive and significant for the latter and negative and significant for the former. The pseudo-R2 of model 2a is 0.04, lower than in model 1 (0.08), suggesting that regional variables are most important when explaining migration.

Model 3a adds the regional variables to model 2a. As in model 2a, it emerges that migrants are those who have the highest level of qualifications (MULTIPLE is positive and significant for migrants and not for returners). Nonetheless, in this specification both migrants and returners tend to have lower grades than stayers (GRADE is negative and significant). In terms of academic background model 3a confirms that medicine graduates are less mobile than the rest (BACKG_M is negative and significant for both movers), whilst it highlights that those with a degree in social sciences, humanities and law are more likely to move (BACKG_SSHL is positive and significant for migrants). Model 3a confirms that employment is an important driver for migrants but not for returners (EMP_STATUS_E is positive and significant for migrants but not for returners). It also highlights, interestingly, that those whose parents have at least a secondary education degree are more likely to migrate (SEC_PAR is positive and significant for migrants). CHILDREN has the same sign and significance level than in model 2a. The model confirms that the propensities to migrate and return increase and decrease respectively with age, and that female graduates are less likely to migrate.

As of the regional variables, the model confirms that migrants do not leave regions with high employment rates (ORI_EMP is negative and significant) whilst the opposite is true for returners. Similarly to model 1, ORI_DEN (the population density in the region of origin) is negative and significant for migrants but not for returners.

The coefficients of the RIS variables show that migrants seek to relocate in more innovative regions. Indeed, all the RIS variables are negative and strongly significant with the exception of that accounting for business R&D (ORI_RDBUS), which is not significant. In other words, migrants tend to leave regions with low levels of employment in technology intensive sectors, a low presence of innovative firms and with a low level of public R&D expenditures. Returners show a different behaviour: the coefficient for public R&D expenditures (ORI_RDGOV) is positive and significant, whilst that for private R&D (ORI_RDBUS) is negative and significant. As public R&D expenditures include also higher education, the results simply confirm that returners leave "university-regions" (such as Veneto or Emilia Romagna, as discussed in chapter

3). At the same time, they indicate that a strong knowledge base (driven by the private sector) attracts returners.

Overall these results support the hypothesis that a strong RIS is important for attracting high-skilled individuals and that, whilst both types of movers are attracted to innovative regions, such effect is stronger for migrants (for whom the majority of RIS variables are significant). To conclude, we notice that the pseudo-R2 is higher than in the other models (0.11).

Table 4.7 presents the results for models 2b and 3b, which refer to the sub-sample of graduates in employment (representing 78% of migrants and 69% of returners).

Table 4. 7 MLogit models 2b and 3b. Employed graduates

	Model 2b		Model 3b	
	MIGRANTS	RETURNERS	MIGRANTS	RETURNERS
ORI_EMP			-0.0891***	0.140***
			(-9.97)	(7.68)
RRR			0.91	1.15
ORI_DEN			-0.00342***	0.000561
			(-6.24)	(0.53)
RRR			1.00	1.00
ORI_HTKIEMP			-0.221***	0.110
			(-3.27)	(0.94)
RRR			0.80	1.12
ORI_RDGOV			-0.775***	0.709*
			(-2.90)	(1.67)
RRR			0.46	2.03
ORI_RDBUS			0.386	-0.838
			(1.36)	(-1.58)
RRR			1.47	0.43
ORI_INNPP			-0.156***	0.107
			(-3.91)	(1.16)
RRR			0.86	1.11
GRADE	0.0168***	-0.0267***	0.00109	-0.0152
	(3.07)	(-2.74)	(0.19)	(-1.50)
MULTIPLE	0.437***	0.226	0.284***	0.164
	(5.70)	(1.54)	(3.65)	(1.11)
ONTIME	-0.304***	-0.0295	-0.135	-0.0911
	(-2.98)	(-0.16)	(-1.31)	(-0.49)
BACKG_SSLH	0.253***	0.115	0.248***	0.0630
	(3.23)	(0.89)	(3.03)	(0.48)
BACKG_M	-0.451***	0.149	-0.328**	0.187
	(-2.99)	(0.67)	(-2.07)	(0.83)
DEGREE_NEC	0.199**	0.186	0.210**	0.146
	(2.19)	(1.13)	(2.23)	(0.88)
DEGREE_REQ	-0.157*	-0.279*	-0.0868	-0.258
	(-1.70)	(-1.73)	(-0.89)	(-1.60)
WAGE	0.000353***	-0.000150	0.000361***	-0.000291**
	(4.79)	(-1.04)	(4.42)	(-2.09)
SEC_PAR	0.0839	-0.108	0.179**	-0.144
	(1.06)	(-0.78)	(2.21)	(-1.05)
CHILDREN	0.240	-1.423**	0.279*	-1.531**
	(1.64)	(-2.12)	(1.79)	(-2.51)
FEMALE	-0.209**	-0.229	-0.167**	-0.203
	(-2.57)	(-1.56)	(-1.98)	(-1.40)
AGE	0.0308*	-0.0957**	0.0102	-0.0771**
	(1.72)	(-2.51)	(0.55)	(-2.08)
SOUTHD	-0.842***	0.525***	-2.436***	2.312***
	(-8.04)	(3.56)	(-11.72)	(9.94)
LAZLOMD	0.0455	-1.099***	0.588***	-1.064***
	(0.58)	(-5.71)	(3.61)	(-2.91)
cons	-4.441***	3.013*	6.176***	-8.762***
	(-5.35)	(1.73)	(5.81)	(-3.85)
Pseudo-R2	0.04		0.13	
No of obs.	10084		10084	

* p<0.10, ** p<0.05, *** p<0.01; t-statistics in parenthesis

Model 2b highlights that returners tend to have lower grades than stayers, which in turn have lower grades than migrants (GRADE is negative and significant for returners and positive and significant for migrants). Furthermore it shows that migrants tend to have multiple qualifications, are less likely to have finished their degree on time, tend to have studied social science and are less likely to have a medicine background (MULTIPLE and BACKG_SSLH are positive and significant, ONTIME and BACKG_M are negative and significant).

The most interesting variables, in this model, are those regarding the employment conditions of the graduate. We find that migrants tend to have a significantly higher salary than stayers and returners. What is more, we find that whilst migrants are more likely than stayers and returners to be in jobs in which they apply their knowledge (DEGREE_NEC is positive and significant), both movers are less likely to be in jobs where their degree is formally required (DEGREE_REQ is negative and significant). Overall these results suggest that the opportunity to apply one's own skills does have an impact on the mobility decision. In terms of familiar background and conditions (SEC_PAR, CHILDREN), model 2b confirms what seen in models 2a.

Model 3b confirms that the two types of movers differ in important ways. In terms of academic background and performance we find that MULTIPLE, BACK_SSHL and BACK_M keep the same sign and significance as in model 2b: migrants, are more likely to have achieved multiple qualifications, to have studied social sciences humanities and law and less likely to have a degree in medicine. As of employment features we find that migrants tend to have a higher income than stayers which, in turn, tend to earn more than returners (WAGE is positive and significant for migrants and negative and significant for returners). Most importantly we confirm that migrants tend to apply their knowledge in their jobs more than their fellow graduates: DEGREE_NEC is in fact positive and significant. In terms of social background and personal characteristics we find, as in model 3a, than migrants tend to have more educated parents than their peers (SEC_PAR is significant and positive), are more likely to have children and less likely to be female. As of returners, model 3b confirms the majority of findings of model 2b: returners are less likely to have children and tend to be younger than the rest of the sample. As we noted above in model 3b, the coefficient for WAGE is also negative and significant, confirming their poorer performance in the labour market.

At the regional level model 3b confirms that whilst migrants are pushed to leave regions with low employment rate (ORI_EMP is negative and significant), returners tend to follow the opposite behaviour (ORI_EMP is positive and significant). Furthermore, as in model 3a, we find that whilst migrants tend to leave non-innovative regions (ORI_HTKIEMP, ORI_RDGOV, ORI_INNPP are negative and significant), a weak RIS does not influence returners' decisions (ORI_RDGOV is the only RIS variable to be significant and its positive sign confirms that the returners leave regions with strong universities). The control variables, SOUTHD and LAZLOM_D have the same sign and significance level than in models 2a and 2b respectively. Finally, as for previous specification, model 3b has pseudo-R2 much higher than model 2b (0.13 versus 0.04).

4.8.1. Discussion

The econometric analysis has confirmed that distinguishing among migrants and returners is valuable. Not only do the two movers differ in their geographical preferences (as shown in chapter 3), but also in their individual characteristics and behaviour.

Across all models, we have found that migrants have invested more in education than returners and stayers (as they have multiple qualifications), and in this respect, we argue that they have a higher level of human capital than the rest. On the other hand returners, across most specifications, tend to perform poorly in their degree, having lower grades than their colleagues. The differences between migrants and returners become even more evident when we look at economic aspects. The former in fact seek regions with high employment rates, are more likely to be in work and earn a higher salary. As for the regional knowledge base, we have found that migrants, as opposed to returners, leave areas with weak innovation system. Most importantly, migrants tend to be in jobs for which their education level is effectively needed (as shown in both models 2b and 3b), whilst this is not the case for returners. Migrants move in order to apply their knowledge in regions where more learning opportunities are available: they move in order to learn. Overall, the study confirms that individual and regional knowledge do shape mobility choices. [22]

4.9. Conclusions

This chapter has analysed the mobility patterns of Italian graduates focusing on two issues so far largely neglected by the literature. The traditional view of migration, as driven by economic differentials, has been extended to take into account the knowledge flows generated by graduate mobility. In particular, we have tested the hypothesis that mobile graduates are attracted to stronger innovation systems to which they can contribute, thereby participating in the collective learning processes. At the same time, we have explored whether such behaviour applies to different types of movers, namely those who return to their home region (returners) and those who move somewhere else (migrants).

The descriptive statistics and multinomial logit models have shown that migrants and returners differ not only in their geographical spread (with the former mostly relocating in the Centre-North, and the latter in the South), but also in their individual characteristics and behaviour.

The results indicate that returners have overall a poorer academic performance, and are less attracted than migrants to regions with a strong RIS. Most interesting, when focussing exclusively on the employed sub-sample, the results point out that migrants are more likely to integrate in the innovation system by applying their knowledge in their jobs. In other words, we find that the most talented have an incentive to leave poorer and less innovative regions, to move to more innovative areas where they can learn by transferring their knowledge. Theoretically the findings support the intuition of Nelson and Phelps (1965) and of Vandebussche *et al.*, (2006), who suggest that different human capital structures will suit countries and regions at different stages of technological development.

[22] These results are robust to alternative specifications and techniques. This is shown in appendix 4.5, where we report multinomial probit regressions for models 3a and 3b, and we run multinomial logit models with other indicators of regional innovation.

From the two different types of mobility one can infer two different sets of consequences, which will be explored in chapter 6. As migrants are attracted to RISs to which they can contribute and from which they can learn, they may be effectively participating to a virtuous cycle where a strong innovation system attracts skills, which make it stronger and, in turn, more attractive to human capital. Returners, on the other hand, are less likely to be employed and, if they do have a job, they are less likely than migrants to use their knowledge in the regional system of innovation. In other words they do not sustain a virtuous cycle, rather they may contribute to a stagnating system.

Overall, it emerges that looking at migration in terms of knowledge flows is critical to comprehend graduates' mobility choices. What is more, this perspective can also shed light on the phenomenon of the Southern brain drain. Specifically, our approach indicates that the Mezzogiorno, with its weak (if present) RISs, does not provide the learning opportunities that can attract or retain the best graduates, with worrying implications for local development. At the policy level the analysis suggests that higher education cannot be seen simply as an input to production, but rather as an element of a broader innovation and economic system: if migration is an outcome where the local RIS cannot accommodate high-skills, it means that the higher education system needs to be integrated strategically with regional industrial and innovation policy, generating the skills that can enhance the process of structural change. Until this happens (and the Italian history tells us that it may not be soon), the results at the very least raise questions on who are the actual stakeholders of the education system in the Mezzogiorno. In so doing, they add another piece to the deeply rooted puzzle of the Italian geographical divide.

Appendix 4.1 – Synopsis of the variables

Individual level

1. Academic background and performance
BACKG – the background of the graduate.
GRADE – the graduation mark.
MULTIPLE – identifies those who have (or are studying for) other qualifications.
ONTIME – identifies those who graduated on time

2. Employment status
EMP_STATUS_E– identifies employed graduates.
WAGE – the monthly wage of the graduate
DEGREE_REQ – identifies graduates for whom a the degree was required by the employer to apply for the job.
DEGREE_NEC –identifies graduates who think their was effectively needed for her/his job.

3. Social background and personal situation
SEC_PAR – identifies whether at least one of the parents of the graduate was educated to secondary level or above.
CHILDREN – identifies whether the graduate has children.

4. Control variables
AGE – the age of the graduate.
FEMALE – a dummy that identifies female graduates.
LAZLOMD – graduates is currently residing in Lazio or Lombardia
SOUTHD – graduates is currently in the South

Regional level variables
ORI_HTKIEMP – employment rate in high-tech sectors in the region of origin.
ORI_RDGOV – percentage of Public R&D expenditures on GDP in the region of origin.
ORI_RDBUS –percentage of Private R&D expenditures on GDP in the region of origin.
ORI_INNPP –percentage of *regional units* that have introduced both product and process innovation in the region of origin.
ORI_EMP – employment rate in the region of origin.
ORI_DEN –population density in the region of origin.

Appendix 4.2 – Survey questions

This appendix reports the translation of the survey questions upon which the variables used in the chapters (in parenthesis) are based. The variables are introduced in the same order than in the main text.

Q I. 4 Area of study (BACKG)

The information is not part of the questionnaire and is provided by universities themselves in the first part of the survey process. The original classification includes 7 categories:

1. Humanities
2. Socio-Economic disciplines
3. Sciences
4. Law
5. Engineering and Architecture
6. Medicine
7. Sports

Graduates in Sports have been excluded from the sample due to their small numerosity (less than 1% of the total) and high propensity to migrate following the fact that only few universities located mainly in the centre north offer such degree.

The 7 categories have been grouped in the variables BACKG in the three groups described in the text. Namely:

1. Science, Engineering and Architecture
2. Socio-Economic disciplines, Law and Humanities
3. Medicine.

Q.1.10 and q.1.12 (GRADE)

Q.1.10 What is your graduation grade?
In the Italian system graduation marks go from 60 to 110.
Q.1.12 Did you achieve a distinction
If the graduate achieved a distinction its mark was put to 111.

Q.1.3a and q.31 (MULTIPLE)

Q1.3 Did you achieve any other university qualification?
Q.31 I will ask you about further study that you may have undertaken after 2001. Please state, for each of them if you joined, achieved, dropped or never joined the following:

1. A PhD programme
2. Non-university specialization course.
3. University specialization course or masters.

4. Non- university master course.
5. Another university undergraduate degree
6. A university diploma or similar
7. A sponsored employment or study programme
8. Stage, internships
9. Professional courses or updating courses
10. Other.

If the graduate answered yes to either q.1.3a and/or q31 (excluding those who declared to have dropped from the course) it was classified as pursuing or having achieved multiple qualifications.

Q.1.7 (ONTIME)
Did you graduate within the expected time?

Q.2.1 (EMP_STATUS)
Are you employed?

Q.2.22 (WAGE)
What is your net income from your job?

Q.2.26 (Degree_Req)
Was a degree formally required to do your job?

Q.2.29 (Degree_Nec)
Was the degree necessary? (if the answer to Q 2.26 is no)
Was the degree effectively necessary? (if the answer to Q 2.26 is yes)

Q.4.3 and q.4.4 (SEC_PAR)
Q.4.3 When you were 14 what was the education level of your father?
(illiterate, primary, middle school, upper secondary, university diploma, university degree or doctorate)
Q.4.4 When you were 14 what was the education level of your mother?
(illiterate, primary, middle school, upper secondary, university diploma, university degree or doctorate)

SEC_PAR is equal to 1 if the parent with the highest education level (be it the mother or the father), has at least a secondary school degree.

Q.5.11 (CHILDREN)
Do you have children?

Q.5.5 q.5.7 (SOUTHD, LAZLOMD)
Q.5.5 In what city do you reside?
Q.5.7 In which city do you work?

Please note that the information on the city is not released in the Indagine, which instead provides the region of work.

The variable SOUTHD assumes value 1 when the region of destination/residence is in the South and 0 otherwise. LAZLOMD assumes value 1 when the region of destination/residence is either Lazio or Lombardia and 0 otherwise.

In some cases, for employed graduates, the region of residence and region of work do not coincide. This is either because the graduate has not complied with the bureaucracy to change residence (9.1% of employed graduates), or because the information on the region of work is missing (8.9% of employed graduates). In the former case we use the region of work to classify the graduate by its mobility category.

Appendix 4.3 – Regionalised CIS

As is well known in the literature, the production of CIS regional indicators has been, so far, hindered by the lack of methodological guidelines on the regionalisation of innovation surveys in the OSLO Manual (OECD and EUROSTAT, 1997). Specifically, the adoption of the "enterprise" as the statistical unit of the Manual introduces a bias in the measurement of the technological potential of those regions hosting a large number of production units belonging to enterprises with headquarters located elsewhere.

To address this issue ISTAT has recently pioneered a “two tiered approach”, in which data gathered in the CIS4 is matched with survey data on local units of innovative firms. This two-tiered approach enables to distinguish among innovative firms situated in one location only (or with several units within the same region) and innovative units located in a region but belonging to firms with headquarters in a different region. Specifically in the 1st phase the CIS4 postal survey is adjusted to distinguish between:

- Firms located in one region only – which are asked the full CIS4 questionnaire, questions on the use of local sources of knowledge and questions on cooperation with other local institutions.
- Firm with multiple locations – which are asked the full CIS4 questionnaire only.

In the 2nd phase a CAPI (Computer Aided Personal Interview) survey complements the first phase by addressing only innovative firms with units located in more than a NUTS 2 region. These firms are asked questions on the level of their regional innovation, level of innovation expenditures in regional units and other control questions. Through these two steps the enterprise is replaced by the *Regional Unit* (RU), a unit of analysis composed of all the local units of a firm localised in a region. The RU fully with the firm if the enterprise is “uni-localised” (i.e. the firm fully coincides with the head quarters) or “multi-localised” within just one region (i.e. the firm has several units located within the same NUTS 2 region). As a result it is possible to build unbiased indicators of regional innovation.

Appendix 4.4 – Tolerance and VIF

The two indicators are calculated as follow:

Equation A4.4.1
$$Tolerance(X_i) = 1 - R2_i$$

Equation A4.4.2
$$VIF(X_i) = 1/Tolerance(X_i)$$

Where Xi is one of the explanatory variables of a model and R2i is the R2 of a model in which Xi is regressed against all the other explanatory variables. In other words the A high R2i indicates high collinearity between Xi and the other covariates, therefore a small Tolerance, or a high VIF, gives an idea of how large the collinearity is.

Appendix 4.5 – Robustness check

Table A4.5. 1 Multinomial probit for models 3a and 3b in the main text

	MIGRANT	RETURNER	MGRANT	RETURNER
ORI_EMP	-0.0307***	0.0831***	-0.0503***	0.0560***
	(-5.90)	(9.75)	(-7.77)	(4.70)
ORI_DEN	-0.00191***	-0.000760*	-0.00224***	-0.00100*
	(-7.33)	(-1.85)	(-6.38)	(-1.82)
ORI_HTKIEMP	-0.0350	-0.0000840	-0.111**	-0.0282
	(-0.97)	(-0.00)	(-2.38)	(-0.44)
ORI_RDGOV	-0.379**	0.534***	-0.461**	0.272
	(-2.43)	(2.68)	(-2.27)	(1.04)
ORI_RDBUS	-0.121	-0.359	0.0818	-0.160
	(-0.80)	(-1.48)	(0.40)	(-0.51)
ORI_INNPP	-0.0507**	-0.0540	-0.113***	-0.0170
	(-2.14)	(-1.38)	(-3.58)	(-0.32)
GRADE	-0.00812***	-0.0211***	0.000503	-0.0115*
	(-2.58)	(-4.44)	(0.12)	(-1.78)
MULTIPLE	0.315***	0.135*	0.252***	0.177*
	(6.78)	(1.89)	(4.05)	(1.87)
ONTIME	0.0642	-0.0630	-0.0838	-0.0674
	(1.10)	(-0.71)	(-1.03)	(-0.57)
BACKG_SSLH	0.156***	0.0849	0.194***	0.0854
	(3.46)	(1.30)	(3.01)	(1.01)
BACKG_M	-0.226***	-0.432***	-0.248**	0.0930
	(-3.30)	(-4.24)	(-2.05)	(0.63)
EMP_STATUS	0.0935*	-0.0949		
	(1.70)	(-1.21)		
DEGREE_NEC			0.182**	0.137
			(2.48)	(1.25)
DEGRE_REQ			-0.0893	-0.197*
			(-1.18)	(-1.83)
SALARY			0.000283***	-0.000101
			(4.59)	(-1.17)
SEC_PAR	0.0952**	-0.00656	0.144**	-0.0757
	(2.01)	(-0.10)	(2.27)	(-0.86)
CHILDREN	0.371***	-1.198***	0.202*	-0.945***
	(4.91)	(-5.60)	(1.67)	(-2.72)
FEMALE	-0.0944**	-0.107	-0.156**	-0.156*
	(-2.03)	(-1.53)	(-2.37)	(-1.68)
AGE	0.0192*	-0.0554***	0.00589	-0.0513**
	(1.86)	(-3.40)	(0.40)	(-2.30)
SOUTHD	-1.021***	1.127***	-1.420***	0.901***
	(-9.90)	(9.29)	(-10.50)	(4.98)
LAZLOMD	0.159**	-0.355***	0.271***	-0.309**
	(2.06)	(-3.00)	(2.74)	(-1.99)
CONS	2.010***	-2.710***	3.378***	-2.257
	(3.46)	(-2.90)	(4.15)	(-1.62)
N		19069		10084

t statistics in parentheses
* p<0.10, ** p<0.05, *** p<0.01

Table A4.5. 2 MLogit alternative specification for models 3a and 3b

	MIGRANT	RETURNER	MIGRANT	RETURNER
ORI_EMP	-0.0910***	0.138***	-0.117***	0.104***
	(-11.24)	(8.61)	(-11.40)	(4.40)
ORI_DEN	-0.000767**	0.000965	-0.00129***	0.000538
	(-2.31)	(1.25)	(-2.78)	(0.51)
ORI_HTMAN	0.197***	0.0712**	0.174***	0.0394
	(10.18)	(2.10)	(7.01)	(0.83)
ORI_RDGOV	-0.843***	1.578***	-1.186***	1.205***
	(-5.17)	(7.98)	(-6.08)	(4.52)
ORI_RDBUS	-1.992***	-1.622***	-2.012***	-1.028*
	(-10.63)	(-3.53)	(-8.28)	(-1.69)
ORI_PROD	0.0404	0.212**	0.0501	0.299**
	(0.97)	(2.36)	(0.85)	(2.39)
GRADE	-0.00864**	-0.0276***	0.00207	-0.0131
	(-2.22)	(-3.79)	(0.37)	(-1.31)
MULTIPLE	0.369***	0.0978	0.290***	0.156
	(6.46)	(0.88)	(3.76)	(1.06)
ONTIME	0.0621	-0.121	-0.118	-0.0569
	(0.86)	(-0.87)	(-1.14)	(-0.30)
BACKG_SSLH	0.146***	0.0576	0.204**	0.0715
	(2.58)	(0.57)	(2.48)	(0.55)
BACKG_M	-0.243***	-0.685***	-0.331**	0.166
	(-2.79)	(-4.24)	(-2.11)	(0.73)
EMP_STATUS	0.112	-0.228*		
	(1.62)	(-1.84)		
DEGREE_NEC			0.206**	0.156
			(2.21)	(0.94)
DEGREE_REQ			-0.0983	-0.254
			(-1.01)	(-1.57)
SALARY			0.000343***	-0.000284**
			(4.18)	(-2.02)
SEC_PAR	0.109*	-0.0109	0.183**	-0.148
	(1.88)	(-0.10)	(2.30)	(-1.07)
CHILDREN	0.450***	-2.077***	0.242	-1.500**
	(4.93)	(-5.05)	(1.57)	(-2.38)
FEMALE	-0.0918	-0.153	-0.143*	-0.212
	(-1.58)	(-1.39)	(-1.71)	(-1.47)
AGE	0.0299**	-0.0860***	0.0215	-0.0732**
	(2.36)	(-3.25)	(1.17)	(-1.99)
SOUTHD	-1.902***	2.450***	-2.422***	2.339***
	(-11.56)	(14.55)	(-11.58)	(10.11)
LAZLOMD	0.532***	-0.728***	0.592***	-0.819**
	(4.68)	(-3.14)	(4.04)	(-2.57)
CONS	3.768***	-7.421***	4.509***	-7.308***
	(5.11)	(-5.24)	(4.34)	(-3.46)
N		19069		10084

t statistics in parentheses
* p<0.10, ** p<0.05, *** p<0.01

Table A4.5.1 contains the same variables of models 3a and 3b in the text. However, the models are here estimated through multinomial probit (rather than logit) techniques. The results are highly consistent with those reported in the text.

Table A4.5.2 presents an alternative specification for models 3a and 3b. Two variables have been substituted:

ORI_HTMAN (instead of ORI_HTKIEMP) the proportion of employment in high-technology and medium-high technology manufacturing in the region of origin (also sourced from Eurostat).

ORI_PROD (instead of ORI_INNPP), which is also sources from the regionalize CIS4. ORI_PROD is the proportion of regional units, in the region of origin, which have introduced only product innovation

The key results of the models reported in the main text are confirmed, with migrants more strongly attracted to developed RIS than returners. Indeed, ORI_RDGOV is again negative and significant for migrants and positive and significant for returners, whilst ORI_RDBUS is negative and significant across all models and mobility categories. Finally ORI_PROD is not significant for migrants and positive and significant for returners. The results for ORI_HTMAN, however, are surprising. The variable is in fact positive and significant for migrants and returners in model 3a and for migrants in model 3b. This is because we are now considering employment in both medium and high-technology manufacturing, rather that high-tech manufacturing and knowledge intensive services as in the main text (ORI_HTKIEMP). In other words, this indicator does not capture accurately the type of industrial structure that attracts graduates. As for employment status and conditions, we confirm that migrants are more likely to be employed than returners (EMP_STATUS is negative and significant for the latter), that they are more likely to apply their knowledge in their work (DEGREE_NEC is positive and significant) and to earn more than returners (SALARY is positive and significant for migrants and negative and significant for returners).

Chapter 5

Graduates' locational choice: going with the flow?

Abstract

Chapter 5 analyses the locational choice of graduates, focussing on both its macro and meso-level drivers. As for the former it studies which spatial characteristics contribute to attracting or retaining graduates into a region; as for the latter, it studies the function of migration networks. Results confirm that the regional quality of life and knowledge base are important in attracting talent and that networks are crucial mechanisms through which a destination is chosen. They also confirm that migrants and returners have distinct behaviours.

5.1. Introduction

This chapter carries out a macro and meso level analysis of graduates' locational choices. At the macro-level it compares the role of different regional characteristics in attracting skills, whilst at the meso-level it explores the role of migration networks, an aspect so far largely neglected by economic geographers. These factors are studied for graduates as a whole and for migrants and returners separately[1].

Whilst the macro-view of migration can give insights on the structural features that drive population flows, it does not explain how the process itself occurs. The approach posits that collective migration patterns emerge from the sum of individual decision-making processes based on utility maximisation. Such a view has been criticised for being unrealistic and neglecting that the decision to move, rather than occurring in isolation, relies on social networks, which reduce the costs and risks of relocation itself (Haug, 2008). Combining the macro and meso level perspectives, therefore, gives a more precise representation of graduate behaviour and, as such, serves as a sounder base for policy design.

[1] Returners are those who leave the region of study to move back to the home region. Migrants are those who leave the region of study to move somewhere else than the home region. Stayers are those who remain the region where they attended university. See section 3.4.2 for a rigorous definition.

Methodologically the analysis is based on econometric techniques: conditional logit (CL) and multinomial probit (MP) models are used to examine the behaviour of graduates as a whole, and that of migrants and returners separately. Both techniques are theoretically suited to the study of locational choice. However, as they have different properties and different limitations[2], scholars are currently debating which is more appropriate as an empirical tool (Dahlberg and Eklof, 2003; Dow and Endersby, 2004; Christiadi and Crushing, 2008). For these reasons, it is useful to apply both types of models to give robustness to the findings and contribute to this methodological debate.

The chapter is organised as follows. Section 5.2 summarises how different strands of literature have looked at migration and high-skilled locational choice. Section 5.3 defines the research objectives of the paper. Sections 5.4 and 5.5 describe the methodology: the former introduces the econometric techniques, the latter describes the econometric strategy. Section 5.6 provides some descriptive statistics whilst section 5.7 conducts the empirical analysis. Section 5.8 concludes by summarising the results and providing some policy implications.

5.2. Migration: individual or social process?

Different streams of research have explored the spatial features that drive population movements.[3] *Gravity models*, for instance, posit that population flows are determined by the size of and the distance between the areas of origin and destination: much like in Newtonian physics, movements are stronger among close areas and tend to flow from smaller to the larger regions. Mainstream economic theory (Sjaastad, 1962), on the other hand, has highlighted that migrants move from poorer to more economically buoyant areas. This approach, although capturing a key element of the phenomenon, has been broadened to include factors that are specifically relevant to the highly skilled. Many scholars, indeed, have pointed out that talent looks for quality of life and cultural amenities when choosing where to live (i.e. Cebula, 2005; Di Pietro, 2005; van Dalen and Henken, 2007); at the same time, others have repeatedly found that the highly skilled tend to concentrate in innovative areas (e.g. Ritsila and Ovaskainen, 2001;

[2] In particular, though more detail will be given in section 5.4 below, CL models rely on the Independence of Irrelevant Alternatives (IIA) assumption, whilst MP models, which do not rely on the IIA, are computationally onerous and rely on simulation techniques.

[3] For more detailed information on the different branches of research see chapter 1.

Florida, 2002; Giannetti, 2001 and 2003; Pekkala, 2003; Rutten and Gelissen, 2008).[4]

Implicit in these approaches is the assumption that migration is an individual process, whereby the choice to relocate is based on the characteristics of the areas of origin and destination. However, the sociology of migration has repeatedly stressed that migration is a collective phenomenon, which relies on social networks (e.g. Portes and Back, 1985; Massey, 1990; Goss and Lindquist, 1995; Guilmoto and Sandron, 2001). This literature has highlighted that networks facilitate, support and reinforce the process of relocation by providing support and assistance, thereby reducing the costs and risks of migration itself.[5] Moreover, it has been pointed out that networks differ both in nature and in the specific function they carry out: for instance they maybe family based (Boyd, 1989), or nationality/community based (Portes *et al.*, 1999), they may facilitate migration in general terms, or more formally organise employment and encourage business activity (Rindoks *et al*., 2006). As for networks of graduates, scholars have recognised that they are key in setting the future path of skilled labour circulation (Vertovec, 2002). This chapter takes into account the different macro-aspects highlighted above and the meso-level role of networks. Both are crucial to achieve a complete view of the migration process and have rarely been examined jointly.

5.3. Research questions

Chapter 5 analyses the relative importance of the traditional macro-level drivers of migration, such as economic performance, origin-to-destination distance and population size, versus quality of life and regional innovation (aspects that are deemed crucial for human capital). Furthermore, it compares the role of these spatial features to that of social networks to understand to which extent migration is an individual or a collective process.

This macro-meso analysis is carried out for graduates as a whole (i.e. including both *movers* and *stayers*) and for migrants and returners separately. Looking at the two movers separately enables us to understand how their spatial preferences differ. At the

[4] Chapter 4 of this thesis has also confirmed this finding.

[5] The literature on migration networks has mostly focused on transnational rather than sub-national migration networks.

same time, analysing the sample as a whole enables the evaluation of the unobserved costs of migration. As stayers represent three quarters of total graduates, such costs are likely to play a critical role and will be studied following the methodology of Davies *et al*. (2001), explained in section 5.5.1.

This study of graduates' locational choice is relevant for policy makers aiming at attracting human capital into a region. Indeed, it allows us to understand which features are most important to the highly educated and to recognise the social structures that sustain their migration processes.

5.4. Methodology I: econometric techniques

This chapter applies both conditional logit (CL) and multinomial probit (MP) models. The former is an extension of the multinomial logit (ML), described in the previous chapter. Whilst in the ML the explanatory variables refer to the decision-maker (i.e. the graduate), in the CL they are attributes of the alternatives to be chosen (i.e. of the potential regions of destination). Similarly, the MP can be used to study phenomenon in which the independent variables are the characteristics of the decision-maker (as we did in appendix 4.5) or the characteristics of the alternatives (as we do in this chapter). Both the CL and the MP with alternatives' characteristics require a different organisation of the dataset as compared to the ML or the MP with individual characteristics, which is explained in appendix 5.2.[6]

Mueller (1985) was among the first to apply a CL model to migration, when he examined individual destination choices among US states. However, probably because of software limitations, the CL (and even more the MP) model did not receive substantial attention among migration scholars until recently (Christiadi and Cushing, 2008). For instance Davies *et al.*(2001) applied it to study interstate migration in the US, whilst Faggian (2005) used it to evaluate the utility of different types of graduate mobility in the UK, and Choe and LaBrent Chrite (2009) applied it to their analysis of black migration in post-apartheid in South Africa.

[6] Graduates' locational choice could also have been studied through an *alternative specific conditional logit* in which both individual and regional characteristics can be used (McFadden, 1974). This strategy was attempted by including, as explanatory variables, the regional features (i.e. the characteristics of the alternatives) and the mobility category (i.e. the characteristics of the individual making the choice). However, these models failed to converge given the large number of alternative regions available.

The next subsection first describes the theory behind the two models and then it introduces the debate on the *pros* and *cons* of CL and MP.

5.4.1. Conditional logit & multinomial probit models

As with all discrete choice models, CL and MP are based on a utility maximization process, where an alternative (i.e. a region of destination) is chosen on the grounds that the individual derives from it greater utility than from the others.[7] Formally, if the utility of individual i choosing region j is represented as U_{ij}, location j will be chosen if and only if :

$$\mathbf{U}_{ij} > \mathbf{U}_{il} \qquad \forall l \neq j \qquad \textbf{(Eq. 5.1)}$$

U_{ij} consists of two components, one observable and one unobservable:

$$\mathbf{U}_{ij} = \mathbf{V}_{ij} + \varepsilon_{ij} \qquad \textbf{(Eq. 5.2)}$$

Where V_{ij}, the predicted utility, can be observed on the basis of the choice's attributes, and ε_{ij} is an unobserved random component.

The deterministic part of the utility function is:

$$V_{ij} = \beta' X_n \qquad \textbf{(Eq. 5.3)}$$

where i is the individual, j is the alternative (i=1,2,…,J), n is the number of alternative specific characteristics (n=1,2,…,p).

As explained in chapters 3 and 4, probit and logit models differ in the assumptions they make on the error term, which, in turn, produces different properties and problems in each method. In the CL, the assumptions on the distribution of the error terms is the same as the ML: the errors are independent, identically distributed (i.i.d) with type I extreme value distribution. The density function therefore takes the following form:

[7] See Borooah (2002) for more details about the likelihood function and the process of maximization.

$$f(\varepsilon_{ij}) = e^{-\varepsilon_{ij}} e^{-e^{-\varepsilon_{ij}}} \qquad \textbf{(Eq. 5.4)}$$

and the cumulative density is:

$$F(\varepsilon_{ij}) = e^{-e^{-\varepsilon_{ij}}} \qquad \textbf{(Eq. 5.5)}$$

Under this assumptions, the probability of individual *i* choosing destination *j* can be solved as a closed-form expression:

$$P_{ij} = \frac{e^{V_{ij}}}{\sum_j e^{Vij}} = \frac{e^{\beta' X_{ij}}}{\sum_j e^{\beta' X_{ij}}} \quad \textbf{(Eq. 5.6)}$$

Where X_{ij} represents all the observed factors or explanatory variables and β represents parameters obtained from the model. Equation 5.6 above is exactly the same as equation 4.4 in chapter 4: the CL is simply a particular case of ML. The only difference between the two is in the utility function: in the CL the choice is driven by the characteristics of the alternatives rather than those of the decision-making unit.

As with the multinomial logit, the CL has the advantage that its exponentiated coefficients can be easily interpreted. Indeed, they represent the Odds Ratio (OR).[8] The OR represents the change in the odds of an alternative being chosen as compared to it not being chosen, when the variable increases by one. More precisely an OR of *1+x* indicates than the odds of choosing a destination increases by *x%*, whilst an OR of *1-x* indicates that the odds of choosing a destination decreases by *x%*.

As with the multinomial logit, the CL has the disadvantage of relying on the Independence of Irrelevant Alternatives (IIA) assumption. The latter implies that the odds of individuals choosing between two alternatives do not depend on the existence or on the attributes of the other alternatives.[9]

[8] In the case of multinomial logit we used the term Relative Risk Ratio rather than Odds Ratio. This is because the RRR compares the probably of an alterative being chosen *relative* to base category.
[9] See chapter 4, section 4.5.2 for more details.

In the MP, on the other hand, the errors are multivariate normal, with mean 0 and covariance matrix:

$$\sum = \begin{bmatrix} \sigma_1^2 & \sigma_{12} & & \sigma_{1n} \\ \sigma_{12} & \sigma_2^2 & & \\ . & . & . & . \\ \sigma_{1n} & \sigma & \sigma & \sigma_n^2 \end{bmatrix} \quad \textbf{(Eq. 5.7)}$$

and the probability of choice j occurring is:

$$P(y = j \mid \beta, \alpha_j, X_{ij}, Z_i, \Sigma^*) = \int^{\beta^* X_1^* + \alpha_1^* Z^*} \ldots \quad \ldots \int^{\beta^* X_{j-1}^* + \alpha_{j-1}^* Z^*} \ldots \quad f(\varepsilon_{i1}^* .. \varepsilon_{ij-1}^*) \partial\varepsilon_{i1}^* .. \partial\varepsilon_{ij-1}^* \quad \textbf{(Eq. 5.8)}$$

where *f*(…) is the density function of the multivariate normal distribution.

The above is a multi-dimensional integral, which must be solved through simulations, as it does not have a closed-form solution. This, as will be explained in the next subsection, is a remarkable drawback of the MP, even if current econometric packages enable such estimation.

5.4.2. The comparison between multinomial probit and conditional logit

One of the well-known disadvantages of the CL is its reliance on the IIA assumption, which states that the odds of choosing an alternative are independent from the choice-set itself. Not only the IIA is a restrictive and, in certain circumstances, unrealistic assumption, but it is also hard to identify its violation when the number of alternatives is large. Indeed, the Hausman test (Hausman and McFadden, 1984; McFadden, 1987), used to check if the IIA holds, compares the parameters of the model being assessed to those of a new model in which some alternatives have been removed: if the parameters of the latter are not systematically different from those of the full model, the IIA is said to hold. Needless to say, when the alternatives are 20, as in the present case, it is only possible to conduct a limited number of tests given the large number of possible combinations of all the elements.[10] Furthermore, although it is possible to use the CL when the IIA is violated if the alternatives are clearly distinct from each other (McFadden, 1974)[11], this does not seem to be a safe assumption in the present case, where graduates may judge different regions (i.e. different alternatives) as similar.

As the MP does not rely on the IIA, it would seem natural to prefer this model to the CL. However, this is not the case as the MP presents problems at the empirical level, which are only starting to be understood (Dahlberg and Eklöf 2003; Mazzanti, 2003; Dow and Endersby, 2004; Christiadi and Crushing, 2008). As well as requiring longer convergence time, the MP presents serious identification problems (see Weeks, 1997; and Dow and Endersby, 2004), which increase with the number of alternatives. In other words, whilst for the CL a closed form representation of the equation exists regardless of the number of alternatives, this is not the case in the MP. In this case, in fact, as the choice-set becomes larger, a separate identification of a subset of parameters is not only possible, but also hard to detect, leading to plausible, yet arbitrary or misleading estimates and inferences.

Preferring the MP to the CL is therefore not a straightforward choice, all the more as some scholars have suggested that the results of a conditional logit can often be used as a general approximation of models that relax IIA[12] (Train, 2003; Christiadi and Crushing, 2008). Furthermore, as highlighted by Train (2003) a violation of the IIA becomes a serious issue only when researchers attempt to forecast the substitution patterns among the alternatives[13] (a task not carried out in this study). When researchers are more concerned with knowing the individuals' average preferences (as is the case here), violating IIA is not a serious issue.

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[10] With 20 regions the number of possible combinations for the Hausman test are *20!* (20 factorial). That is: if one removes only one alternative 20 combinations are possible. If one removes two alternatives, the number of combinations goes to 20*19, etc.

[11] Indeed, this is what we have done in chapter 4, when we applied the ML to compare stayers, migrants and returners.

[12] These include: nested logit, mixed logit, multinomial probit, and heteroscedastic extreme value models.

[13] For instance if researchers need to forecast how much the demand for alternative A would change due to changes in its characteristics or the characteristics of other choices

Given that the debate on MP versus CL is not resolved, and given the large number of alternatives in the models of this chapter, it makes sense to use both techniques and compare the results in their sign and significance. This not only gives robustness to the findings but also contributes to this methodological discussion.

5.5. Methodology II: econometric analysis

The analysis is based on a combination of the ISTAT (2007a) survey on graduates' entry in the labour market[14], through which stayers, migrants and returners are identified. The survey is merged with other regional-level variables, which capture four sets of attributes, namely: traditional explanation of migration, innovation systems, quality of life and social networks. As well as regional attributes, the models contain regional fixed effects, to control for other spatial features of the regions of destination and a *non-migration dummy* (introduced, in a similar study, by Davies *et al.*, 2001), capturing the unobserved costs of migration. This section first introduces the variables (5.5.1) and then the estimation strategy (5.5.2).

5.5.1. Econometric specification[15]

As in the previous chapter, the regional attributes are expressed in terms of destination-to-origin ratios (D-O ratios). This has two advantages: first we are able to take into account the characteristics of both the region of origin and of destination. Secondly, we are effectively standardising the different sets of variables, making it possible to compare their relative importance.

The variables, which are described below, have been selected following the methodology outlined in chapter 4 section 4.6.2.1. As usual, we indicate the source of the data in parenthesis.

1. Traditional explanations of migration

EMP (EUROSTAT REG_ECO) [16] is the D-O ratio of the employment rate in 2003.

POP (EUROSTAT REG_POP)[17] is the D-O ratio of the population (expressed in 1000 inhabitants) in 2003.

[14] See chapter 3 for a description of the survey.
[15] Appendix 5.1 contains a synopsis of all the variables.
[16] EUROSTAT Regional Economic Statistics

DIST (ACI)[18] is the distance (in 100km) between the main city of the region of origin and the main city of the region of destination. This variable captures the fact that migration is most likely across close areas.

DIST2 (ACI) is the squared distance (as defined above), which captures, as in Davies *et al.*(2001), the fact that the deterring effects of distance decline when the latter increases. In other words the marginal cost of moving a unit further is lower at greater distances.

2. The regional innovation system[19]

HTKIEMP (EUROSTAT REG_ST) is the D-O ratio of the percentage of employment in high-tech sectors (knowledge intensive services and high-technology manufacturing) in 2003.[20]

RDGOV (EUROSTAT REG_ST) is the D-O ratio of the proportion of public R&D expenditures on regional GDP in 2003.

RDBUS (EUROSTAT REG_ST) is the D-O ratio of the proportion of business R&D expenditures on regional GDP in 2003

The variable INNPP, used in chapter 4 to measure product and process innovation in firms, has been excluded because it was multicollinear with EMP.

3. Quality of life

CULT (ISTAT ICCVR)[21] is the proxy for cultural amenities and captures the D-O ratio of the proportion of employment in the cultural and recreation industries[22] in 2003.

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[17] EUROSTAT Regional Population Statistics.

[18] The variable has not been used in previous chapters and therefore needs to be described. The distance between the main cities in Italian peninsular regions has been sourced from ACI (the Italian Automobile Club). The distance between Sicilia and Sardegna (the two islands) to the other regions, has been calculated differently. From web-based satellite services we derived the distance between each of the islands and the closer peninsular regions, namely Calabria for Sicily and Lazio for Sardinia. We have then added this value to the "distance vector" of Calabria and Lazio themselves to measure the distance of the Islands to other regions.

[19] For a more detailed description of the variables see Chapter 4.

[20] See chapter 4, section 4.6.2 for a definition of high-tech sectors.

[21] ISTAT Indicatori di Contesto Chiave e Variabili di Rottura

[22] The sector, as defined by ISTAT, includes the following NACE Rev.1 categories: cinema and video production and distribution, radio and TV activities, other show-business activities, press agency, libraries, archives, museums and other cultural activities, sport and other recreational activities.

CRIME (ISTAT ICCVR) captures the proportion of micro-criminality in cities. It is the D-O ratio of the number of micro-crime per 1000 citizens in 2003.

TRANS (ISTAT ICCVR) captures the availability of public transport. It is the D-O ratio of the number of public transport lines (in cities) per 100 square km in 2003.

5. Migration network & concentration of graduates

NETMIG (ISTAT, 2007a): Given the region of origin of a graduate, the variable provides, for each potential region of destination, the proportion of migrants coming from the same region of study of the graduate. An example will illustrate the variable better. Suppose a migrant is from region X and has to choose between region A, B, C. MIGNET would tells us that, of the total migrants living in A, 20% come from X, of the total migrants living in B, 30% come from X, etc. The variable, in other words, measures how strong are the links between the region of origin and destination of the graduate.

NETRET (ISTAT, 2007a): The variable gives similar information, based instead on the proportion of returners. For each potential region of destination, it gives the proportion of returners that come from the same region of study of the individual.

6. Non-migration dummy

NMDum: The non-migration dummy is introduced to capture the difference between "choosing the region of study as the region of residence" (i.e. staying) and "choosing any other region" (i.e. migrating or returning). Such intrinsic difference arises because there are unobservable costs (psychological and time costs) associated with moving. To control for these aspects, following Davies *et al.*(2001) we include, in the models run for the whole sample, a dummy variable that takes value 1 when the alternative (i.e. the potential region of destination) is the same as the region of study and 0 otherwise. This non-migration dummy identifies the decision to stay as distinct from any other alternative.

The percentage difference in the probability of moving versus the probability of not moving (as in equation 5.9), gives an idea of how large the unobserved costs (UC) of migration are:

$$UC = \frac{P(moving) - P(not\_moving)}{P(not\_moving)} \quad \textbf{(Eq. 5. 9)}$$

Given that the exponentiated coefficient of the non-migration dummy is the odds ratio of the variable:

$$\frac{P(not\_moving)}{P(moving)} = e^{\beta} \quad \textbf{(Eq. 5. 10)}$$

the UC can be rewritten as follows:

$$UC = \frac{P(moving)}{P(not\_moving)} - 1 = e^{-\beta} - 1 \quad \textbf{(Eq. 5. 11)}$$

Equation 5.11 tells us that all the unobservable costs of migration make the probability of moving $e^{-\beta}$-1 lower than the probability of moving.

5.5.1.1. Variables selection and correlation matrix

Table 5.1 reports the correlation matrix of the selected variables.

Table 5. 1 Correlation matrix

	EMP	HTKIEM	RDGOV	RDBUS	CULT2	TRANS	CRIM	POP	DIST	DIST2	NETMIG	NETRET
EMP	1.00											
HTKIEM	0.26	1.00										
RDGOV	-0.06	0.38	1.00									
RDBUS	0.34	0.28	0.09	1.00								
CULT	0.33	0.28	0.50	0.25	1.00							
TRANS	0.21	-0.12	-0.14	0.06	0.15	1.00						
CRIM	0.11	0.37	0.37	0.28	0.28	0.01	1.00					
POP	-0.03	0.32	0.16	0.16	0.01	-0.21	0.51	1.00				
DIST	0.07	-0.02	-0.03	0.18	0.03	0.19	0.01	-0.04	1.00			
DIST2	0.09	0.00	-0.05	0.18	0.04	0.19	0.02	0.00	0.95	1.00		
NETMIG	0.14	0.31	0.15	0.13	0.09	-0.05	0.33	0.52	-0.21	-0.17	1.00	
NETRET	-0.09	0.03	-0.04	-0.02	-0.13	0.00	0.02	0.08	-0.23	-0.19	0.54	1.00

The indicators are not highly correlated with each other (as table 5.1 shows), with the exception of DIST and DISTSQ.[23] Although their correlation is 0.95, their simultaneous

[23] The variable INNPP, used in chapter 4 to measure product and process innovation in firms, and the variable WAGE (the D-O ratio of regional wage, used in appendix 4.5) have been excluded because they were multicollinear with EMP.

inclusion in the model does not create instability in the coefficients, nor does it generate high standard errors or VIF.[24]

5.5.2. Estimation strategy

The empirical analysis consists of three sets of six models: one set for the whole sample, one for migrants and one for returners. Each model is estimated both with a CL and a MP. As well as the variables described above, each model includes regional fixed effects, in this way we control for other excluded spatial features.

The six models in each set include the following variables:

Table 5. 2 Summary of econometric analysis

Model Number	Model Name	Variables included
1	BASE	EMP, POP, DIST, DIST2 and REGIONAL FIXED EFFECTS
2	RIS	BASE + RGOV, RDBUS, HTKIEMP
3	QLIFE	BASE + CULT, TRANS, CRIM
4	NETWORKS	BASE + NETMIG, NETRET
5	REGIO	BASE + RIS + QLIFE
6	REGIO+NETWORKS	BASE + RIS + QLIFE + NETWORKS

In what follows, models AC.1 to AC.6 refer to the CL estimates for the sample of all graduates, whilst models AP.1 to AP.6 refer to the MP estimates for sample of all graduates.[25] Similarly MC.1 to MC.6 and MP.1 to MP.6 refer to estimate with CL and MP for migrants, whilst model RC.1 to RC.6 and RP.1 to RP.6 refer to returners.

5.6. Descriptive statistics

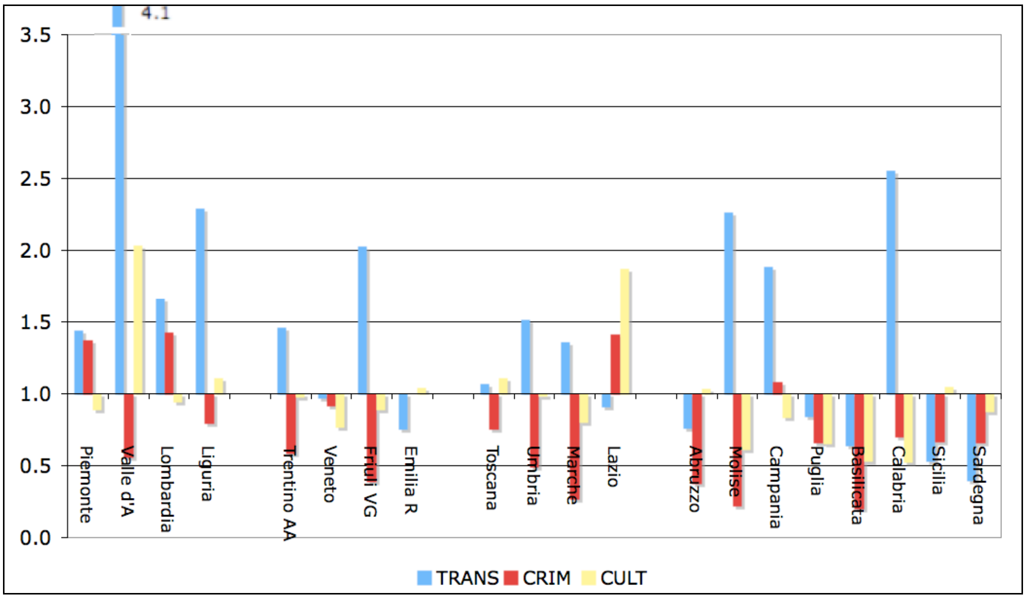
The majority of variables used in this analysis have been already introduced in chapters 3 and 4, where we have described respectively the direction of graduates flows and the innovation and employment level of Italian regions.

In this section we briefly introduce the indicators of quality of life and highlight how they differ across Italian regions. Figure 5.1 reports the regional-to-national ratio of all

[24] Variance Inflation Factor.
[25] The models for the whole sample (models A) also include the non-migration dummy in all the specification.

the quality of life variables taken into account. A value higher (lower) than one indicates that the region is performing better (worse) than Italy as a whole.

Figure 5. 1 Regional quality of life relative to the Italian average[26]



Source – author's elaborations from ISTAT ICCVR

All the regions of the Centre-North, with the exception of Lazio, Emilia Romagna and Veneto have a higher than average presence of public transport in cities (TRANS). In the South, on the other hand, only Molise, Campania and Calabria do. As for the availability of cultural amenities (CULT) Lazio, Valle d'Aosta and Liguria are the only regions outperforming Italy as a whole. Finally Lazio, Lombardia and Piemonte (where the large cities of Rome, Milan and Turin are located) have the highest level of micro-criminality and together with Campania, are the only regions to have a higher than average rate of micro-crime.

5.7. Econometric results

This section presents the econometric results, covering the models for the whole sample (models A), for migrants (models M) and for returners (models R) in subsections 5.7.1, 5.7.2 and 5.7.3.[27] In each of them we first compare the findings of the CL and MP

[26] The regions in the graph are grouped by macro-areas. Specifically Lombardia, Piemonte, Valle d'Aosta and Liguria are in the North West; The North East includes Veneto, Trentino Alto Adige, Friuli Venezia Giulia, Emilia Romagna; the Centre includes Toscana, Umbria, Marche, Lazio; the South and Islands include Abruzzo, Molise, Campania, Basilicata, Puglia, Calabria, Sicilia and Sardegna.

[27] The regional fixed effects are, for the sake of clarity, excluded from the tables below and are reported in appendix 5.3.

models and then, to contribute better to the methodological debate, we verify whether the IIA holds through a set of Hausman tests. Finally in 5.7.4 we clarify the differences across the three groups and in 5.7.5 we draw together the empirical and methodological results of the analysis.

5.7.1. Location choice of graduates

Table 5.3 below reports the results for models AC.1 and AP.1, which include only the variables accounted by traditional explanations of migration.

Table 5. 3 Base models for graduates: AC.1 and AP.1

	BASE AC.1 - CL	BASE AP.1 - MP
EMP	8.028*** (7.35)	0.623*** (9.48)
NMDummy	2.260*** (38.41)	3.083*** (80.54)
POP	0.0000869*** (5.28)	0.000126*** (14.33)
DIST	-0.565*** (-24.60)	-0.303*** (-24.99)
DIST2	0.0253*** (17.79)	0.0145*** (19.05)
No of obs. Pseudo-R2	511660 0.64	518600

* p<0.10, ** p<0.05, *** p<0.01; z scores in parentheses

All the variables have the expected sign and are highly significant (with similar order of magnitude) in both models. Population size (POP) is positive and significant, suggesting that graduates chose larger regions; furthermore we find that distance discourages migration but, as expected, it does so at declining rates (DIST is negative and DIST2 is positive). The D-O ratio of employment rate (EMP) is positive and significant indicating that graduates, in line with traditional theory, chose to live in economically more buoyant regions. The non-migration dummy is also positive, indicating that unobservable costs of relocation are important. In particular, applying equation 11 to the coefficient of the CL (2.260), it emerges that such costs make moving 89% less likely than staying.

Table 5.4 below gives the results for models covering the role of the RIS, quality of life and of migration networks.

Table 5. 4 Models AC.2, AP.2, AC.3, AP.3, AC.4, AP.4

	RIS AC.2 - CL	RIS AP.2 –MP	QLIFE AC.3 - CL	QLIFE AP.3 - MP	NETWORK AC.4 - CL	NETWORK AP.4 - MP
EMP	9.804*** (8.39)	0.519*** (7.47)	7.726*** (6.79)	0.563*** (8.03)	6.832*** (6.07)	0.270*** (4.09)
HTKIEM	0.638*** (9.72)	0.0580*** (3.54)				
RDGOV	0.0239*** (3.65)	0.00676 (1.59)				
RDBUS	0.0374*** (8.93)	0.0119*** (5.92)				
CULT2			1.195*** (8.38)	0.0271 (0.70)		
TRANS			0.0551 (1.09)	0.0506*** (3.57)		
CRIM			-0.123*** (-2.97)	0.134*** (11.40)		
NETMIG					4.630*** (19.29)	2.855*** (19.21)
NETRET					1.065*** (6.68)	1.006*** (10.38)
POP	8.72E-08*** (5.02)	1.28E-07*** (14.61)	9.09E-05*** (5.24)	1.18E-04*** (13.62)	1.41E-05 (0.92)	7.56E-05*** (8.03)
DIST	-0.600*** (-24.89)	-0.308*** (-24.85)	-0.595*** (-25.76)	-0.301*** (-24.80)	-0.220*** (-8.28)	-0.0973*** (-7.03)
DIST2	0.0263*** (17.67)	0.0147*** (18.75)	0.0274*** (19.14)	0.0143*** (18.62)	0.00802*** (4.92)	0.00442*** (5.09)
NMdum	2.372*** (38.79)	3.091*** (79.60)	2.280*** (36.70)	3.127*** (81.11)	3.942*** (47.80)	4.126*** (82.04)
No of obs. Pseudo-R2	508700 0.64	515640	511660 0.64	518600	511660 0.65	518600

* p<0.10, ** p<0.05, *** p<0.01; z scores in parentheses

As in models AC.1 and AP.1, the D-O ratio of employment rate, population size, distance and its square as well as the non-migration dummy (i.e. the *base* variables) are highly significant and have the expected sign in all the regressions (the only exception is POP is AC.4, where it is not significant). Models AC.2 and AP.2, which take into account the regional innovation, confirm that a strong knowledge base is an attractive feature for high-skilled individuals: the D-O ratio of employment in high-tech sectors (HTKIEMP) and the proportion of private R&D expenditures on GDP (RDBUS) are positive and significant in both the MP and the CL. On the other hand, the D-O ratio of the proportion of public R&D expenditures on GDP (RDGOV) is positive and significant in the CL and positive and not significant in the MP. Models AC.3 and AP.3 include the variables that account for quality of life and cultural amenities and provide slightly different results. The CL, in line with the "Creative Class" hypothesis introduced by Florida (2002), confirms that graduates are attracted to regions with a higher offer of cultural activity: the destination-to-origin ratio of employment in cultural and recreational industries (CULT) is in fact positive and significant. The variable CRIM also has the expected sign (negative) and is significant, suggesting that graduates prefer areas with low micro-criminality. The variable capturing the availability of public transport (TRANS) is not significant. In the MP, on the other hand, CULT is positive but not significant, TRANS is positive and significant, indicating that graduates prefer areas with better public transport, and CRIM is significant but, unexpectedly, has a positive sign. Models AC.4 and AP.4, which take into account the presence of social networks, show that these are crucial in explaining graduates' locational choice. The results are consistent between the MP and the CL: migrants and returners chose to move to regions where there are more graduates from their area of origin. To conclude, we notice that all the CL models have rather high pseudo-R2: in AC.2 and AC.3 the pseudo-R2 is 0.64, whilst in AC.4 it is 0.65.

Table 5.5 below reports the results for the last four models: AC.5 and AP.5, which include all the regional features among the explanatory variables, and AC.6 and AP.6, which include regional features and social networks.

Table 5. 5 Models AC.5, AP.5, AC.6 and AP.6

	REGIO AC.5 - CL	REGIO AP.5 - MP	REGIO + NETWORK AC.6 - CL	REGIO + NETWORK AP.6 - MP
EMP	9.355*** (7.88)	0.491*** (6.65)	7.019*** (5.83)	0.319*** (4.31)
HTKIEM	0.559*** (7.69)	0.0423** (2.09)	-0.121 (-1.48)	-0.0374* (-1.68)
RDGOV	0.00535 (0.60)	-0.00619 (-1.25)	0.00389 (0.42)	0.00597 (1.15)
RDBUS	0.0317*** (7.15)	0.0103*** (4.44)	0.0107** (2.02)	0.00532** (2.14)
CULT	0.699*** (3.81)	-0.0222 (-0.43)	0.998*** (5.44)	-0.101* (-1.90)
TRANS	0.0986* (1.87)	0.0397*** (2.69)	-0.183*** (-3.08)	-0.0134 (-0.91)
CRIM	-0.0423 (-0.83)	0.141*** (10.59)	0.169*** (3.28)	0.127*** (8.88)
NETMIG			4.528*** (17.49)	2.738*** (17.85)
NETRET			1.355*** (7.78)	1.034*** (10.37)
POP	8.68e-08*** (4.86)	1.20E-07*** (14.00)	2.54e-08 (1.53)	7.63e-08*** (8.20)
DIST	-0.609*** (-25.28)	-0.304*** (-24.55)	-0.243*** (-8.53)	-0.104*** (-7.43)
DIST2	0.0271*** (18.22)	0.0143*** (18.30)	0.0101*** (5.91)	0.00468*** (5.35)
NMdum	2.378*** (37.00)	3.120*** (79.84)	4.022*** (44.80)	4.120*** (80.88)
No of obs.	508700	515640	511660	518600
Pseudo-R2	0.64		0.65	

* p<0.10, ** p<0.05, *** p<0.01; z scores in parentheses

Models AC.5 and AP.5 confirm that graduates are attracted to regions with a higher level of employment in high-tech sectors and with higher private, but not public, R&D expenditure (HTKIEM and RDBUS are positive and significant, RDGOV is not significant). The CL and MP models also give different results when quality of life variables are considered: the level of cultural amenities (CULT) is positive and significant in AC.5, but not in AP.5. On the other hand, whilst TRANS (the availability of public transport) is positive and significant in both cases, CRIM (capturing micro-criminality) is not significant in the CL and positive and significant in the MP. When network effects are included (models AC.6 and AP.6) the significance and sign of some of the RIS and quality of life variables change: HTKIEM is not significant in the CL and negative and weakly significant in the MP, CULT is negative and significant in the MP and not significant in the CL, TRANS is negative and significant in the CL but not significant in the MP, whilst CRIM is positive and significant in both. The network variables (NETMIG and NETRET), still have the expected sign and are strongly significant. In all the four models EMP, DIST and DIST2 as well as the non-migration dummy have the expected sign and are significant, whilst POP is not significant in AC.6.

To conclude Table 5.6 and 5.7 reports six Hausman tests, for model AC.5 (which is overall consistent with AP.5) and for model AP.6 (where CL and MP differ to some extent). The tests have been conducted by removing, in turn, six regions. These are Valle d'Aosta, Trentino Alto Adige, Lazio, Sicilia, Lombardia and Veneto and have been chosen because they differ in size, economic and innovation performance, quality of life and graduate attraction/retention.

Table 5. 6 IIA test for model AC.5

OMITTED CATEGORY	CHI2	P-VALUE	IIA RESULT
VALLE D'AOSTA	26.71	0.48	IIA holds
TRENTINO	160.97	0.00	IIA does not hold
LAZIO	145.05	0.00	IIA does not hold
SICILIA	46.76	0.01	IIA does not hold
LOMBARDIA	269.12	0.00	IIA does not hold
VENETO	387.63	0.00	IIA does not hold

Table 5. 7 IIA test for model AC.6

OMITTED CATEGORY	CHI2	P-VALUE	IIA RESULT
VALLE D'AOSTA	25.97	0.63	IIA holds
TRENTINO	220.89	0.00	IIA does not hold
LAZIO	83.59	0.00	IIA does not hold
SICILIA	33.22	0.27	IIA holds
LOMBARDIA	180.49	0.00	IIA does not hold
VENETO	158.64	0.00	IIA does not hold

The IIA holds only for Valle d'Aosta in model 5 and for Valle d'Aosta and Sicilia in model AC.6. This would encourage caution in applying and interpreting the CL. However, it should be noted firstly that models AC.5 and AP.5 are extremely similar, despite the violation of the IIA. Secondly, only four coefficients differ between AC.6 and AP.6: HTKIEM, POP, CULT and TRANS. Moreover, HTKIEM, which is not significant in the CL, is only weakly significant in the MP. POP, which is significant only in the former exerts a very weak effect in attracting graduates. In other words, the two techniques produce similar results.

5.7.2. Destination choice of migrants

Table 5.8 below gives the result of the base models for migrants (MC.1 and MP.1).

Table 5. 8 Base models for migrants: MC.1 and MP.1

	BASE MC.1- CL	BASE MP.1- MP
EMP	2.890*	0.533***
	(1.77)	(5.69)
POP	0.000204***	0.000206***
	(8.18)	(14.40)
DIST	-0.116***	-0.108***
	(-6.59)	(-8.69)
DIST2	-0.0000665	0.00318***
	(-0.04)	(3.57)
No of obs.	91440	98100
Pseudo-R2	0.1763	

* p<0.10, ** p<0.05, *** p<0.01; z scores in parentheses

The results are similar to those found for model A.1, with the exception of DIST2, which is not significant in MC.1. All the coefficients have the expected sign and are significant in both MC.1 (estimated with the CL) and MP.1 (estimated with the MP).

Table 5.9 reports the results for model MC.2, MP.2, MC.3, MP.3, MC.4 and MP.4 which take into account the role of the RIS, that of quality of life and that of migration networks.

Table 5. 9 Models MC.2, MP.2, MC.3, MP.3, MC.4, MP.4

	RIS MC.2 - CL	RIS MP.2 - MP	QLIFE MC.3 - CL	QLIFE MP.3 - MP	NETWORK MC.4 - CL	NETWORK MP.4 - MP
EMP	3.707** (2.17)	0.405*** (4.14)	4.583*** (2.72)	0.426*** (4.23)	-2.663 (-1.57)	0.0951 (0.97)
HTKIEM	1.318*** (10.86)	0.119*** (4.20)				
RDGOV	0.00636 (0.73)	0.00395 (0.71)				
RDBUS	0.0240*** (3.95)	0.00923*** (3.25)				
CULT			1.139*** (6.47)	0.152** (2.51)		
TRANS			0.577*** (7.80)	0.136*** (6.18)		
CRIM			0.00591 (0.10)	0.0280 (1.59)		
NETMIG					7.035*** (20.81)	6.584*** (26.74)
NETRET					1.033*** (4.23)	0.566*** (3.38)
POP	2.00E-04*** (7.36)	2.11E-04*** (14.53)	1.62E-04*** (6.35)	1.98E-04*** (13.82)	7.27E-05** (2.52)	2.03E-05 (1.12)
DIST	-0.177*** (-8.31)	-0.115*** (-8.96)	-0.158*** (-7.97)	-0.107*** (-8.55)	0.0366 (1.53)	0.0190 (1.32)
DIST2	0.00256* (1.65)	0.00328*** (3.58)	0.00194 (1.31)	0.00266*** (2.93)	-0.00104 (-0.63)	-0.00164* (-1.66)
N Pseudo-R2	90600 0.19	97260	91440 0.18	98100	91440 0.27	98100

* p<0.10, ** p<0.05, *** p<0.01; z scores in parentheses

Models MC.2 and MP.2, which include RIS variables, confirm that migrants chose regions that are more innovative. Specifically the coefficients for the D-O ratio of the proportion of employment in high-tech sectors (HTKIEMP) and that capturing the proportion of private R&D expenditures on GDP (RDBUS) are positive and significant in both the CL and the MP, whilst the proportion of public R&D expenditures (RDGOV) is never significant. Models MC.3 and MP.3, which take into account the role of quality of life, provide very coherent results. They show that migrants chose regions with higher employment in cultural activities (CULT is positive and significant) and better transport services (TRANS is positive and significant). The level of micro-criminality (CRIM) does not seem to exert any effect. Models MC.4 and MP.4, which take into account the role of social networks, confirm that migrants chose regions where more movers from their origin are located: NETMIG and NETRET are positive and highly significant in both the CL and MP. As for the *base* variables, we find that the D-O ratio of employment rate (EMP) and the origin-to-destination distance (DIST) are positive and significant only in the models capturing the effect of RIS and of quality of life (MC.4 and MP.4). Population is always significant except in model MP.4, whilst DIST2 is positive and significant only in MC.1, MP.1 and MP.2 and negative and significant in MP.4. Finally, we notice that the pseudo-R2 is much larger in model MC.5 (0.27), than in the former two (0.18 and 0.19).

Table 5.10 below gives the results for the last four models.

Table 5. 10 Models MC.5, MP.5, MC.6, MP.6

	REGIO MC.5 – CL	REGIO MP.5 - MP	REGIO+ NETWORK MC.6 - CL	REGIO+ NETWORK MP.6 - MP
EMP	5.134*** (2.94)	0.393*** (3.75)	-2.470 (-1.41)	0.255** (2.28)
HTKIEM	1.268*** (9.78)	0.103*** (3.13)	0.227 (1.37)	-0.0269 (-0.67)
RDGOV	-0.00611 (-0.59)	0.00282 (0.42)	0.0251** (2.21)	0.0275*** (3.70)
RDBUS	0.0244*** (3.66)	0.0114*** (3.52)	0.0123 (1.28)	0.00615* (1.79)
CULT	0.446* (1.88)	-0.0150 (-0.19)	0.629** (2.33)	-0.210** (-2.46)
TRANS	0.653*** (8.60)	0.119*** (5.17)	0.0743 (0.95)	0.0130 (0.54)
CRIM	0.0344 (0.53)	0.0311 (1.57)	0.0295 (0.38)	-0.000412 (-0.02)
NETMIG			6.918*** (18.88)	6.752*** (26.47)
NETRET			1.041*** (4.08)	0.487*** (2.82)
POP	0.000000168*** (6.27)	0.000000202*** (13.89)	7.24e-08** (2.41)	1.28e-08 (0.69)
DIST	-0.191*** (-8.65)	-0.107*** (-8.41)	0.0150 (0.59)	0.0194 (1.32)
DIST2	0.00273* (1.80)	0.00232** (2.51)	0.00000819 (0.00)	-0.00206** (-2.02)
No of obs. Pseudo-R2	90600 0.19	97260	90600 0.27	97260

* p<0.10, ** p<0.05, *** p<0.01; z scores in parentheses

In models MC.5 and MP.5 (which include all the regional factors), the *base* variables (EMP, POP, DIST and DIST2) are significant and have the expected sign. However, when network variables are added these results change: in MC.6 only POP stays significant, whilst in MP.6 only EMP has the expected sign and is significant whilst DIST2 becomes negative and significant.

Models MC.5 and MP.5, confirm that migrants are attracted to regions with a higher proportion of employment in high-tech sectors and with higher private R&D expenditures (HTKIEM and RDBUS are positive and significant). As of quality of life, both techniques show that migrants chose regions with better public transport (TRANS is positive and significant), whilst cultural activity (CULT) is significant only in the CL. Models MC.6 and MP.6 confirm the importance of networks, with NETMIG and NETRET being positive, strongly significant and of larger in magnitude than the other coefficients. Although the inclusion of the network variables renders many of the other coefficients non (or less) significant, it still emerges that migrants chose more innovative regions (RDGOV is significant in both regressions and RDBUS is significant in the MP) Moreover, MC.6 highlights that migrants move to regions with higher cultural activities as CULT is positive and significant (MP.6, however, suggests the opposite). Finally, it is important to notice that the pseudo-R2 goes from 0.19 in model MC.5 to 0.27 in model MC.6: taking into account networks of migration increases the explanatory power of the model.

As in the previous sections Table 5.11 and 5.12 reports the IIA tests based on model MC.5 and MC.6. The same six regions are removed.

Table 5. 11 IIA tests for model MC.5

CATEGORY OMITTED	CHI2	P-VALUE	IIA RESULT
VALLE D'AOSTA	25.42	0.50	IIA holds
TRENTINO	40.38	0.04	IIA does not hold
LAZIO	369.47	0.00	IIA does not hold
SICILIA	84.88	0.00	IIA does not hold
LOMBARDIA	265.97	0.00	IIA does not hold
VENETO	140.51	0.00	IIA does not hold

Table 5. 12 IIA tests for model MC.6

CATEGORY OMITTED	CHI2	P-VALUE	IIA RESULT
VALLE D'AOSTA	19.06	0.90	IIA holds
TRENTINO	44.44	0.03	IIA does not hold
LAZIO	187.03	0.00	IIA does not hold
SICILIA	54.16	0.00	IIA does not hold
LOMBARDIA	114.70	0.00	IIA does not hold
VENETO	45.94	0.02	IIA does not hold

The tables show that the IIA holds only when Valle d'Aosta (a very small region in the North West) is removed from the choice set, suggesting that the CL may not be appropriate to study the destination choice of migrants. Nonetheless it is important to notice again that models MC.5 and MP.5 are completely consistent, whilst models MC.6 and MP.6 differ in EMP, RDBUS, POP and DIST2.

5.7.3. Destination choices of returners

Table 5.13 below gives the results for the base models for returners (RC.1 and RP.1).

Table 5. 13 Base models for returners: RC.1 and RP.1

	BASE RC.1- CL	BASE RP.1- MP
EMP	-7.744**	-0.0671
	(-2.23)	(-0.28)
POP	0.000125**	0.0000538
	(2.17)	(1.63)
DIST	-0.179***	-0.188***
	(-4.74)	(-6.79)
DIST2	-0.000926	0.00241
	(-0.26)	(1.03)
No of obs.	25620	25900
Pseudo-R2	0.1298	

* p<0.10, ** p<0.05, *** p<0.01; z scores in parentheses

Distance has the expected sign in both the CL and MP, suggesting that graduates tend to return to their home regions especially if they have studied in a close area. On the other hand DIST2 is not significant in either regression. The D-O ratio of employment rate (EMP) is negative and significant in the CL (RC.1), but not significant in the MP (RP.1), confirming, as in previous chapters, that returners have a distinct pattern as compared to migrants. Whilst the CL confirms that returners prefer large regions, in terms of population, in the multinomial probit POP is not significant.

Table 5.14 gives the results for models RC.2, RP.2, RC.3, RP.3, RC.4 and RP.4.

Table 5. 14 Models RC.2, RP.2, RC.3, RP.3, RC.4, RP.4.

	RIS RC.2 - CL	RIS RP.2 - MP	QLIFE RC.3 - CL	QLIFE RP.3 - MP	NETWORK RC.4 - CL	NETWORK RP.4 - MP
EMP	-6.799*	-0.179	-8.142**	-0.120	-7.951*	-0.710***
	(-1.94)	(-0.72)	(-2.27)	(-0.53)	(-1.91)	(-2.82)
HTKIEM	1.224***	0.155***				
	(8.18)	(3.01)				
RDGOV	0.0194	0.0186*				
	(1.17)	(1.94)				
RDBUS	0.0388***	0.0142				
CULT			1.430***	0.324***		
			(3.11)	(2.64)		
TRANS			0.577***	0.185***		
			(3.64)	(3.43)		
CRIM			-0.106	-0.0130		
			(-1.03)	(-0.36)		
NETMIG					3.709***	2.382***
					(4.22)	(4.06)
NETRET					6.768***	5.966***
					(10.11)	(14.67)
POP	1.27E-07**	5.40E-08	9.87E-05*	4.12E-05	9.06E-05	3.52E-06
	(2.13)	(1.62)	(1.68)	(1.27)	(1.36)	(0.08)
DIST	-0.252***	-0.195***	-0.234***	-0.192***	-0.0337	-0.0190
	(-5.95)	(-6.85)	(-5.67)	(-6.84)	(-0.62)	(-0.61)
DIST2	0.00354	0.00255	0.00350	0.00239	0.00654	-0.000766
	(0.98)	(1.07)	(1.01)	(1.03)	(1.54)	(-0.33)
No of obs.	25300	25580	25620	25900	25620	25900
Pseudo-R2	0.1401		0.1353		0.2883	

* p<0.10, ** p<0.05, *** p<0.01; z scores in parentheses

In these models EMP, POP, DIST and DIST2 show similar patterns than in models RC.1 and RP.1 above. EMP is negative and significant in all the CLs, whilst it is no significant in RP.2 and RP.3 and negative and significant in RP.4. POP and DIST are significant and have the expected sign in the models accounting for the RIS and for the quality of life, but are not significant when networks are included. DIST2 is never significant. The models that take into account the RIS (RC.2 and RP.2) show that, as migrants, returners tend to move towards more innovative regions: HTKIEM, is positive and significant in both regressions, whilst RDGOV and RDBUS are respectively positive and significant in RP.2 and RC.2. Models RC.3 and RP.3, which include quality of life variables, both indicate that returners prefer areas with more cultural activities and better transport networks (CULT and TRANS are positive and significant). The variable capturing micro-criminality (CRIM) has the expected negative sign in both models but is not significant. Finally, models RC.4 and RP.4 confirm, also for returners, the importance of networks: NETMIG and NETRET are highly significant and positive in both the MP and CL.

Table 5.15 below reports the results for model RC.5, RP.6, RC.6 and RP.6.

Table 5. 15 Models RC.5, RP.5, RC.6, RP.6

	REGIO RC.5 - CL	REGIO RP.5 - MP	REGIO + NETWORK RC.6 - CL	REGIO + NETWORK RP.6 - MP
EMP	-6.528* (-1.77)	-0.157 (-0.65)	-8.347** (-2.02)	-0.739*** (-2.63)
HTKIEM	1.245*** (7.56)	0.143** (2.15)	0.339 (1.47)	0.0842 (1.21)
RDGOV	0.0277 (0.96)	0.0287** (2.29)	-0.0168 (-0.41)	0.0325* (1.92)
RDBUS	0.0351** (2.07)	0.0194* (1.73)	0.0214 (0.88)	0.0180 (1.61)
CULT	-0.0176 (-0.02)	-0.0110 (-0.06)	1.160 (1.36)	-0.568*** (-2.89)
TRANS	0.608*** (3.71)	0.156*** (2.77)	-0.388 (-1.56)	-0.0985 (-1.48)
CRIM	-0.137 (-1.16)	-0.0266 (-0.65)	-0.0589 (-0.39)	-0.105** (-2.14)
NETMIG			3.463*** (3.43)	2.420*** (3.98)
NETRET			6.882*** (9.58)	6.162*** (14.88)
POP	9.67e-08 (1.58)	4.46e-08 (1.36)	0.000000116* (1.69)	1.66e-08 (0.36)
DIST	-0.279*** (-6.21)	-0.199*** (-6.87)	-0.0417 (-0.74)	-0.00935 (-0.28)
DIST2	0.00552 (1.57)	0.00269 (1.14)	0.00672 (1.56)	-0.000862 (-0.36)
No. of Obs. Pseudo-R2	25300 0.14	25580	25300 0.29	25580

* p<0.10, ** p<0.05, *** p<0.01; z scores in parentheses

Models RC.5 and RP.5 (which include all the regional variables) confirm that returners tend to have studied in regions close to home (DIST is negative and significant). POP and DIST2 are not significant in either regression, whilst EMP is negative and significant in the former and not significant in the latter. As of models RC.6 and RP.6 (which include both regional and network variables), DIST and DIST2 are not significant, POP is significant and positive only in RC.6 and EMP is negative and significant in both the CL and the MP.

Model RC.5 indicates that returners move to regions with more employment in high-tech sectors and with a higher level of private R&D expenditures (HTKIEMP and RDBUS are positive and significant), model RP.5 confirms these results and suggests that public expenditures in R&D (RDGOV) also exert a positive effect. Models RC.5 and RP.5 produce similar results for the variables capturing quality of life, with TRANS being positive and significant in both cases and indicating that returners move to region with better public transport.

The network variables, in models RC.6 and RP.6 are, as in the previous models, highly significant, of large magnitude and of the expected sign. However, their inclusion makes the majority of regional variables to become insignificant in the CL. In the MP, on the other hand, it still emerges that returners are attracted to more innovative region (RDGOV is positive and significant), whilst CULT is negative and significant. As in the former cases the pseudo-R2 increases when network variables are included, going form 0.14 to 0.29.

To conclude, tables 5.16 and 5.17 give the results of the IIA tests for returners. As usual, the Hausman tests have been conducted on the specification including both all regional variables (RC.5) and regional and network variables (RC.6) and removing the same six regions.

Table 5. 16 IIA Tests for model RC.5

CATEGORY OMITTED	CHI2	P-VALUE	IIA RESULT
VALLE D'AOSTA	9.38	0.99	IIA holds
TRENTINO	18.57	0.85	IIA holds
LAZIO	373.62	0.00	IIA does not hold
SICILIA	54.53	0.00	IIA does not hold
LOMBARDIA	67.11	0.00	IIA does not hold
VENETO	137.74	0.00	IIA does not hold

Table 5. 17 IIA Tests for model RC.6

CATEGORY OMITTED	CHI2	P-VALUE	IIA RESULT
VALLE D'AOSTA	12.51	0.99	IIA holds
TRENTINO	19.21	0.89	IIA holds
LAZIO	110.47	0.00	IIA does not hold
SICILIA	15.92	0.97	IIA holds
LOMBARDIA	29.87	0.42	IIA holds
VENETO	31.87	0.28	IIA holds

The IIA assumption holds more often for returners: in two and five cases respectively for models RC.5 and RC.6, suggesting that the CL is an appropriate methodology.[28] Again, models 5 are more similar than models 6.

5.7.4. Comparing graduates, migrants and returners

In this subsection we try to identify the distinct spatial preferences of migrants and returners. To do so, we will take into account two aspects: first we will compare the odds ratios of models AC.5, MC.5 and RC.5 (for the regional variables), and of AC.6, MC.6 and RC.6 (for the network variables); secondly, we will evaluate, for each mobility category, how coherent the results of the six models are. Both these steps are needed, given the large number of regressions run, the methodological debate and the occasional conflicting results.

Table 5.18 below reports the coefficient and the odds ratios[29] of the traditional migration variables.

[28] Indeed, the IIA assumption is effectively implicit in the choice of returning in that, regardless of the existence and of the characteristics of other regions, there is only one that can be called *home*. In this sense, the fact that the IIA now holds more often validates the original distinction between migrants and returners, introduced in this thesis.
[29] The ORs are only reported for significant variables.

Table 5. 18 ORs for traditional migration variables

	AC.5	MC.5	RC.5
	ALL	MIGRANTS	RETURNERS
EMP	9.355***	5.134***	-6.528*
OR	11556.46	169.69	0.0014
POP	8.68E-08***	1.68E-07***	9.67E-08
OR	1.00	1.00	
DIST	-0.609***	-0.191***	-0.279***
OR	0.54	0.83	0.76
DIST2	0.0271***	0.00273*	0.00552
OR	1.03	1.03	

* p<0.10, ** p<0.05, *** p<0.01

EMP is positive and significant for migrants and for the whole sample, whilst it is negative and significant for returners (a very consistent result across specifications). Its impact is extremely strong across all groups. For returners, for instance, a unitary increase in EMP would reduce the odds of choosing a region by nearly 99.9%.[30] To make sense of this figure, however, one must recall that EMP, and all the other regional variables, are expressed as D-O ratios. This means that a unitary increase could occur only under radically new circumstances, for example, if the employment rate doubled at destination, or halved at the origin. Table 5.18 also shows that migrants are the least concerned by distance: an increase in 100km in distance (i.e. a unitary increase of DIST) reduces the chances of choosing a region as destination by 17% for migrants and by 24% for returners. Furthermore, the table highlights that although POP is significant in AC.5 and MC.5, but not in RC.5, its effect is negligible (the ORs are 1.00).

Table 5.19 reports the coefficient and the ORs of the RIS variables in models AC.5, MC.5 and RC.5

Table 5. 19 ORs for RIS variables in models AC.5, MC.5 and RC.5

	AC.5	MC.5	RC.5
	ALL	MIGRANTS	RETURNERS
HTKIEM	0.559***	1.268***	1.245***
OR	1.75	3.55	3.47
RDGOV	5.35E-03	-0.00611	2.77E-02
RDBUS	0.0317***	0.0244***	0.0351**
OR	1.03	1.02	1.04

* p<0.10, ** p<0.05, *** p<0.01

[30] That is 1-0.0014=0.9986. See section 5.4.1 above for the interpretation of ORs.

A higher level of R&D private expenditures (RDBUS) increase the odds of choosing a region as a destination to a similar level across migrants, returners and the whole group (a unitary increase of RDBUS will raise the odds of choosing a region by 3% for the whole group, by 4% for returners and by 2% for migrants). However, the most important factor attracting/retaining graduates is the D-O ratio of the employment in knowledge intensive sectors (HTKIEMP): a unitary increase of HTKIEMP raises the odds of choosing a region as a destination by 75% when the whole group is taken into account, and by 255% and 247% for migrants and returners respectively.

In MC.5 and RC.5 the two types of movers have similar coefficients for the RIS variables, which suggests that the two value the regional knowledge base similarly, in comparison to the other regional characteristics.[31] Nonetheless it must be noted that in the other models where the regional knowledge base was taken into account (models M.2, R.2 and M.6 and R.6)[32], the RIS variables tend to be more often significant and of larger magnitude for migrants than for returners. Overall, therefore, we conclude that that the RIS is a relatively more important factor of attraction for the former.

Table 5.20 reports the coefficient and ORs for the quality of life variables in models AC.5, MC.5 and RC.5.

Table 5. 20 ORs for quality of life in models AC.5 MC.5 and RC.5

	AC.5	MC.5	RC.5
	ALL	MIGRANTS	RETURNERS
CULT	0.699***	0.446*	-0.0176
OR	2.01	1.56	
TRANS	0.0986*	0.653***	0.608***
OR	1.10	1.92	1.84
CRIME	-0.0423	0.0344	-0.137
OR			

* p<0.10, ** p<0.05, *** p<0.01

The three groups differ in how they value cultural amenities. Whilst a unitary increase of CULT (the D-O ratio of the proportion of employment in cultural and recreational

[31] As we have expressed all the regional variables in terms of D-O ratios, we can compare their relative impact within models.

[32] That is in MC.2, MP.2, MC.6, MP.6 and RC.2, RP.2, RC.5, RP.5.

sectors) make the odds of choosing a region as destination 56% higher for migrants and 101% higher for the group as a whole, the variable is not significant for returners. The availability of public transport (captured by TRANS) is significant for the three groups: a unitary increase in TRANS raises the odds of choosing a region as a destination by 92% for migrants, 84% for returners and 10% for graduates as a whole.

Finally, Table 5.21 below, reports the coefficients and ORs for network variables in models A6, M6 and R6.

Table 5. 21 ORs for networks of migrants and returners

	AC.6	MC.6	RC.6
	ALL	MIGRANTS	RETURNERS
NETMIG	4.528***	2.738***	3.463***
OR	92.57	15.46	31.91
NETRET	1.355***	1.034***	6.882***
OR	3.88	2.81	974.57

* p<0.10, ** p<0.05, *** p<0.01

The effect of mobility networks is positive and highly significant across specifications (with very large ORs). Unsurprisingly, NETMIG, which captures networks of migrants, is higher than NETRET in the model for migrants, whilst the opposite is true in the models for returners. In other words, it is the presence of graduates from the same mobility category that is the most important factor in determining the destination choice.

5.7.5. Discussion

The econometric analysis has revealed important empirical and methodological insights. As for the former, the results have shown that regional innovation, quality of life and mobility networks are all important in determining the location of graduates, migrants and returners. They have also confirmed that movers differ in their behaviour: returners tend to relocate towards regions with weaker economic performance, whilst migrants place more importance on the availability of cultural amenities and on the innovation level of the region. The study has also taken into account the non-economic costs of migration applying, for the first time to the Italian case, a methodology developed by Davies *et al.*(2001) and showing that these costs are extremely important. The most striking results regard, however, the role of mobility networks, which have proven as crucial in determining destination choices. Skilled migration has emerged as a collective phenomenon, as graduates rely heavily on their peers when choosing where to go. Furthermore, the fact that in models 6, where the macro and the meso levels are jointly considered, many of the regional variables lose their significance, indicates that the direction of skilled flows is better explained by looking at its social nature than at its structural drivers.

Methodologically, this chapter has contributed to the debate on the advantages of the multinomial probit and conditional logit models. We found that the MP and CL give overall consistent results in the first five models of each set, and especially in the models for migrants and returners (models M and R). In models 6[33] (where both the macro and meso levels are included), however, this is less the case. Furthermore, the degree of similarity between the two techniques is, across models, independent from whether they respect the IIA assumption or not. These results give two methodological indications: first, they confirm that the violation of the IIA is not a sufficient reason to use the MP, as the results are qualitatively similar (Dow and Endersby, 2004; and Christiadi and Cushing, 2007). Secondly, they seem to indicate (though more research should be carried out) that the inconsistencies between techniques may mask problems with the specification of the model. In particular, the fact that MP and CL give more similar results when macro and meso aspects are analysed separately (models 1 to 5) than jointly (models 6) suggests that there are problems in capturing the interaction between the macro and meso dimensions.

It is important to stress, that this observation does not invalidate our results; rather, it highlights an important direction for future research: more should be known about the social nature of migration and the way it manifests itself into spatial patterns.

5.8. Conclusions

Chapter 5 has analysed the locational choice of graduates from both a macro and a meso level perspective, a task rarely undertaken in economic-geography studies of migration. In so doing it has provided evidence for policy makers aiming at increasing the retention and attraction of human capital into a region.

[33] That is model AC.6 and AP.6, MC.6 and MP.6, RC.6 and RP.6.

At the macro level, it has compared different drivers of migration, such as economic performance, quality of life and the regional knowledge base. At the meso level, it has focussed on the importance of networks in determining graduates' movements. We have highlighted how, whilst migrants and graduates as a whole tend to move towards regions with higher employment, this is not the case for returners. Furthermore we have found that although all graduates prefer highly innovative regions, this is more strongly the case for migrants. Graduates also enjoy living in areas with a high quality of life, and migrants, are particularly attracted to regions that offer cultural amenities. Whilst this macro analysis has highlighted the structural features that drive population flows, we have also shown that the meso-level matters and that networks are key mechanisms that sustain and direct graduates' mobility.

Methodologically the study has applied different sets of conditional logit and multinomial probit models, which present different strengths and weaknesses upon which scholars are debating. Whilst the former relies on the restrictive IIA assumption, the latter can be only estimated through simulation, making the results more uncertain and convergence times more lengthy. Throughout the specifications, the MP and CL have been generally consistent, especially in models 1 to 5, regardless of whether the IIA was holding or not. This confirms, as suggested by Christiadi and Cushing (2007) and Dow and Endersby (2004), that the less onerous CL is to be preferred even when the IIA seems to be violated.

The results are rich in policy implications. They indicate that there is a wide spectrum of regional structural features upon which policy makers could act to attract and retain human capital. Secondly, they imply that social networks should be accessed for the communication and management of any policy aimed at attracting and retaining graduates.[34]

To conclude, the limitations of the analysis need to be highlighted. Firstly, the results are limited to a cohort of graduates and it would be interesting to verify whether the same relationships hold in different years. In particular, understanding how migration

[34] Incidentally, universities could play an important role as they could access networks by actively engaging with their alumni.

networks operate dynamically seems to be crucial both at the theoretical and empirical level. Secondly, and perhaps most importantly, the results shed light on only one aspect of development policy: although attracting human resources is crucial for regional growth, this can only be seen as one element of a more comprehensive strategy.

Appendix 5.1 – Synopsis of the variables

1. Traditional explanations of migration

EMP – D-O ratio of the employment rate in 2003.

POP – D-O ratio of the population (expressed in 1000 inhabitants) in 2003.

DIST – distance (in 100km) between the main city of the region of origin and the main city of the region of destination.

DIST2 (ACI) – squared distance (as defined above).

2. The regional innovation system

HTKIEMP – D-O ratio of the percentage of employment in high-tech sectors in 2003.

RDGOV – D-O ratio of the proportion of public R&D expenditures on regional GDP in 2003.

RDBUS – D-O ratio of the proportion of business R&D expenditures on regional GDP in 2003

3. Quality of life

CULT – D-O ratio of the proportion of employment in the cultural and recreation industries in 2003.

CRIME captures the proportion of micro-criminality in cities. It – D-O ratio of the number of micro-crime per 1000 citizens in 2003.

TRANS captures the availability of public transport. It – D-O ratio of the number of public transport lines (in cities) per 100 square km in 2003.

5. Migration network & concentration of graduates

NETMIG (ISTAT, 2007a) – captures the networks of migrants between two regions.

NETRET (ISTAT, 2007a) – captures the networks of returners between two regions

6. Non-migration dummy

NMDum: The non-migration dummy

Appendix 5.2 – A practical difference between the ML and the CL[35]

Although the CL is effectively a particular case of ML, there is an important practical difference between the two (or between the MP used with decision makers' attributes and the MP used to study alternatives' characteristics). While in the ML each individual is represented by a single line and the dependent variable is just the number of the alternative chosen, in the CL (or the MP with alternatives' characteristics) each line represents a single alternative (i.e. a single potential region of destination) and the dependent variable is a binary one indicating whether or not the alternative has been chosen. To clarify this, let us use an example. Suppose we observe 3 students and each student faces 4 choices (e.g. regions 1, 2, 3 or 4). The explanatory variables are two regional attributes (e.g. regional employment rate and regional R&D expenditures). The data matrix to estimate CL would consist of 12 rows, 3 blocks of 4 rows, as in the table below.

Table A5.2.1 Example of data matrix for a CL

Graduate	Alternative	**Choice**	*Employment Rate*	*Proportion of R&D Spending on GDP*
1	1	0	84.39	319
1	2	1	81.07	295
1	3	0	79.83	300
1	4	0	60.4	178
2	1	1	84.39	319
2	2	0	81.07	295
2	3	0	79.83	300
2	4	0	60.4	178
3	1	1	84.39	319
3	2	0	81.07	295
3	3	0	79.83	300
3	4	0	60.4	178

The first column indicates the individual decision maker, the second the number of each alternative, while the third column, ***Choice***, is the dependent variable. The last two columns contain the two alternative-specific explanatory variables. Needless to say, due to the much more complex database construction models that take into account alternatives' rather than individuals' characteristics are harder to estimate and take longer to converge.

[35] This section is adapted from Faggian (2005).

Appendix 5.3 – Regional fixed effects

Table A5.3.1 Regional fixed effects, models AC.1 to AC.6

	BASE AC.1-CL	RIS AC.2-CL	QLIFE AC.3-CL	NET AC.4-CL	REGIO AC.5-CL	REGIO +NET AC.6-CL
Valle d'Aosta	-2.551***	-1.191***	-4.227***	-2.190***	-3.249***	-3.756***
	(-9.20)	(-3.49)	(-10.76)	(-8.13)	(-4.69)	(-5.48)
Trentino	-1.519***	-1.356***	-1.702***	-0.791***	-1.585***	-0.748***
	(-9.41)	(-7.78)	(-9.78)	(-5.35)	(-8.37)	(-4.27)
Veneto	-0.245***	1.023***	-0.0911	-0.170**	0.515*	-0.568**
	(-3.03)	(4.92)	(-1.01)	(-2.22)	(1.86)	(-2.09)
Friuli VG	-1.076***	-0.881***	-1.317***	-0.779***	-0.849***	-0.288
	(-8.43)	(-5.91)	(-8.86)	(-6.00)	(-4.70)	(-1.61)
Liguria	-0.199*	-0.182	-0.582***	0.0763	0.201	0.579*
	(-1.95)	(-0.75)	(-4.84)	(0.81)	(0.66)	(1.90)
Emilia Romagna	-1.286***	-1.163***	-1.467***	-0.992***	-1.357***	-1.422***
	(-8.89)	(-7.55)	(-9.60)	(-6.96)	(-8.02)	(-8.44)
Toscana	-0.606***	-0.159	-0.954***	-0.419***	-0.610***	-0.866***
	(-7.32)	(-1.40)	(-9.57)	(-4.86)	(-3.38)	(-5.03)
Umbria	-0.855***	-0.245*	-1.125***	-0.684***	-0.581***	-0.654***
	(-7.52)	(-1.81)	(-8.57)	(-5.91)	(-3.42)	(-4.19)
Marche	-0.791***	0.0302	-0.848***	-0.751***	-0.819**	-0.804**
	(-6.20)	(0.11)	(-5.05)	(-5.74)	(-2.13)	(-2.16)
Lazio	0.767***	0.267	-0.209	0.605***	0.442	0.0952
	(6.08)	(1.00)	(-1.13)	(4.48)	(1.53)	(0.32)
Abruzzo	-0.324***	0.231	-0.703***	-0.153	-0.0796	-0.292
	(-2.71)	(1.60)	(-4.63)	(-1.22)	(-0.40)	(-1.55)
Molise	0.155	1.847***	0.233	0.239	1.218***	0.604*
	(0.68)	(5.49)	(0.95)	(0.99)	(3.19)	(1.65)
Campania	1.892***	3.251***	1.799***	1.892***	2.480***	1.565***
	(5.25)	(7.23)	(4.82)	(4.97)	(4.82)	(3.06)
Puglia	2.073***	3.757***	2.349***	1.969***	3.067***	1.840***
	(5.63)	(7.60)	(6.05)	(5.15)	(5.52)	(3.33)
Basilicata	1.270***	3.454***	1.552***	1.160***	1.860**	0.485
	(4.59)	(5.26)	(4.99)	(4.05)	(2.17)	(0.57)
Calabria	2.741***	4.831***	2.997***	2.071***	3.654***	2.162***
	(7.59)	(8.86)	(8.05)	(5.55)	(5.66)	(3.38)
Sicilia	2.197***	3.747***	1.866***	2.211***	2.933***	1.472**
	(5.16)	(7.37)	(4.05)	(5.02)	(4.84)	(2.47)
Sardegna	1.146***	2.721***	1.154***	1.069***	1.857***	0.388
	(5.16)	(7.24)	(4.48)	(4.63)	(3.69)	(0.78)
N	511660	508700	511660	511660	508700	508700

t statistics in parentheses
* p<0.10, ** p<0.05, *** p<0.01; Lombardia (Alternative 3) dropped because of collinearity

Table A5.3.2 Regional fixed effects, models AP.1 to AP.6

	BASE AP.1-MP	RIS AP.2-MP	QLIFE AP.3-MP	NET AP.4-MP	REGIO AP.5-MP	REGIO +NET AP.6-MP
Valle d'Aosta	-0.702***	-0.557***	-0.772***	-0.450***	-0.775***	-0.208
	(-5.96)	(-4.57)	(-5.53)	(-3.83)	(-3.97)	(-1.08)
Trentino	-0.361***	-0.315***	-0.289***	-0.110	-0.234***	-0.0121
	(-4.87)	(-4.13)	(-3.88)	(-1.41)	(-3.04)	(-0.15)
Veneto	0.0802*	0.167***	0.147***	0.116**	0.196***	0.111**
	(1.81)	(3.40)	(3.22)	(2.52)	(3.92)	(2.28)
Friuli VG	-0.325***	-0.302***	-0.266***	-0.193**	-0.192**	-0.0929
	(-4.29)	(-3.92)	(-3.44)	(-2.37)	(-2.39)	(-1.08)
Liguria	-0.132**	-0.132*	-0.132*	0.0519	-0.0212	0.111
	(-2.02)	(-1.88)	(-1.95)	(0.76)	(-0.29)	(1.46)
Emilia R	-0.294***	-0.257***	-0.240***	-0.0733	-0.216***	-0.0539
	(-5.94)	(-5.09)	(-4.74)	(-1.38)	(-4.16)	(-1.00)
Toscana	-0.271***	-0.223***	-0.206***	0.0320	-0.171***	0.0867
	(-5.49)	(-4.38)	(-4.06)	(0.60)	(-3.17)	(1.54)
Umbria	-0.438***	-0.378***	-0.375***	-0.166**	-0.311***	-0.0850
	(-5.81)	(-4.89)	(-4.91)	(-2.04)	(-3.94)	(-1.01)
Marche	-0.130*	-0.0441	-0.0127	0.0533	0.00134	0.157**
	(-1.83)	(-0.60)	(-0.18)	(0.71)	(0.02)	(2.00)
Lazio	0.187***	0.130**	0.152***	0.218***	0.210***	0.244***
	(4.56)	(2.48)	(2.98)	(5.16)	(3.68)	(4.33)
Abruzzo	-0.274***	-0.253***	-0.164**	-0.0606	-0.131*	0.00241
	(-3.78)	(-3.42)	(-2.20)	(-0.78)	(-1.71)	(0.03)
Molise	-0.315***	-0.201**	-0.221**	-0.109	-0.0966	0.00595
	(-3.50)	(-2.08)	(-2.42)	(-1.19)	(-0.97)	(0.06)
Campania	-0.336***	-0.315***	-0.331***	-0.0773*	-0.318***	-0.0739
	(-7.71)	(-7.00)	(-7.63)	(-1.65)	(-6.82)	(-1.51)
Puglia	0.0448	0.0953	0.132**	0.126**	0.168***	0.152***
	(0.80)	(1.64)	(2.28)	(2.19)	(2.83)	(2.61)
Basilicata	0.104	0.235**	0.278***	0.0981	0.261***	0.201**
	(1.10)	(2.38)	(2.91)	(1.02)	(2.63)	(2.04)
Calabria	0.527***	0.620***	0.519***	0.201***	0.544***	0.268***
	(7.87)	(9.04)	(7.56)	(2.92)	(7.48)	(3.55)
Sicilia	-0.109*	-0.0699	-0.0133	-0.0135	0.0221	0.0555
	(-1.95)	(-1.21)	(-0.22)	(-0.24)	(0.35)	(0.94)
Sardegna	0.179***	0.264***	0.272***	0.170***	0.314***	0.231***
	(2.85)	(4.04)	(4.26)	(2.61)	(4.71)	(3.45)
Const	-3.190***	-3.411***	-3.387***	-3.772***	-3.020***	-3.879***
	(-33.65)	(-22.85)	(-34.20)	(-39.56)	(-16.69)	(-20.66)
N	518600	515640	518600	518600	515640	515640

t statistics in parentheses
* p<0.10, ** p<0.05, *** p<0.01; Lombardia (Alternative 3) dropped because of collinearity

Table A5.3.3 Regional fixed effects, models MC.1 to MC.6

	BASE MC.1-CL	RIS MC.2-CL	QLIFE MC.3-CL	NET MC.4-CL	REGIO MC.5-CL	REGIO MC.5-CL	REGIO+ NET MC.5-CL
Valle d'Aosta	-1.739***	0.617	-5.147***	-1.100***	-1.894**	-1.894**	-2.333***
	(-4.99)	(1.42)	(-8.57)	(-3.15)	(-2.52)	(-2.52)	(-2.79)
Trentino	-0.931***	-0.520*	-1.274***	-0.142	-0.784***	-0.784***	-0.276
	(-3.71)	(-1.94)	(-4.88)	(-0.57)	(-2.79)	(-2.79)	(-1.00)
Veneto	0.00493	1.889***	0.378***	0.118	2.063***	2.063***	0.137
	(0.04)	(6.76)	(2.95)	(0.90)	(6.07)	(6.07)	(0.39)
Friuli VG	-0.676***	-0.131	-1.133***	-0.225	-0.564**	-0.564**	0.0739
	(-3.51)	(-0.60)	(-5.18)	(-1.15)	(-2.12)	(-2.12)	(0.27)
Liguria	-0.459***	-0.271	-1.242***	-0.241	-0.740	-0.740	0.294
	(-2.58)	(-0.67)	(-5.85)	(-1.28)	(-1.52)	(-1.52)	(0.57)
Emilia R	-0.326	0.208	-0.345	0.704***	0.407	0.407	0.614**
	(-1.34)	(0.82)	(-1.36)	(3.08)	(1.46)	(1.46)	(2.38)
Toscana	-0.666***	0.229	-0.789***	0.220	0.314	0.314	0.0321
	(-4.70)	(1.29)	(-4.95)	(1.51)	(1.31)	(1.31)	(0.14)
Umbria	-0.929***	0.0987	-1.158***	-0.501**	-0.0856	-0.0856	-0.439*
	(-4.52)	(0.43)	(-5.22)	(-2.32)	(-0.34)	(-0.34)	(-1.72)
Marche	-0.456**	0.823*	-0.389*	0.123	0.590	0.590	-0.234
	(-2.17)	(1.93)	(-1.68)	(0.60)	(1.20)	(1.20)	(-0.46)
Lazio	0.596***	-0.505	-0.0502	-0.0332	0.000244	0.000244	-0.491
	(3.42)	(-1.36)	(-0.21)	(-0.17)	(0.00)	(0.00)	(-1.09)
Abruzzo	-0.546**	0.368	-0.331	-0.499**	0.744**	0.744**	-0.467
	(-2.57)	(1.50)	(-1.37)	(-2.18)	(2.56)	(2.56)	(-1.62)
Molise	-1.057***	1.555***	-1.022***	-1.716***	1.101**	1.101**	-1.374***
	(-3.17)	(3.47)	(-2.78)	(-4.79)	(2.29)	(2.29)	(-2.68)
Campania	-0.802	0.851	-0.402	-1.369**	0.922	0.922	-1.572**
	(-1.49)	(1.30)	(-0.72)	(-2.46)	(1.33)	(1.33)	(-2.26)
Puglia	-0.00966	2.071***	1.228**	-1.112**	2.784***	2.784***	-1.123
	(-0.02)	(2.93)	(2.15)	(-2.02)	(3.72)	(3.72)	(-1.48)
Basilicata	0.209	3.034***	1.370***	-0.933**	3.444***	3.444***	-1.570
	(0.58)	(3.66)	(3.37)	(-2.33)	(3.54)	(3.54)	(-1.44)
Calabria	1.009*	3.384***	1.139**	-1.177**	2.691***	2.691***	-1.511*
	(1.93)	(4.37)	(2.05)	(-2.11)	(3.23)	(3.23)	(-1.69)
Sicilia	-0.0420	1.885**	1.041	-1.491**	2.979***	2.979***	-1.635*
	(-0.07)	(2.54)	(1.54)	(-2.21)	(3.58)	(3.58)	(-1.95)
Sardegna	-1.155***	0.868	-0.174	-2.126***	1.600**	1.600**	-2.342***
	(-2.81)	(1.49)	(-0.40)	(-4.80)	(2.38)	(2.38)	(-3.31)
const							
N	91440	90600	91440	91440	90600	90600	90600

t statistics in parentheses
* p<0.10, ** p<0.05, *** p<0.01; Lombardia (Alternative 3) dropped because of collinearity

Table A5.3.4 Regional fixed effects, models MP.1 to MP.6

	BASE MP.1- MP	RIS MP.2 - MP	QLIFE MP.3 - MP	NET MP.4 - MP	REGIO MP.5 - MP	REGIO+ NET MP.6 - MP
Valle d'Aosta	-0.596***	-0.339*	-1.137***	-0.708***	-1.328***	-0.696**
	(-3.59)	(-1.91)	(-5.27)	(-4.04)	(-4.48)	(-2.38)
Trentino	-0.257**	-0.230*	-0.275**	-0.241*	-0.243*	-0.296**
	(-2.17)	(-1.86)	(-2.30)	(-1.89)	(-1.90)	(-2.20)
Veneto	0.0701	0.227***	0.160**	0.0105	0.242***	-0.0401
	(0.96)	(2.71)	(2.13)	(0.13)	(2.78)	(-0.42)
Friuli VG	-0.196*	-0.0720	-0.276**	-0.187	-0.0737	-0.193
	(-1.65)	(-0.58)	(-2.26)	(-1.47)	(-0.57)	(-1.40)
Liguria	-0.156	0.0485	-0.321***	-0.119	0.0140	-0.0779
	(-1.35)	(0.38)	(-2.60)	(-0.97)	(0.10)	(-0.54)
Emilia R	-0.00153	0.0604	0.0740	0.229***	0.0968	0.222**
	(-0.02)	(0.75)	(0.93)	(2.80)	(1.13)	(2.54)
Toscana	-0.356***	-0.270***	-0.340***	0.0839	-0.308***	0.0817
	(-4.10)	(-2.97)	(-3.75)	(0.92)	(-3.07)	(0.81)
Umbria	-0.359***	-0.219	-0.399***	-0.271**	-0.264*	-0.287**
	(-2.78)	(-1.64)	(-3.00)	(-1.97)	(-1.87)	(-1.96)
Marche	-0.0450	-0.0251	-0.00823	-0.0264	-0.0828	-0.103
	(-0.39)	(-0.20)	(-0.07)	(-0.22)	(-0.64)	(-0.78)
Lazio	0.333***	0.285***	0.226***	0.152**	0.268***	0.127
	(5.30)	(3.46)	(2.65)	(2.11)	(2.75)	(1.16)
Abruzzo	-0.225*	-0.153	-0.170	-0.190	-0.0725	-0.193
	(-1.77)	(-1.14)	(-1.27)	(-1.42)	(-0.51)	(-1.34)
Molise	-0.504***	-0.226	-0.594***	-0.656***	-0.328**	-0.712***
	(-3.65)	(-1.51)	(-4.17)	(-4.49)	(-2.06)	(-4.29)
Campania	-1.012***	-0.975***	-1.094***	-0.231***	-1.116***	-0.256***
	(-12.24)	(-11.16)	(-12.98)	(-2.60)	(-12.03)	(-2.62)
Puglia	-0.380***	-0.293***	-0.275***	-0.0930	-0.196**	-0.0975
	(-4.32)	(-3.18)	(-3.02)	(-0.98)	(-2.04)	(-0.99)
Basilicata	0.0889	0.0868	0.226	-0.213	0.0505	-0.320**
	(0.63)	(0.57)	(1.56)	(-1.43)	(0.32)	(-2.00)
Calabria	0.390***	0.471***	0.234**	-0.168	0.197*	-0.250*
	(3.69)	(4.25)	(2.20)	(-1.41)	(1.67)	(-1.88)
Sicilia	-0.524***	-0.393***	-0.413***	-0.135	-0.319***	-0.0147
	(-5.22)	(-3.76)	(-3.85)	(-1.23)	(-2.74)	(-0.12)
Sardegna	-0.677***	-0.571***	-0.536***	-0.737***	-0.498***	-0.732***
	(-4.78)	(-3.89)	(-3.70)	(-5.00)	(-3.27)	(-4.78)
const	-3.119***	-2.717***	-3.328***	-3.101***	-2.137***	-2.781***
	(-21.74)	(-11.25)	(-22.22)	(-20.31)	(-7.35)	(-9.39)
N	98100	97260	98100	98100	97260	97260

t statistics in parentheses
* p<0.10, ** p<0.05, *** p<0.01; Lombardia (Alternative 3) dropped because of collinearity

Table A5.3.5 Regional fixed effects, models RC.1 to RC.6

	BASE RC.1- CL	RIS RC.2 - CL	QLIFE RC.3 - CL	NET RC.4 - CL	REGIO RC.5 - CL	REGIO + NET RC.6 - CL
Valle d'Aosta	-0.647	1.209	-4.046***	0.569	0.128	5.419***
	(-0.96)	(1.17)	(-3.87)	(0.79)	(0.07)	(2.85)
Trentino	-0.0558	0.145	-0.340	1.379**	-0.0468	2.055***
	(-0.10)	(0.24)	(-0.61)	(2.39)	(-0.07)	(3.16)
Veneto	0.948***	2.356***	1.356***	0.418	2.976***	2.791***
	(3.80)	(2.97)	(5.08)	(1.37)	(3.17)	(3.07)
Friuli VG	-0.297	0.315	-0.857**	0.856*	-0.491	0.363
	(-0.77)	(0.68)	(-1.99)	(1.91)	(-0.90)	(0.67)
Liguria	-0.701*	0.0195	-1.639***	0.444	-1.167	-2.098*
	(-1.94)	(0.02)	(-3.88)	(0.98)	(-1.00)	(-1.83)
Emilia R	-0.226	0.132	-0.0895	1.311**	0.585	1.752***
	(-0.45)	(0.24)	(-0.17)	(2.48)	(0.94)	(2.87)
Toscana	-0.781**	-0.120	-0.994**	0.845**	0.218	2.009***
	(-1.97)	(-0.23)	(-2.31)	(2.10)	(0.32)	(3.08)
Umbria	-1.247***	-0.358	-1.630***	0.343	-0.538	1.289**
	(-2.61)	(-0.68)	(-3.17)	(0.62)	(-0.87)	(2.00)
Marche	0.686*	1.332	0.712	1.524***	1.660	4.999***
	(1.72)	(1.17)	(1.62)	(3.52)	(1.26)	(3.77)
Lazio	-1.271***	-1.809*	-2.254***	-0.475	-1.781*	-3.421***
	(-2.98)	(-1.85)	(-3.52)	(-0.87)	(-1.75)	(-3.27)
Abruzzo	-0.226	0.603	-0.276	0.777	0.930	1.375**
	(-0.63)	(1.38)	(-0.64)	(1.60)	(1.61)	(2.22)
Molise	-1.015	1.096	-1.419**	-0.196	0.711	2.855**
	(-1.61)	(1.13)	(-2.13)	(-0.22)	(0.67)	(2.16)
Campania	-2.779***	-1.590	-3.052***	-1.608	-1.260	1.700
	(-2.67)	(-1.20)	(-2.84)	(-1.28)	(-0.86)	(1.03)
Puglia	-1.182	0.276	-0.650	-0.994	1.205	2.717
	(-1.11)	(0.18)	(-0.57)	(-0.77)	(0.72)	(1.49)
Basilicata	-0.778	0.719	-0.149	-0.541	2.217	6.667**
	(-1.06)	(0.31)	(-0.18)	(-0.53)	(0.81)	(2.36)
Calabria	-0.592	0.910	-1.104	-1.530	0.838	4.031*
	(-0.58)	(0.52)	(-1.05)	(-1.14)	(0.44)	(1.78)
Sicilia	-1.996	-0.594	-1.843	-2.285	0.724	0.810
	(-1.53)	(-0.40)	(-1.29)	(-1.39)	(0.41)	(0.41)
Sardegna	-1.477**	-0.135	-0.997	-0.993	1.076	2.791*
	(-2.10)	(-0.10)	(-1.27)	(-1.06)	(0.69)	(1.67)
N	25620	25300	25620	25620	25300	25300

t statistics in parentheses
* p<0.10, ** p<0.05, *** p<0.01; Lombardia (Alternative 3) dropped because of collinearity

Table A5.3.6 Regional fixed effects, models RC.1 to RC.6

	BASE RP.1-MP	RIS RP.2-MP	QLIFE RP.3-MP	NET RP.4-MP	REGIO RP.5-MP	REGIO + NET RP.5-MP
Valle d'Aosta	-0.715**	-0.424	-1.648***	-0.0518	-1.566**	1.463**
	(-2.17)	(-1.20)	(-4.28)	(-0.13)	(-2.44)	(2.39)
Trentino	-0.443*	-0.472*	-0.545**	0.314	-0.559**	0.348
	(-1.68)	(-1.70)	(-2.04)	(0.98)	(-1.96)	(1.03)
Veneto	0.587***	0.773***	0.702***	0.0155	0.797***	-0.0149
	(3.81)	(4.43)	(4.31)	(0.07)	(4.25)	(-0.07)
Friuli VG	-0.323	-0.248	-0.518**	0.149	-0.385	0.146
	(-1.32)	(-0.97)	(-2.10)	(0.49)	(-1.47)	(0.45)
Liguria	-0.344	-0.173	-0.620**	0.234	-0.350	0.355
	(-1.46)	(-0.68)	(-2.56)	(0.82)	(-1.33)	(1.09)
Emilia R	-0.709***	-0.653***	-0.652***	0.233	-0.616***	0.373*
	(-3.76)	(-3.35)	(-3.30)	(1.10)	(-2.93)	(1.70)
Toscana	-0.646***	-0.568**	-0.679***	0.303	-0.633**	0.497*
	(-2.63)	(-2.26)	(-2.74)	(1.21)	(-2.45)	(1.89)
Umbria	-0.802***	-0.664**	-0.896***	0.119	-0.781**	0.211
	(-2.69)	(-2.16)	(-2.95)	(0.34)	(-2.42)	(0.58)
Marche	0.298	0.344	0.306	0.672**	0.262	0.657**
	(1.28)	(1.37)	(1.28)	(2.37)	(1.00)	(2.17)
Lazio	-0.384**	-0.592***	-0.566***	0.0824	-0.652***	0.399
	(-2.34)	(-2.91)	(-2.89)	(0.44)	(-2.69)	(1.62)
Abruzzo	0.112	0.197	0.133	0.571**	0.220	0.552*
	(0.48)	(0.81)	(0.53)	(1.99)	(0.82)	(1.84)
Molise	0.166	0.475	0.0377	0.455	0.268	0.450
	(0.62)	(1.62)	(0.14)	(1.36)	(0.87)	(1.25)
Campania	-0.382**	-0.347**	-0.445***	0.236	-0.498***	0.371*
	(-2.30)	(-1.97)	(-2.67)	(1.20)	(-2.59)	(1.68)
Puglia	0.850***	0.952***	1.028***	0.689***	1.057***	0.500**
	(5.19)	(5.34)	(5.89)	(3.29)	(5.69)	(2.24)
Basilicata	0.493*	0.521*	0.674**	0.438	0.516	0.313
	(1.76)	(1.73)	(2.31)	(1.24)	(1.62)	(0.85)
Calabria	1.228***	1.335***	1.063***	0.405	1.028***	0.455
	(5.57)	(5.61)	(4.57)	(1.42)	(3.83)	(1.46)
Sicilia	0.622***	0.751***	0.732***	0.464**	0.803***	0.499*
	(3.27)	(3.75)	(3.64)	(1.96)	(3.49)	(1.93)
Sardegna	0.0733	0.184	0.259	0.263	0.272	0.210
	(0.30)	(0.71)	(1.01)	(0.89)	(0.97)	(0.68)
Cons	-1.737***	-1.388**	-2.146***	-2.599***	-1.087	-2.825***
	(-5.05)	(-2.53)	(-5.96)	(-6.45)	(-1.55)	(-3.83)
N	25900	25580	25900	25900	25580	25580

t statistics in parentheses
* p<0.10, ** p<0.05, *** p<0.01; Lombardia (Alternative 3) dropped because of collinearity

Chapter 6

Migrants, returners and regional learning: a polarising effect?

Abstract

This chapter tests the existence of two self-reinforcing processes: one in which the most innovative regions attract *migrants* who contribute to local innovation and, in so doing, make these areas more appealing to the highly skilled. Another whereby *returners* move back to the less innovative areas, where they cannot participate to collective learning processes, thereby making the areas less attractive. We explore these aspects through simultaneous equation models and we introduce the crucial distinction between graduates' *specific* and *generic knowledge*.

6.1 Introduction

As previous chapters have highlighted, migrants and returners have different individual characteristics, preferences and spatial distribution. Migrants are more attracted than returners to strong innovation systems, more likely to have done well at university, to be employed and to be using their skills in their jobs. Geographically they tend to concentrate in the richer and more innovative regions of the Centre-North, whilst returners largely concentrate in the South. [1]

From the perspective of this thesis, whereby graduates are seen as an integral part of the innovation system and where their impact depends on the strength and structure of the system itself, these findings lead to the hypothesis that graduate mobility can generate two self-reinforcing processes: one in which the most innovative regions attract *migrants* from the less dynamic areas, who then contribute to local knowledge creation which, in turn, makes these areas more appealing to the highly skilled. Another whereby *returners* tend to move back to the less dynamic regions, where they cannot participate in collective learning processes, thereby making the areas less attractive to human

[1] Returners are those who move from the region of study back to their home region, whilst migrants are those who move from the region of study somewhere else. Stayers are those who stay in the same region of graduation. The groups have been described in detail in chapter 3, section 3.4.2.

capital. The existence and extent of these simultaneous processes is discussed and formally tested in this chapter, through a series of simultaneous equation models.

To better understand the relationship between skilled-mobility and innovation, the chapter takes into account two mechanisms through which graduates' contribute to innovation. Adapting the distinction introduced by Becker (1964), it compares the effect that graduates exert through their *general* knowledge, i.e. by conducting a variety of tasks effectively, regardless of their personal background, to those derived from their *specific* knowledge, i.e. by applying the competences that are most relevant to innovation.

As well as providing empirical insights and policy suggestions, this chapter also makes theoretical contributions. Indeed, the two self-reinforcing mechanisms under scrutiny effectively imply that graduate mobility, by impacting on the regional ability to innovate and attract talent, contributes to widening sub-national disparities, challenging the traditional approach to migration which predicts that population flows will facilitate spatial convergence.

The chapter is organised as follows: section 6.2 introduces the theoretical background that frames the analysis. Section 6.3 specifies the research questions. Section 6.4 describes the econometric techniques used and section 6.5 the estimation strategy. Section 6.6 provides some descriptive statistics. Section 6.7 provides the results. Section 6.8 concludes.

6.2 Graduate mobility and innovation: knowledge flows and rising inequalities

The links between skilled migration and innovation can be framed within the regional innovation system approach. This literature stresses that innovation is an interactive process among public and private actors and institutions and that all the economic and knowledge processes created inside and outside the firms are "embedded" in such system (see Iammarino, 2005, for a review). Within this conceptual framework the mobility of high-skilled groups have has long been recognised as a crucial knowledge transfer mechanisms. A large amount of research has analysed the mobility of scientists, inventors and engineers (e.g. Almeida and Kogut, 1999; Breschi and Lissoni; 2003, Møen, 2005), both within clusters (Power and Lundmark, 2004), within the European Union (Ackers, 2005) or internationally (Grossmann and Stadelmann, 2008). The importance of the phenomenon is indeed reflected in the increasing attention to *Brain Competition Measures* in the toolbox of innovation policy makers (OECD, 2008b; Reiner, 2010). The results of this research stream are in line with the propositions of Nelson and Phelps (1966) and Vandebussche *et al.* (2006) who stress that the rate of return to higher education depends (and increases with) the technological development of the region and that different human capital structures will suit countries and regions at different stages of technological development.

Looking at high-skilled mobility from an innovation system perspective can also explain how spatial inequality can coexist with migration. According to traditional migration theory, in fact, population flows by rebalancing demand and supply of factors of production, should reduce spatial imbalances.[2] Whilst the new economic geography (NEG) and the *brain drain* literature have already challenged this assumption, we suggest a new way of addressing it. The NEG has stressed how migration from poor to rich areas increase the real wage at destination due to economies of scale and that such an increase perpetuates the migration flows (Henderson and Wang, 2005)[3]. The brain drain literature has focussed on the selective nature of migration (Fratesi and Riggi, 2007; Bhagwati and Hamada, 1974) positing that, given the higher propensity to move of the more educated and given the strategic importance of human capital for endogenous growth (Lucas, 1988; Romer, 1990), home countries will suffer from migration whilst host countries will not.[4] Whilst the NEG ignores the distinctive characteristics of skilled migration, the brain drain approach ignores the role of the demand side, looking at human capital exclusively as an input to production. By examining skill-mobility and regional innovation jointly, as done in this thesis, both these limitations can be overcome. Indeed, as less innovative regions do not offer the conditions for the highly educated to employ their skills, they lose human capital to more innovative areas and fail to achieve social returns to skills. On the other hand,

[2] See chapter 1 for a review of this literature.
[3] See chapter 1 for a detailed description of the NEG.
[4] Needless to say the picture is more complex than that and there are channels, such as diaspora networks, remittances and increased incentives to education, through which brain drain may benefit the home region (See Kanbur and Rapaport, 2005 for a review).

innovative regions, attract talent because they do offer such opportunities and in so doing benefit from this crucial resource. As a result a self-reinforcing mechanism of skilled immigration (out-migration) and regional innovation (stagnation) emerges, which increases spatial economic disparities.

Despite the interest in high-skilled population flows, innovation scholars have largely neglected graduates' mobility. However, as proven by Faggian and McCann (2006 and 2009), graduates are crucial actors, transferring knowledge from the university sectors across space. Moreover, as they are a highly skilled and highly mobile segment of society, they are particularly suited to empirically test the cumulative relationship between mobility and regional knowledge.

This chapter explores precisely these dynamics focussing on the Italian case. With its large internal disparities and its increasing flows of graduates, Italy is certainly an interesting case to study.

6.3 Research questions

Previous chapters of this thesis have compared individual characteristics and spatial preferences of migrants and returners. This chapter builds again on this distinction and analyses the macro-level implications of both types of mobility.

We have seen that migrants are more attracted than returners to strong innovation systems, more likely to be employed and more likely to be using their skills. Moreover, whilst migrants tend to concentrate in the most innovative regions of the Centre-North, returners largely move to the South. In light of the theoretical perspectives presented above, whereby skilled mobility influences and is influenced by the regional knowledge creation, these differences lead to the hypothesis of the existence of two cumulative processes. A first one whereby migrants are attracted to innovative regions and, as they feed into local learning processes, they make these areas more attractive to talent. A second one whereby returners, moving to the less innovative parts of the country, do not (and cannot) contribute to regional learning processes, making backward regions less attractive to skills.

The existence and scope of these processes are tested and analysed in this chapter, through three concurrent steps: first mobility and innovation are modelled econometrically as simultaneous processes; secondly the two types of movers are analysed separately and then jointly, in order to identify if, and when, synergies can emerge between migrants and returners; thirdly, we distinguish between two different mechanisms through which graduates can impact on innovative performance: adapting the ideas of Becker (1964)[5], we assume that graduates can act either as carriers of *general knowledge*, i.e. as a highly educated individuals that can conduct a variety of tasks efficiently regardless of their background and employment, or as carriers of *specific knowledge*, i.e. as carriers of crucial knowledge for innovative activity such scientific and engineering skills. Through such a distinction we are able to understand different ways in which higher education, via mobile graduates, impacts on regional knowledge creation. At the same time, we can evaluate how the different innovations systems can receive (lose) and make use of (not) different types of skills.

The simultaneous links between skilled migration and innovation have rarely been explored. Indeed, to the best of the author's knowledge, only Faggian and McCann (2006, 2009), have conducted a similar analysis for UK graduates.

6.4 Methodology I: simultaneous equation models

Simultaneous equation models (SEMs), a technique first studied by Haavelmo (1943), can capture a variety of social and economic phenomena, in which variables are endogenously or jointly determined.[6] As the regional ability to innovate depends, among other things, on the inflows of human capital, whilst the inflows of human capital depend, among other things, on the innovative performance of a region, the two variables are endogenous. SEMs are therefore a suitable technique for the phenomenon at stake.

In its simplest form, a SEM is composed of two equations:

[5] According to Becker (1964) specific human capital refers to skills or knowledge that are useful only to a single employer or industry, whereas general human capital is useful to all employers.
[6] When variables are endogenous, as will be clarified later, OLS estimates cannot be used.

$$y = \beta x + \sum_{k=1}^{K} \gamma_k x_k + u$$

$$x = \delta y + \sum_{j=1}^{J} \theta_j x_j + \varepsilon$$

where y and x are the endogenous dependent variables, x_k and x_j the exogenous explanatory variables, and ε and υ the error terms.

The fact that the two dependent variables feed back into each other means that OLS estimates are inconsistent. In fact, the OLS assumption of zero covariance between the disturbance term and the independent variables is by definition violated: since x is a function of y, and y is a function of u (that is, is correlated with the error), the correlation between x and u will be non-zero. OLS estimation of SEM will therefore result in biased and inconsistent coefficients, regardless of the sample size.

A potential solution to this problem is to use instrumental variables (IV), which are highly correlated with the endogenous variable and uncorrelated with the disturbance term.[7] The most common strategy adopted in this case is to create an instrument using the method of two-stage least squares (2SLS). In the 2SLS the endogenous variable is regressed on all the exogenous variables. The predicted value of this regression is used in the second stage, to replace the original endogenous variables in the equation and estimation is carried out. In so doing the 2SLS effectively separates the endogenous variable into two parts, one correlated with the disturbance term and another uncorrelated with the disturbance term. The 2SLS and IV are part of the so called "Limited information methods", which estimate one single equation at a time.[8]

It must be noticed that while the 2SLS estimate is consistent when the instruments are exogenous, it is generally not efficient if the error terms ε and u are correlated. Since there is no theoretical reason to exclude a priori the existence of such correlation in the present model, the three-stage least squares (3SLS) method is used instead. The 3SLS,

[7]For the dangers of using inappropriate instruments in SEM see Larcker and Rusticus (2010).

[8] The family also includes and includes indirect least squares (ILS) and limited information maximum likelihood (LIML).

developed by Zellner and Theil (1962), is a full information method[9] and can be seen as a logical extension of the 2SLS, which uses also the correlation structure between u and ε to achieve greater efficiency. Such greater efficiency, however, comes at a cost. Whilst in the 2SLS an equation can be consistently estimated if its instruments are exogenous, in the 3SLS, where information from each equation is used to estimate the whole model, consistency is achieved only when all the instruments in the model are exogenous (Wooldridge, 2002).

Given that there will always be a trade-off between the robustness of the limited-information procedure (such as the 2SLS estimation technique) and the efficiency of the full-information method (such as the 3SLS estimation technique), it becomes important to test for possible misspecification in the model. This is done through a Hausman test (Hausman, 1978) in which the null hypothesis is that all exogenous variables are uncorrelated with the disturbance terms. In this case both the 2SLS and the 3SLS estimator are consistent but only the 3SLS estimator is (asymptotically) efficient. If the null hypothesis is not rejected, the 3SLS is to be preferred to the 2SLS.

6.5 Methodology II: econometric analysis

6.5.1 Estimation strategy

The research questions are answered through three sets of five SEMs, which compare the impact of different sub-sets of migrants and returners on the cumulative process of innovation and human capital attraction. The dataset is based on a combination of the ISTAT survey *Indagine sull'inserimento professionale dei laureati* (described in previous chapters) and regional data from EUROSTAT and ISTAT.

The first two sets of models focus respectively on migrants (models M1 to M5[10]) and returners (models R1 to R5). The third set of models (models A1 to A5) takes into account all movers (migrants and returners) simultaneously. The three sets of models differ in the structural equations included, whilst the models within each set differ in the sub-samples that they use, that is, in their ability to capture the effects of *general* or

[9] The full information maximum likelihood (FIML) is another technique of the same family.

[10] In the notation, the letter refers to the mobility category taken into account whilst the number to the sample used. That is: models A1, M1 and R1 apply respectively to all movers (A), migrants (M) and returners (R) and they all refer to the whole sample of graduates (sample 1).

specific knowledge. The following subsections describe in turn, the samples used, the structural equations and the variables used.

6.5.1.1 The samples

Models 1, 2 and 3, take into account graduates from all background and therefore, through them, we can evaluate the impact of *general knowledge* on innovation. Specifically:

- Models M1, R1 and A1 refer to graduates as a whole
- Models M2, R2 and A2 refer to employed graduates.
- Models M3, R3 and A3 refer to employed graduates in jobs for which their education level is required or necessary. As the job requirements or needs match their education level, these graduates will be referred to as *matched* graduates.[11]

Models 4 and 5 take into account the *specific* skills needed for knowledge-based development, as they focus on graduates that have studies scientific or engineering disciplines. We will refer to them as STEM (science, technology, engineering and mathematics) graduates.[12] Specifically:

- Models M4, R4 and A4 refer to the whole group of STEM graduates.
- Models M5, R5 and A5 look at the subsets of matched-STEM graduates: those with a scientific background employed in jobs for which their education is either needed or required.

6.5.1.2 The structural equations

Models M1 to M5 include a migrants' attraction function and a knowledge production function (KPF). Models R1 to R5 include a returners' attraction function and a knowledge production function. Models A1 to A5 include both a migrants' and a

[11] They are identified as those who answered yes in either question 2.26 or 2.29, described in appendix 4.2. The questions cover the effective needs and the formal educational requirements of the graduate's job.

[12] This includes natural sciences (geology, biology, physics and agricultural sciences), as well as mathematics and all the engineering branches. They correspond the group BACKG_S used in chapter 4, without the graduates in architecture. The latter have been identified through the survey question q.I.3 and q.I.4, described in appendix 6.2.

returners' attraction functions and a knowledge production function.

Specifically, models M1 to M5 contain the following equations:

$$MIGR = CONST + \gamma INNPP + \eta WAGE + \delta CULT + \gamma POP + \iota LAZ + \kappa LOM + \varepsilon \quad \textbf{(Eq. 6.1)}$$

$$INNPP = CONST + \alpha MIGR + \chi STAY + \delta RD\_GDP + \phi RD\_BUS\_PROP + \gamma LARGERU + v \quad \textbf{(Eq. 6.2)}$$

where INNPP and MIGR are the endogenous variables of the system.

Models R1 to R5 contain the following equations:

$$RET = CONST + \gamma INNPP + \eta WAGE + \delta TRANS + \gamma POP + \iota SOUTH + \varepsilon \quad \textbf{(Eq. 6.3)}$$

$$INNPP = CONST + \alpha RET + \chi STAY + \delta RD\_GDP + \phi RD\_BUS\_PROP + \gamma LARGERU + v \quad \textbf{(Eq. 6.4)}$$

where INNPP and RET are the endogenous variables of the system.

Models A1 to A5 contain the following three equations:

$$MIGR = CONST + \gamma INNPP + \eta WAGE + \delta CULT + \gamma POP + \iota LAZ + \kappa LOM + \varepsilon \quad \textbf{(Eq. 6.5)}$$

$$RET = CONST + \gamma INNPP + \eta WAGE + \delta TRANS + \gamma POP + \iota SOUTH + \varepsilon \quad \textbf{(Eq. 6.6)}$$

$$INNPP = CONST + \alpha MIGR + \beta RET + \chi STAY + \delta RD\_GDP + \phi RD\_BUS\_PROP + \gamma LARGERU + v \quad \textbf{(Eq. 6.7)}$$

where INNPP, MIGR and RET are the endogenous variables of the system.

6.5.1.3 Variables description

The measure innovative performance (INNPP) is the *proportion of regional units*[13] (RU) *that have introduced both product and process innovation.* The variable, which was already used in chapter 4, is sourced from the regionalised CIS4[14] and has two important advantages. First, it is a regionally unbiased indicator: when innovation occurs in peripheral plants of multi-region firms, in fact, it is recorded in the region of the plant, rather than in the region of the headquarters' (as would happen with firm-based indicators). Secondly the variable includes innovations that may or may not result from formal R&D investment or that may or may not have been patented, capturing a broad range of knowledge production activities.

[13] The regional unit is a statistical subject composed of all the production units of a firm localised in a specific region. This means that such unit of analysis overlaps fully with the firm if the enterprise is "uni-localised" (i.e. the firm fully coincides with the head quarters) or if it is "multi-localised" within just one region (i.e. the firm has several units located within the same NUTS 2 region); on the other hand, if one firm has its sites brunches distributed in two different regions, these will be recorded as two different regional units.

[14] See appendix 4.3 for a description of the experimental regionalisation of the CIS4.

The measures of mobility (MIGR, RET and STAY) are respectively the net migration rate, the net return rate and the proportion of stayers (retention rate), for the various sub-samples of graduates taken into account. Specifically:

$$MIGR = 100 * \frac{In\_migr - Out\_migr}{Tot\_graduates} \qquad \textbf{(Eq. 6.8)}$$

$$RET = 100 * \frac{In\_ret - Out\_ret}{Tot\_graduates} \qquad \textbf{(Eq. 6.9)}$$

$$STAY = 100 * \frac{Stayers}{Tot\_graduates} \qquad \textbf{(Eq. 6.10)}$$

Where:

In_migr and *In_ret* are respectively the total number of migrants and returners entering a region.

Out_migr and *Out_ret* are respectively the total number of migrants and returners returners leaving a region

Stayers is the number of graduates who remain in the region after graduating.

Tot_graduates is the total number of graduates currently living in a region.[15]

As of the other variables in the models, the ***migrants' attraction*** equations contain, as well as the endogenous INNPP, the following variables (the source of the data is in parenthesis):

WAGE (CNEL RL)[16]	The average wage of the region, to take into account the fact that migrants are attracted to more buoyant regions.
CULT	The proportion of employment in cultural and recreational

[15] In all models the denominator of the formulas is the same, the only thing that changes is the numerator, which depends on the sub-sample being analysed.

[16] Consiglio Nazionale di Economia e Lavoro, Redditi da Lavoro.

[17] ISTAT Indicatori di Contesto Chiave e Variabili di Rottura

(ISTAT ICCVR) [17]	industries, which has emerged as a distinctive feature of migrant's locational preferences in chapter 5.
POP (EUROSTAT REG_POP) [18]	The population of the region.
LAZ and **LOM**	The dummies for Lazio and Lombardia which, as seen in previous chapters, are the regions attracting the largest numbers of migrants.

The ***returners' attraction*** functions contain, as well as INNPP, WAGE and POP:

TRANS (ISTAT ICCVR)	The number of public transport lines (in cities), per 100 square Km. In chapter 5 this has emerged as a key feature of returners locational preferences.
SOUTH	A dummy identifying Southern regions and capturing the fact that the large majority of returners relocate there.

Finally the ***knowledge production*** functions contain as well as MIGR (in models M and A), RET (in models R and A) and STAY (in models M, R and A) the following:

RD_GDP (EUROSTAT REG_ST)[19]	The total R&D spending on GDP (includes public, private, higher education and NGO spending).
RD_BUS_PROP (EUROSTAT REG_ST)	The proportion of private R&D spending on total R&D spending.
LARGE_RU (ISTAT ASIA)[20]	The proportion of regional units with 50 employees or more.

It must be pointed out that whilst the knowledge production function has often been used to assess the effects of R&D inputs on regional innovation (Jaffe, 1989; Acs *et al.*, 1992; Buesa *et al.*, 2006; Crescenzi *et al.*, 2007), the literature on the topic is extremely heterogeneous in both the specifications used and in the results. This has lead to question the validity of the approach itself (Óhuallacháin and Leslie, 2007)[21], not least for the weakness of regional innovation indicators (IAREG, 2008). As a consequence,

[18] EUROSTAT Regional Population Statistics.
[19] EUROSTAT Regional Science and Technology Statistics
[20] ISTAT Archivio Statistico Imprese Attive.
[21] Óhuallacháin and Leslie (2007) criticise the approach as it assumes that R&D expenditures by different institutions are substitutes and as it does not distinguish between the causes and effects of R&D spending.

specifying the KPF was more complex than for the other two equations and requires some explanation. The main aim of the KPF was to isolate the effect of graduates on innovation. To do that, we had to control for the main factors affecting knowledge creation, such as R&D expenditures and composition (RD_GDP and RD_BUS_PROP) and the industrial structures (LARGE_RU). Knowledge production function normally also take into account the role of universities through the number of researchers or their share of R&D expenditures. Needless to say, all the university variables were highly correlated with the proportion of stayers, one of the key independent variables in the KPF and therefore were not included.

The table below summarises the estimation strategy.

Table 6. 1 Summary of econometric analysis

	Effects	**Models M Migrants**	**Models R Returners**	**Models A All movers**
1 – All graduates	General Knowledge	Migrants Attraction Function + Knowledge Production Function	Returners Attraction Function + Knowledge Production Function	Migrants Attraction Function + Returners Attraction Function + Knowledge Production Function
2 – Employed Graduates	General Knowledge			
3 – Matched Graduates	General Knowledge			
4 – STEM Graduates	Specific Knowledge			
5– STEM & Matched Graduates	Specific Knowledge			

To conclude some limitations of the methodology, and the way they have been addressed, need to be highlighted. The three sets of SEMs are run for the universe of 20 Italian regions and this small number of observations may be problematic, as the errors may not have a normal distribution. We have taken two steps to cope with this issue. First, the variables have been carefully selected to avoid multicollinearity and ensure parsimony of the models, following the methodology highlighted in chapter 4 (section 4.6.2.1)[22]. Secondly, we have used *small sample statistics* for our inferences, which

[22] However, given the small size of the universe we have raised the correlation threshold from 0.60 to 0.70. Specifically we have calculated the pair-wise correlation among independent variables in each of the equations of the SEMs. If the correlation was below 0.7 we assumed there was no multicollinearity. If it was above 0.7 we then calculated the Variance Inflation Factor (VIF), and if the latter was below 10 we excluded problems of multicollinearity. The correlation matrix and the VIFs are reported in appendix 6.3 and confirm that in the specifications chosen there is no multicollinearity problem.

shift the tests from chi-squared and z-scores on a normal distribution, to F tests and t-values on a t-distribution.[23]

6.6 Descriptive statistics

This section presents some key descriptive statistics on the patterns of mobility of Italian graduates and on the innovative performance of Italian regions.

Table 6.2 summarises some key statistics for the whole sample and for the sub-samples of graduates analysed in the SEM

Table 6. 2 Number and proportion of graduates by mobility category and sub-sample

	1. Total Graduates	2. Employed	3. Employed and Matched	4. STEM	5. STEM and Matched
Sample N % on total graduates	155,483 100%	114,449 73.6%	65,503 42.1%	38,580 24.8%	21,895 14.1%
Total migrants % on total graduates	29,036 18.7%	22,401 14.4%	12,854 8.3%	6,685 4.3%	4,035 2.6%
Total returners % on total graduates	8,296 5.3%	5,717 3.7%	3,638 2.3%	1,687 1.1%	1,030 0.7%
Total stayers % on total graduates	118,151 76.0%	86,331 55.5%	49,011 31.5%	30,208 19.4%	16,830 10.8%

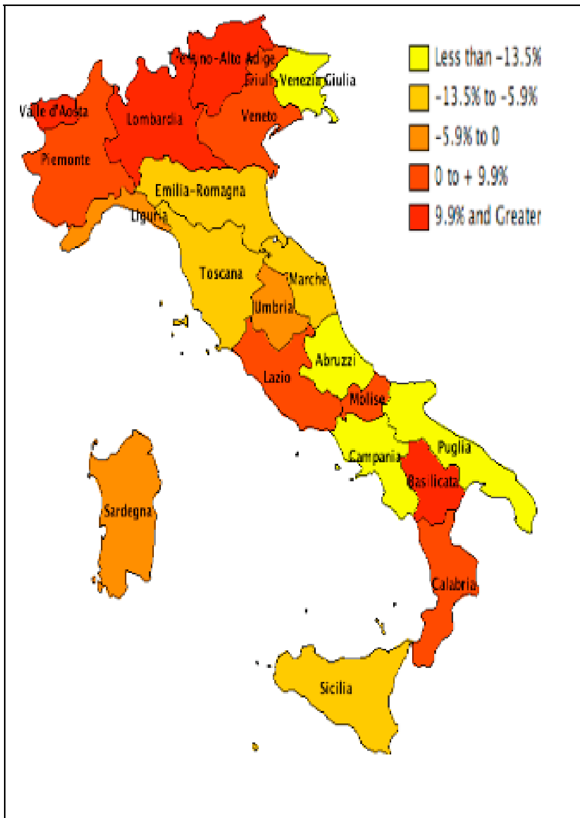
Source – author's calculations from ISTAT (2007a).

Employed graduates constitute 73.6% of the total, whilst employed migrants and returners represent 14.4% and 3.7% of the total. Their spatial distribution is reported in maps 1 and 2, which feature the net migration rates for this sub-sample.

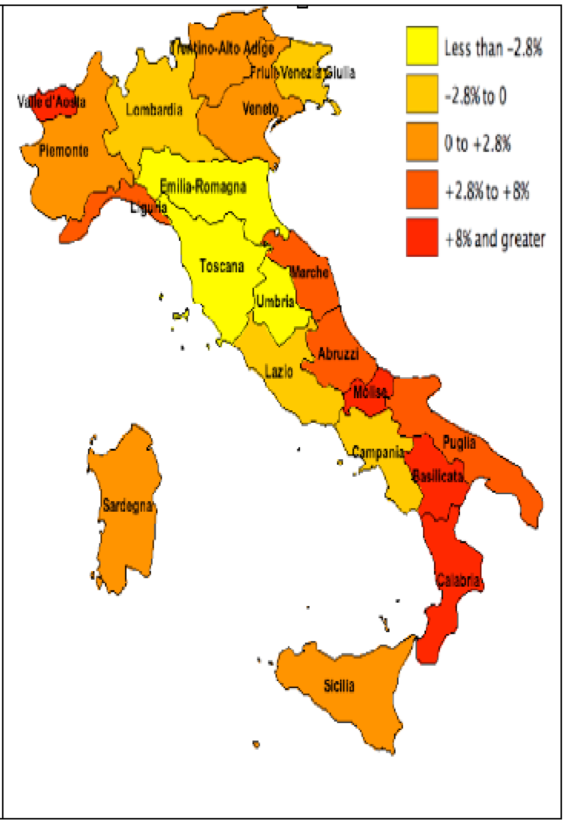
As for matched graduates, our second sub-sample, they represent 42.1% of the total (65,503 individuals), whilst matched migrants and returners are respectively 12.854 and 3,658 (8.3% and 2.3% of the total). Their distribution follows very similar patterns to that of employed graduates (the correlation coefficient is higher than 0.95 for migrants and 0.97 for returners), therefore we do not report their maps.

[23] Small sample statistics are implemented with the option *small* in STATA.

Map 6. 1 Net Migration Rates – Employed Migrants



Map 6. 2 Net Return Rates – Employed Returners



Source – author's calculations from ISTAT (2007a).

In maps 6.1 and 6.2, the darkest red regions are those with the highest positive net rates of migrants and returners. The clearest yellow regions are those losing the largest proportion of migrants and returners.

From map 6.1 it clearly emerges that the biggest regions in the South (Campania, Puglia and Sicilia) are those with highest net loss of migrants, whilst Lazio and the biggest regions of the North (Lombardia, Piemonte and Veneto) have the highest net immigration rates for employed migrants. Emilia Romagna, Toscana and Umbria, in the Centre-North, have negative migration rates. This is because, as mentioned in previous chapters, they have attractive universities, thereby generate a large number of graduates, migrants and returners. Marche, in the Centre, also loses a relatively large proportion of migrants. Basilicata and Molise, the two smallest regions of the South,[24] have positive immigration rates. As explained in detail previously, this is due to two reasons. First, the large immigration rates may result from a misclassification of returners as migrants.

[24] They produce less than 0.56% of graduates host less than 1.5% of the Italian total after three years.

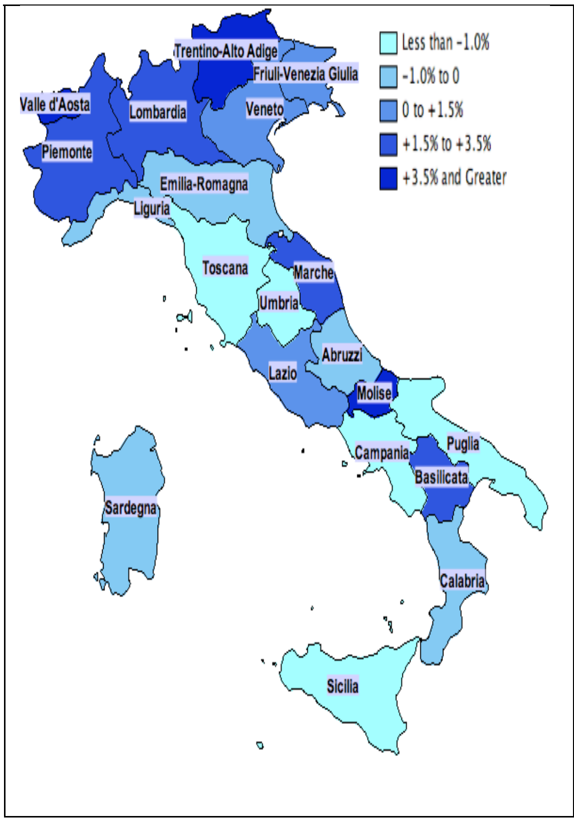
Secondly, given that the universities in the two regions offer a limited amount of courses, the large rate of immigrants may also reflect the fact that the local market lacks certain skills, which have to be sourced from other regions.

Map 6.2 shows that all the regions of the South, with the exception of Campania, are net recipient of returners. Emilia Romagna, Toscana and Umbria, have the highest negative rate of returners precisely because they are university regions. Lazio and Lombardia also have a negative rate, though smaller in magnitude. Marche, in the Centre gains more returners than it loses, displaying a pattern more similar to the regions of the South than to those of the Centre.

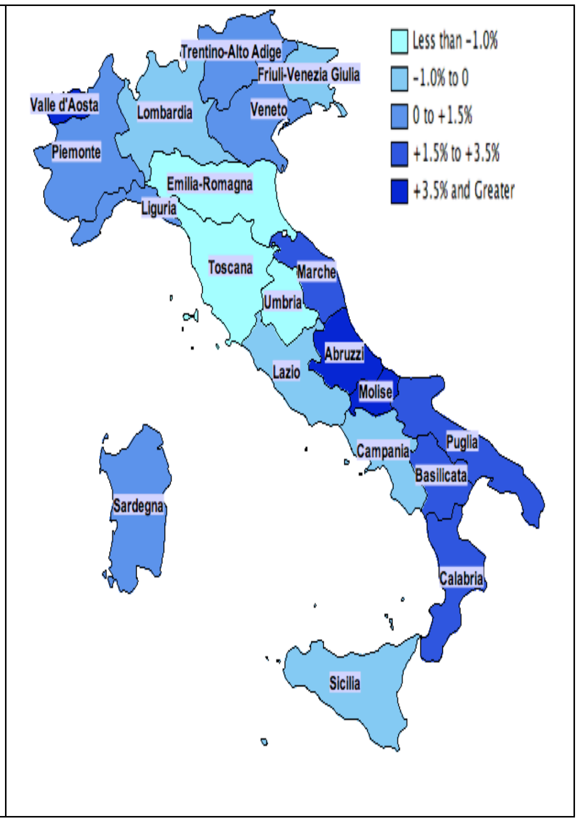
As of graduates with a scientific and engineering background, we see from table 6.1 that they represent the 24.8% of the total (38,580). STEM migrants and returners are respectively 6,685 and 1,687, accounting for 4.3% and 1.1% of the total. Maps 6.3 and 6.4 report their net spatial distribution. Matched-STEM graduates are 14.1% of the total, whilst matched-STEM migrants and returners are respectively 2.6% of the total (4,035) and 0.66% of the total (1,030). Their distribution follows closely that of the STEM graduates (the correlation is 0.95 for migrants and 0.92 for returners), therefore their maps are not included in the text.

Map 6.3 shows again that, with the exception of Molise and Basilicata, all the regions of the South are net drainers of STEM migrants to the rest of Italy. In the Centre-North Toscana, Umbria and Emilia Romagna (the university regions) are again losing migrants, together with Liguria, in the North West. All the other regions in the Centre-North, on the other hand, are positive gainers of NET migrants. Map 6.4, which reports the distribution of STEM returners across Italy, displays a familiar pattern: with the exception of Campania and Sicilia, all the regions of the South have positive net intakes of STEM returners. Again, Emilia, Toscana and Umbria have high negative rates of returners whilst Lazio, Lombardia and Campania, together with Friuli Venezia Giulia, are also losing returners, but in smaller numbers.

Map 6. 3 Net Rates – STEM Migrants



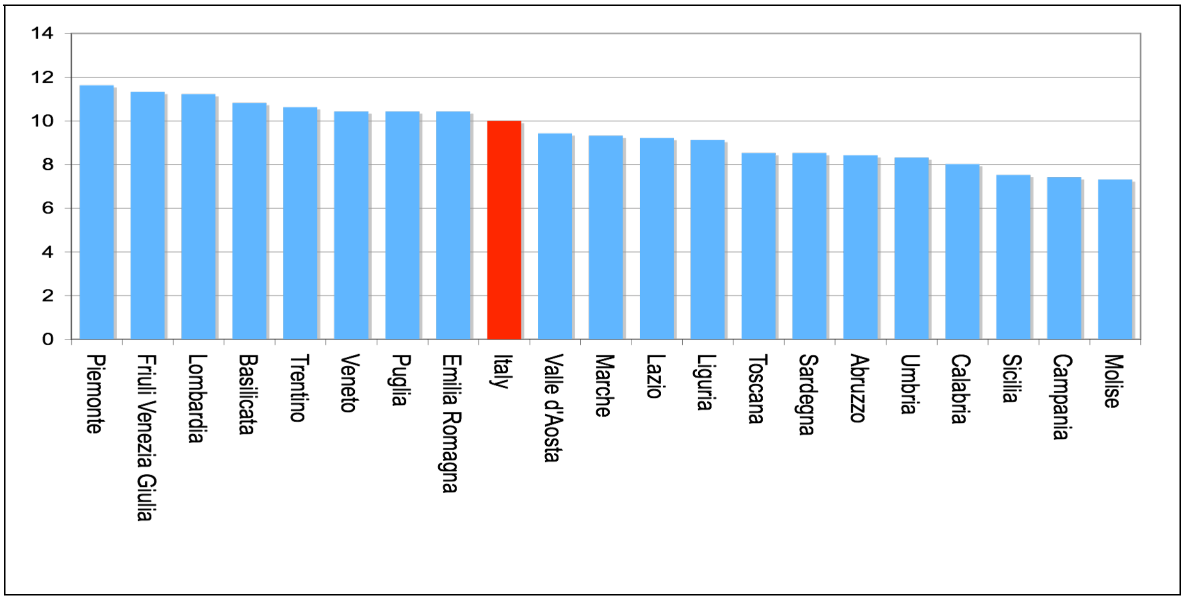
Map 6. 4 Net Rates – STEM Returners



Source – author's calculations from ISTAT (2007a).

To conclude figure 6.1 and 6.2 below describe the variables used in the knowledge production functions, highlighting the large sub-national differences within Italy.

Figure 6. 1 Proportion of regional units with product and process innovation

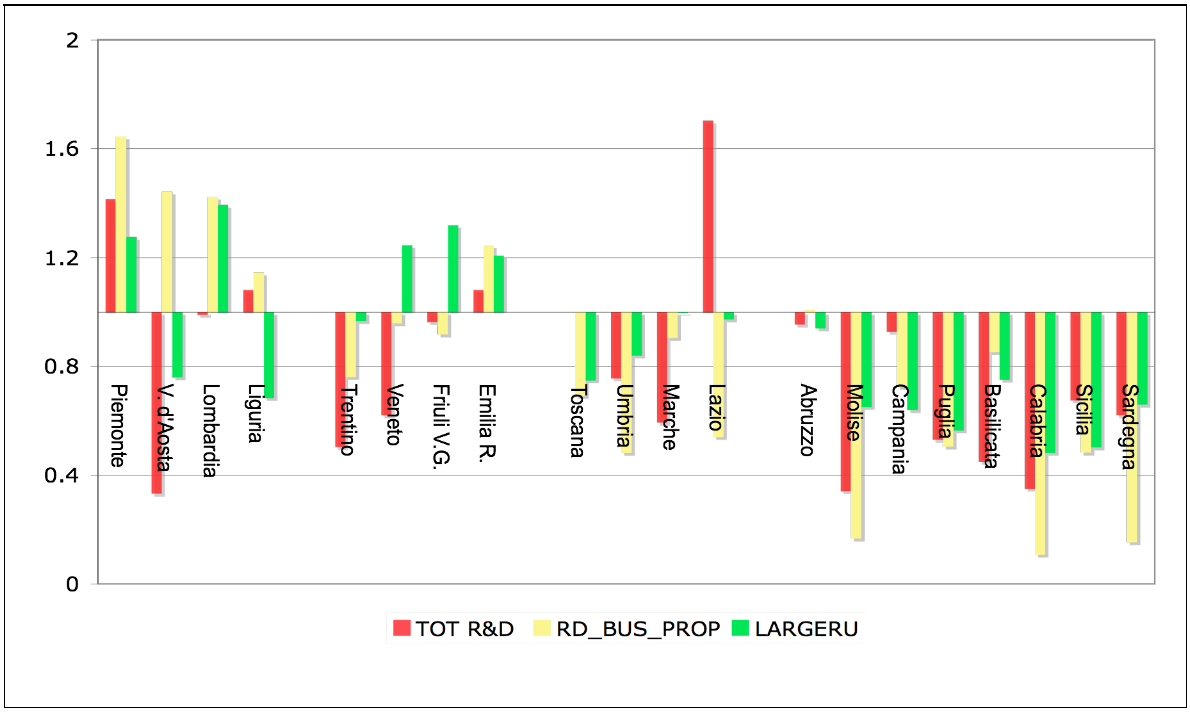


Source – author's calculations from ISTAT-CIS4.

Figure 6.1 reports the dependent variable of the knowledge production functions: the proportion of regional units that introduced both product and process innovation. All the regions with a proportion higher than the national average are in the North, with the exception of Basilicata and Puglia. Remarkably all the regions of the South are at the other end of the graph, together with Umbria (in the Centre).

Figure 6.2 reports the regional-to-national ratio of the proportion of R&D expenditures on GDP (TOT R&D), the proportion of private R&D spending on the total (RD_BUS_PROP) and the percentage of regional units with more than 50 employees (LARGE_RU). The regions are grouped by macro-area

Figure 6. 2 Innovation inputs relative to Italian average[25]



Source – author's calculations from EUROSTAT and ISTAT-ASIA.

In figure 6.2, a value larger (lower) than 1 means that the region is performing better (worse) than average. We find that Lazio has the highest relative level of total R&D spending. This is not surprising given that it receives most public R&D funding. Lazio

[25] The regions in the graph are grouped by macro-areas. Specifically Lombardia, Piemonte, Valle d'Aosta and Liguria are in the North West; The North East includes Veneto, Trentino Alto Adige, Friuli Venezia Giulia, Emilia Romagna; the Centre includes Toscana, Umbria, Marche, Lazio; the South includes Abruzzo, Molise, Campania, Basilicata, Puglia, Calabria, Sicilia and Sardegna.

is followed by Piemonte, Liguria and Emilia Romagna in the North West and North East respectively. In all the regions of the South, the proportion of total R&D expenditures on GDP is lower than the Italian average. Business R&D is concentrated in the North West and in Emilia Romagna. As of the proportion of regional units with more than 50 employees, the figure confirms that all the regions of the South and the Centre (including Lazio) are below the Italian average. Large regional units are concentrated in Lombardia and Piemonte in the North West, and Emilia Romagna, Friuli and Veneto in the North East.

These descriptive statistics confirm that three macro-regional patterns of graduate mobility and innovation identified in chapter 3 (section 3. 5) hold also for employed and STEM graduates. Specifically:

1. The highly innovative regions of the North, together with Lazio, are overall net recipients of migrants and are either gaining or losing moderate amounts of returners.
2. Toscana and Umbria, in the Centre, are mostly producers of human capital. Both migrants and returners leave these regions, which, despite reputable universities, have low innovation capacities.
3. The non-innovative regions of the South, together with Marche in the Centre, are overall losing migrants and gaining large rates of returners.

Given these patterns, it is clearly interesting to investigate the impact of graduates' mobility on knowledge creation.[26]

6.7 Econometric results

This section reports the econometric results of the study. The models for migrants (M1 to M5), returners (R1 to R5) and for all the movers (A1 to A5) are reported separately in subsections 6.7.1, 6.7.2 and 6.7.3 respectively. In sub-sections 6.4 the findings are drawn together and the implications are highlighted.

6.7.1 Migrants: moving and learning

As table 6.3 below shows INNPP is positive and significant in all models, indicating that graduates are attracted to highly innovative regions. Despite this common feature

[26] Due to the peculiar patterns in Basilicata and Molise and the small size of the universe, the three sets of regressions are also run without these two regions. These models, which also serve as robustness checks, are reported in appendix 6.4. They are largely consistent with those presented in the chapter.

significant differences emerge among STEM graduates (models 4 and 5) and the rest of the groups. Indeed, whilst WAGE is negative and significant for models 1, 2 and 3, when it comes to STEM graduates it is not significant. Similarly, whilst the level of cultural amenities (CULT) has a strong positive effect in models M1, M2 and M3, it is not significant in M4 and M5. As for the regional dummies, we find that LAZIO is only significant for matched STEM graduates (M5) reflecting the fact that most of government R&D is in the region, whilst LOMBARDIA is only significant in model 3 (for matched graduates).

In the knowledge production function, key differences emerge again among STEM graduates and the rest. Whilst the proportion of business R&D on the total (RD_BUS_PROP) is not significant in M1, M2 and M3 (when general knowledge is being considered), it is positive and significant in M4 and M5 (when the specific knowledge of STEM graduates is taken into account). Similarly, whilst the proportion of large regional units (LARGE_RU) is positive and significant in M1 and M3, this is not the case for STEM graduates. When it comes to local human capital, we find that the proportion of stayers and migrants (STAY and MIGR) is not significant in M1, where both employed and unemployed graduates are taken into account. On the other hand, both groups contribute to innovative activities in models M2, whilst in M3 STAY is positive and significant and the p-value for MIGR is just outside the significance threshold (0.107). When we focus exclusively on STEM graduates (M4 and M5), however, only migrants impact positively on knowledge creation.

Overall, the models point out to a cumulative relationship between regional learning and graduate migration (the two endogenous variables), which is stronger with STEM migrants. Not only is innovative activity the only regional feature that attracts them but, when it comes to the knowledge production function, they seem to be complementary to business R&D expenditures. These results suggest that migration is actually necessary for those who have a STEM background and want to apply it, as not all regions can absorb them.

Table 6. 3 Models M1 to M5 – Migrants

	M1	M2	M3	M4	M5
	All	Emp	Match	STEM	STEM Match
		Migrants Attraction Function			
INNPP	16.83**	16.46***	8.33***	3.13***	1.32**
	(2.34)	(2.80)	(2.84)	(3.05)	(2.47)
WAGE	-0.01**	-0.01**	-0.01**	-0.00	0.00
	(-2.09)	(-2.41)	(-2.32)	(-1.01)	(0.11)
CULT	45.33***	46.50***	27.66***	1.28	-0.97
	(2.59)	(3.17)	(3.71)	(0.51)	(-0.70)
POP	-0.00	-0.00	-0.00	-0.00*	-0.00*
	(-1.19)	(-0.66)	(-1.63)	(-1.91)	(-1.71)
LAZIO	21.39	11.62	3.49	6.11	4.17*
	(0.80)	(0.54)	(0.30)	(1.54)	(1.83)
LOMBARDIA	45.58	32.68	22.86*	4.73	1.93
	(1.70)	(1.52)	(1.95)	(1.42)	(0.99)
CONST	124.41	102.71	44.75	-6.87	-11.82
	(1.37)	(1.38)	(1.15)	(-0.52)	(-1.62)
R2	0.32	0.26	0.54	0.15	0.34
P	0.0802	0.0392	0.0031	0.0107	0.0109
		Knowledge Production Function			
RD	-0.59	-0.68	-0.74	-0.54	-0.68
	(-0.82)	(-1.13)	(-1.36)	(-0.78)	(-1.08)
RD_BUS_PROP	1.37	1.68	1.95	2.38*	2.38*
	(0.93)	(1.13)	(1.52)	(1.72)	(2.01)
LARGE_RU	4.92***	2.80	3.29**	0.51	1.17
	(3.13)	(1.68)	(2.45)	(0.30)	(0.76)
MIGR	0.02	0.03*	0.04	0.33***	0.42***
	(0.79)	(1.94)	(1.67)	(3.04)	(3.46)
STAY	0.01	0.03*	0.05**	0.03	0.07
	(0.36)	(1.96)	(2.69)	(1.62)	(1.49)
CONST	6.06***	5.86***	5.57***	6.86***	7.77***
	(4.15)	(7.40)	(8.14)	(7.72)	(11.85)
R2	0.62	0.59	0.72	0.31	0.44
P	0.0005	0.0004	0.0000	0.0004	0.0001
N	20	20	20	20	20

* p<0.10, ** p<0.05, *** p<0.01; t-statistics in parenthesis

To conclude, table 6.4 reports the results of the Hausman test. The p-values are higher than 0.10, confirming that the 3SLS is more appropriate than the 2SLS technique.

Table 6. 4 Hausman tests – Models M1 to M5

	M1	M2	M3	M4	M5
	All	Emp	Match	STEM	STEM Match
Chi2	0.62	1.47	0.71	1.78	0.87
P-values	0.96	0.83	0.95	0.78	0.93

6.7.2 Returners: relocation without collective learning

Table 6.5 below reports the results models R1 to R5 and reveals very different patterns than those seen in models M1 to M5. In the returners attraction function we see that the level of regional innovation is only positive and significant in model R1 (which refer to the whole group of returners) and R4, which refers to all STEM returners. In all the other cases, the coefficient is not significant, a major difference as compared to migrants. WAGE is positive and significant only for graduates in science and technology backgrounds (R4). Transport (TRANS), in line with previous findings, is positive and highly significant across equations, whilst population (POP) is negative and significant across models. The dummy for South is, as expected, positive and significant across specifications.

The knowledge production function shows that the proportion of private R&D investment, rather than the level of R&D expenditures itself, matters for innovation: RD_BUS_PROP is positive and significant in R2 and R3, which include employed returners and matched returners. The presence of large regional units is again an important factor influencing innovation; LARGE_RU is positive and significant across specifications. The most important finding, however, is that returners play no role in innovation: RET is never significant. At the same time, the effect of stayers is only positive and significant in R3, when matched graduates are taken into account.

Overall, these models suggest that the flows of returners do not contribute to collective learning processes and that no synergies emerge between stayers and returners.

Table 6. 5 Models R1 to R5 – Returners

	R1 All	R2 Emp	R3 Match	R4 STEM	R5 STEM Match
Returners Attraction Function					
INNPP	5.68**	2.50	0.90	1.20**	0.41
	(2.63)	(1.63)	(1.04)	(2.06)	(0.86)
WAGE	0.00	0.00	0.00	0.00*	0.00
	(0.22)	(1.36)	(1.46)	(1.74)	(1.52)
TRANS	0.06***	0.04***	0.03***	0.02***	0.01**
	(3.42)	(3.60)	(3.51)	(3.35)	(2.66)
POP	-0.00*	-0.00**	-0.00**	-0.00**	-0.00*
	(-2.05)	(-2.57)	(-2.18)	(-2.32)	(-1.80)
SOUTH	23.12***	16.56***	9.97***	6.32***	4.04***
	(3.69)	(3.70)	(3.69)	(3.72)	(2.92)
CONST	-72.05*	-69.47**	-38.16**	-33.23***	-19.29**
	(-1.73)	(-2.31)	(-2.12)	(-2.90)	(-2.07)
R2	0.62	0.62	0.63	0.45	0.44
P	0.0002	0.0003	0.0003	0.0018	0.0141
Knowledge Production Function					
RD	-0.31	-0.78	-0.71	-0.78	-0.88
	(-0.45)	(-1.02)	(-1.12)	(-1.17)	(-1.33)
RD_BUS_PROP	1.42	2.50*	2.80**	1.99	1.64
	(1.02)	(1.85)	(2.39)	(1.61)	(1.30)
LARGE_RU	4.64***	3.94**	3.80**	4.37***	5.29***
	(2.81)	(2.18)	(2.68)	(3.07)	(3.54)
RET	-0.01	0.02	0.06	-0.10	-0.01
	(-0.18)	(0.39)	(0.96)	(-0.70)	(-0.05)
STAY	-0.01	0.01	0.05**	-0.01	-0.01
	(-0.55)	(0.70)	(2.28)	(-0.87)	(-0.07)
CONST	7.42***	5.83***	4.91***	7.81***	6.64***
	(3.10)	(3.53)	(4.26)	(5.44)	(4.14)
R2	0.60	0.63	0.71	0.65	0.61
P	0.0006	0.0003	0.0000	0.0004	0.0007
N	20	20	20	20	20

* p<0.10, ** p<0.05, *** p<0.01; t-statistics in parenthesis

To conclude, table 6.6 reports the results of the Hausman test and confirms (as the P-values are higher than 0.10) that the 3SLS is appropriate.

Table 6. 6 Hausman tests – Models M1 to M5

	R1	R2	R3	R4	R5
	All	Emp	Edu-Job Match	Science and Technology	ST and Match
Chi2	2.80	2.57	0.79	2.50	0.87
P-values	0.59	0.63	0.94	0.64	0.93

6.7.3 Migrants and returners: the scope for complementarity

Table 6.7 below reports the results for the models A1 to A5, which include both migrants and returners.

Whilst many of the findings of models M and R, regarding WAGE, CULT, TRANS and POP are confirmed, the links between mobility and innovation now reveal new interesting features. This is due to the fact that, as the system takes into account the bi-directional links between both types of mobility and innovation, it effectively accounts also for the effects that migrants and returners have on each other. In other words, the models also take into account the synergies (or lack thereof) that occur between the two types of movers.

Migrants and returners are now both attracted to highly innovative regions (INNPP is always positive and highly significant for migrants, whilst for returners it is positive and significant in A1, A2 and A4). Nonetheless, and in line with previous chapters, INNPP has larger coefficients for migrants. At the same time, we find that both migrants and returners, together with stayers, impact positively on innovation, at least in the "general knowledge" models A1 and A2, whilst in model A3 only RET and STAY are positive and significant. Remarkably, when the focus is on STEM graduates, we find again that only migrants (MIGR) have a positive and significant effect on knowledge production. Moreover, whilst in models A1 to A3 the proportion of large regional units (LARGE_RU) positively and significantly impacts on innovation, when it comes to STEM graduates (A4 and A5) only business R&D expenditures matter, a pattern already emerged in models M4 and M5.

Table 6. 7 Models A1 to A5 – Migrants and Returners

	A1 All	A2 Emp	A3 Match	A4 STEM	A5 STEM Match
			Migrants Attraction Function		
INNPP	11.99*	10.30**	7.63***	2.51***	1.53***
	(2.01)	(2.19)	(3.08)	(2.81)	(2.88)
WAGE	-0.01	-0.01*	-0.00**	-0.00	-0.00
	(-1.38)	(-1.69)	(-2.61)	(-0.45)	(-0.29)
CULT	33.78**	34.24***	27.90***	-0.43	-0.39
	(2.47)	(3.05)	(4.94)	(-0.21)	(-0.33)
POP	-0.00	-0.00	-0.00	-0.00**	-0.00*
	(-1.28)	(-0.38)	(-1.32)	(-2.31)	(-1.78)
LAZIO	-6.65	-10.43	-2.42	5.91*	4.04*
	(-0.31)	(-0.58)	(-0.27)	(1.74)	(1.94)
LOMBARDIA	22.07	21.35	16.14*	4.74	1.99
	(1.01)	(1.18)	(1.78)	(1.53)	(1.15)
CONST	29.76	34.94	33.84	-12.49	-9.96
	(0.38)	(0.55)	(1.02)	(-1.02)	(-1.42)
			Returners Attraction Function		
INNPP	5.61***	3.90***	1.32	0.93*	0.31
	(3.06)	(2.88)	(1.65)	(2.00)	(0.76)
WAGE	-0.00	0.00	0.00	0.00	0.00
	(-0.06)	(0.45)	(1.30)	(0.69)	(0.57)
TRANS	0.04***	0.03***	0.02**	0.01***	0.01***
	(2.72)	(3.06)	(2.54)	(3.33)	(2.72)
POP	-0.00***	-0.00**	-0.00**	-0.00*	-0.00
	(-2.89)	(-2.43)	(-2.52)	(-1.78)	(-1.26)
SOUTH	18.75***	14.41***	9.21***	4.17***	2.48**
	(3.72)	(3.80)	(4.29)	(3.19)	(2.20)
CONST	-53.06	-52.60*	-34.86**	-16.95*	-8.60
	(-1.50)	(-1.94)	(-2.22)	(-1.79)	(-1.07)
			Knowledge Production Function		
RD	-0.47	0.12	-0.27	-0.66	-0.64
	(-0.69)	(0.18)	(-0.46)	(-1.05)	(-1.17)
RD_BUS_PROP	0.74	1.25	2.11	2.94**	2.36**
	(0.55)	(0.87)	(1.68)	(2.31)	(2.25)
LARGE_RU	6.74***	2.82*	3.71***	0.05	1.09
	(3.94)	(1.71)	(2.81)	(0.03)	(0.69)
MIGR	0.05**	0.03*	0.02	0.33***	0.41***
	(2.38)	(1.78)	(1.06)	(3.24)	(3.45)
RET	0.09**	0.09**	0.12**	-0.10	-0.02
	(2.11)	(2.10)	(2.52)	(-0.85)	(-0.10)
STAY	0.06**	0.04**	0.06***	0.02	0.09
	(2.00)	(2.46)	(3.22)	(1.33)	(1.24)
CONST	0.84	4.14***	4.14***	7.59***	7.60***
	(0.30)	(3.34)	(4.35)	(6.52)	(5.81)
N	20	20	20	20	20

* p<0.10, ** p<0.05, *** p<0.01; t-statistics in parenthesis

The goodness of fit statistics are reported in table 6.8 below.

Table 6. 8 Models A1 to A5 – Goodness of fit statistics

	A1 All	A2 Emp	A3 Match	A4 STEM	A5 STEM Match
			Migrants Attraction Function		
R2	0.33	0.39	0.55	0.25	0.30
P-Value	0.0704	0.0445	0.0001	0.0071	0.0059
			Returners Attraction Function		
R2	0.57	0.50	0.56	0.48	0.43
P-Value	0.0000	0.0002	0.0002	0.0012	0.0233
			Knowledge Production Function		
R2	0.44	0.44	0.66	0.43	0.50
P-Value	0.0001	0.0002	0.0000	0.0001	0.0000

Finally the table below reports the Hausman tests and confirms that the 3SLS is appropriate in this case.

Table 6. 9 Hausman test – Models A1 to A5

	A1	A2	A3	A4	A5
	All	Emp	Match	STEM	STEM Match
Chi2 P-values	2.80 0.5915	2.57 0.6320	0.79 0.9399	2.50 0.6444	0.87 0.9294

6.7.4 Discussion

These results strongly support the hypotheses set up at the beginning of the chapter: high-skilled mobility and regional innovation are two sides of the same coin and they impact on each other. It follows that the differences in characteristics and behaviour of migrants and returners are mirrored in their different effects on regional knowledge creation.

Models M1 to M5 have highlighted how migrants are overall attracted and contribute to regional learning, generating a cumulative process of knowledge creation and skill accumulation. On the other hand, models R1 to R5 have shown that the opposite is true for returners. The first two sets of models have also shown that stayers have a more positive impact on innovation when their effect is analysed in conjunction with migrants, than with returners.

When both movers are considered together (models A1 to A5), new interesting features emerge. In models A1, A2, i.e. when we look at the *general knowledge* effect, we see that migrants, returners and stayers are all positively contributing to innovation. In others words, in those regions that attract both types of movers (the innovative regions of the North) all graduates contribute to knowledge accumulation. When we focus on STEM skills the picture changes: it is migrants that contribute to innovation, whilst stayers and returners have no significant effects.[27] Migration seems necessary for STEM graduates to contribute to knowledge, as not all regions can absorb them.

These results call for a reflection on how education policy can actually enhance local development especially in the Mezzogiorno, as they point out that graduate mobility can contribute to widening the sub-national gap. They highlight that academic institutions, as providers of skilled labour force, need to be integrated in the local innovation system as well as in the local strategy for development, if a virtuous cycle of education and knowledge-based growth is to be started.

6.8 Conclusions

This chapter has examined the simultaneous links between the innovation activity (or lack thereof) of Italian regions and the mobility patterns of migrants and returners. Although these links have so far been neglected by the literature, they are relevant for at least three reasons: first, they help evaluate the strategic impact of higher education; secondly, they help understand spatial innovation processes and the interaction between various elements of the regional system; thirdly they are important for their socio-economic implications as graduates, a highly skilled segment of society, are a key resource for economic development.

As graduates' mobility and regional innovation are endogenously determined, the analysis has been based on a series of simultaneous equation models. These included both graduates' attraction functions, which have taken into account the differences between returners and migrants emerged previous chapters, and knowledge production functions.

[27] Moreover, the coefficient for MIGR is larger in A5 than in A4, when matched STEM graduates are taken into account. This is because, in this case, we are effectively isolating those who are transferring the knowledge gained at University.

Based on previous chapters, we have hypothesised that two cumulative processes are generated by the two movers: one in which the most innovative regions attract largely migrants which contribute to local innovation and to making the area more appealing to talent; a second one in which returners tend to move back to the less dynamic regions of the South, where they cannot participate in collective learning processes, thereby making the areas less attractive to other high-skilled individuals. In analysing these processes we also distinguished between the general and specific knowledge of graduates. By general knowledge we referred to the fact that, as highly-educated individuals, graduates can carry out a variety of tasks effectively, regardless of their background. By specific knowledge, we referred to the skills most needed for knowledge-based development and isolated graduates with a science and technology background.

The hypothesised virtuous and vicious cycles are actually confirmed when migrants and returners are analysed separately. However, when both migrants and returners are examined together, a different pattern emerges: both types of movers contribute to a virtuous cycle of talent accumulation and regional learning with their generic knowledge. In other words, for the regions that attract both migrants and returners, a synergy emerges between graduates (regardless of their mobility category) and the regional innovation system. Despite that, when the focus is on STEM movers, this is not the case: among them, only migrants have a significant impact on regional innovation. This means that for STEM graduates migration is necessary in order to contribute to regional learning, as not all the regions can absorb their skills.

Given the spatial distribution of movers this indicates that higher education will translate into collective learning only in those regions that are able to integrate talent in their innovation system. In this respect, the findings are in line with the proposition of Nelson and Phelps (1966) and Vandebussche *et al.* (2006), who highlight how the social return of higher education depends on the techno-economic level of the region/country. From a regional innovation system perspective this means that collective learning arises from the interaction and complementarity between the labour force, the firms and the institutions within the system itself. Clearly this is not the case for the regions of the Mezzogiorno and graduate mobility is indeed contributing to worsening their relative position. At the policy level, these findings call for a re-discussion of tertiary education: for the university system to fulfill its wider socio-economic goals and provide the skills needed for development, a better integration with the regional economic and innovation system is necessary.

Appendix 6.1 – Synopsis of the variables

MIGR – the net inflow of migrants into a region

RET – the net inflow of returners into a region.

STAY – the proportion of stayers in a region.

WAGE – the average wage of the region.

CULT – the proportion of employment in cultural and recreational industries

POP – the population of the region.

LAZ and LOM – dummies for Lazio and Lombardia which

TRANS – the number of public transport lines (in cities), per 100 square Km.

SOUTH – dummy identifying Southern regions and capturing the fact that the large majority of returners relocate there.

RD_GDP – the total R&D spending on GDP

RD_BUS_PROP – the proportion of private R&D spending on total R&D spending.

LARGE_RU – the proportion of regional units with 50 employees or more.

Appendix 6.2 – Survey questions

This appendix reports the survey information used to identify STEM graduates. The information is not part of the questionnaire and is provided by universities themselves in the first part of the survey process. To classify graduates as we have used information on the *area* (q I.4) and *group* of study (q I.3).

Each *area* contains several groups, as shown in the table below.

Table A6.2.1 Definition of disciplinary background

Area	Group
Humanities	Literature, languages, pedagogy and psychology
Socio-Economic disciplines	Economics-statistics, social and political studies
Sciences	Sciences, chemistry and pharmaceutical, geology and biology, agriculture
Law	Law and related disciplines
Engineering and Architecture	Engineering and architecture
Medicine	Medicine
Sports	Sports

STEM graduates include those whose degree belonged to the area *Sciences* and to the group *Engineering*.

Appendix 6.3 – Correlation and VIF

Table A6.3.1 Correlation for the migrants' attraction function

	NET_MIG_RATE	INNPP	WAGE	CULT	POP	LAZ	LOM
NET_MIG_RATE	1.00						
INNPP	0.19	1.00					
WAG	0.18	0.52	1.00				
CULT	0.38	-0.03	0.68	1.00			
POP	-0.19	0.18	0.36	0.03	1.00		
LAZ	0.05	-0.03	0.51	0.55	0.23	1.00	
LOM	0.13	0.31	0.34	-0.02	0.63	-0.05	1

Table A6.3.2 VIF for the migrants' attraction function

	VIF	**1/VIF**
WAGE	5.69	0.18
CULT	3.48	0.29
INNPP	2.37	0.42
LOM	2.04	0.49
POP	2.03	0.49
LAZ	1.86	0.54
Mean VIF	2.91	

Table A6.3.3 Correlation for the returners' attraction function

	NET_RET_RATE	INNPP	WAGE	TRANS	POP	SOUTH
NET_RET_RATE	1.00					
INNPP	-0.10	1.00				
WAGE	-0.41	0.52	1.00			
TRANS	0.41	-0.09	0.11	1.00		
POP	-0.46	0.18	0.36	-0.29	1.00	
SOUTH	0.46	-0.51	-0.79	-0.22	-0.11	1.00

Table A6.3.4 VIF for the returners' attraction function

	VIF	**1/VIF**
WAGE	3.44	0.29
SOUTH	3.16	0.32
INNPP	1.50	0.67
POP	1.40	0.72
TRANS	1.24	0.81
Mean VIF	2.15	

Table A6.3.5 Correlation for the knowledge creation function

	INNPP	TOT_RD	BUS_RD_TOT	LARGE_RU	MIGR	RET	STAY
INNPP	1.00						
TOT_RD	0.25	1.00					
BUS_RD_TOT	0.65	0.39	1.00				
LARGE_RU	0.74	0.50	0.67	1.00			
MIGR	0.19	-0.32	0.27	-0.06	1.00		
RET	-0.10	-0.63	-0.14	-0.39	0.62	1.00	
STAY	-0.10	0.55	-0.14	0.12	-0.82	-0.84	1.00

Table A6.3.6 VIF for the knowledge creation function

	VIF	1/VIF
STAY	8.46	0.12
RET	4.88	0.20
MIG	3.61	0.28
LARGE_RU	2.47	0.40
BUS_RD_TOT	2.4	0.42
TOT_RD	2.34	0.43
Mean VIF	4.03	

Appendix 6.4 – Models without Molise and Basilicata

Table A6.4.1 Models M1 to M5 (Migrants) – No Molise and Basilicata

	M1 All	M2 Emp	M3 Match	M4 STEM	M5 STEM Match
Migrants Attraction Function					
INNPP	0.21*	0.13**	0.13***	0.02***	0.02***
	(1.87)	(2.47)	(3.52)	(2.98)	(3.04)
WAGE	-0.00	-0.00*	-0.00***	-0.00	-0.00
	(-1.49)	(-1.99)	(-2.81)	(-0.22)	(-0.53)
CULT	0.56**	0.53***	0.39***	0.01	0.01
	(2.45)	(3.99)	(4.85)	(0.45)	(0.74)
POP	-0.00	0.00	-0.00	-0.00*	-0.00
	(-0.20)	(0.32)	(-0.09)	(-1.77)	(-1.57)
LAZIO	0.08	-0.13	-0.01	0.02	0.02
	(0.25)	(-0.63)	(-0.08)	(1.13)	(1.23)
LOMBARDIA	0.24	0.21	0.14	0.02	0.01
	(0.86)	(0.99)	(1.30)	(0.87)	(0.77)
CONST	0.87	0.51	0.57	-0.17*	-0.09
	(0.71)	(0.68)	(1.27)	(-2.00)	(-1.39)
R2	0.26	0.51	0.58	0.49	0.42
P	0.0988	0.0048	0.0003	0.003	0.0008
Knowledge Production Function					
RD	-0.59	-0.68	-0.74	-0.54	-0.68
	(-0.82)	(-1.13)	(-1.36)	(-0.78)	(-1.08)
RD_BUS_PROP	1.37	1.68	1.95	2.38*	2.38*
	(0.93)	(1.13)	(1.52)	(1.72)	(2.01)
LARGE_RU	4.92***	2.80	3.29**	0.51	1.17
	(3.13)	(1.68)	(2.45)	(0.30)	(0.76)
MIGR	0.02	0.03*	0.04	0.33***	0.42***
	(0.79)	(1.94)	(1.67)	(3.04)	(3.46)
STAY	0.01	0.03*	0.05**	0.03	0.07
	(0.36)	(1.96)	(2.69)	(1.62)	(1.49)
CONST	6.06***	5.86***	5.57***	6.86***	7.77***
	(4.15)	(7.40)	(8.14)	(7.72)	(11.85)
R2	0.58	0.61	0.67	0.53	0.47
P	0.0001	0.0005	0.0002	0.0003	0.0003
N	18	18	18	18	18

* p<0.10, ** p<0.05, *** p<0.01

Table A6.4.2 Models R1 to R5 (Returners) – No Molise and Basilicata

	R1 All	R2 Emp	R3 Match	R4 STEM	R5 STEM Match
	Returners Attraction Function				
INNPP	0.01	0.01	0.01	0.00	0.00
	(0.87)	(0.78)	(1.03)	(1.12)	(0.69)
WAGE	0.00	0.00	0.00	0.00**	0.00*
	(0.72)	(1.61)	(1.46)	(2.22)	(1.73)
TRANS	0.00***	0.00***	0.00***	0.00***	0.00***
	(5.29)	(4.75)	(4.19)	(3.74)	(3.50)
POP	-0.00	-0.00	-0.00	-0.00**	-0.00**
	(-1.14)	(-1.70)	(-1.49)	(-2.66)	(-2.28)
SOUTH	0.14***	0.11***	0.07***	0.04***	0.02**
	(3.07)	(3.03)	(3.32)	(3.49)	(2.55)
CONST	-0.46	-0.53**	-0.32**	-0.21***	-0.10**
	(-1.64)	(-2.41)	(-2.38)	(-3.12)	(-2.31)
R2	0.69	0.66	0.62	0.57	0.57
P	0.0002	0.0005	0.0014	0.0014	0.0046
	Knowledge Production Function				
RD	-0.54	-0.28	-0.34	-0.83	-0.72
	(-0.83)	(-0.41)	(-0.56)	(-1.30)	(-0.93)
RD_BUS_PROP	1.07	0.72	1.14	2.79	-1.54
	(0.76)	(0.48)	(0.81)	(1.10)	(-0.44)
LARGE_RU	5.39***	4.86***	5.11***	4.23*	7.51**
	(3.14)	(2.90)	(3.37)	(2.05)	(2.46)
RET	0.30	9.11	11.32	-13.78	75.61
	(0.05)	(1.37)	(1.44)	(-0.39)	(1.10)
STAY	0.08	2.39	3.13	-4.88	19.32
	(0.04)	(1.26)	(1.58)	(-0.55)	(0.78)
CONST	6.33***	4.80***	5.01***	7.38***	5.01**
	(2.84)	(3.39)	(4.94)	(4.82)	(2.50)
R2	0.66	0.66	0.72	0.66	0.49
P	0.0004	0.0002	0.0001	0.0007	0.0025
N	18	18	18	18	18

* p<0.10, ** p<0.05, *** p<0.01

Table A6.4.3 Models A1 to A5 (All migrants) – No Molise and Basilicata

	A1 All	A2 Emp	A3 Match	A4 STEM	A5 STEM Match
Migrants Attraction Function					
INNPP	0.10	0.08	0.07**	0.03***	0.02***
	(1.11)	(1.54)	(2.36)	(3.85)	(3.51)
WAGE	-0.00	-0.00	-0.00	-0.00	-0.00
	(-0.68)	(-1.05)	(-1.58)	(-1.33)	(-1.26)
CULT	0.39**	0.39***	0.28***	0.02	0.02
	(2.08)	(3.19)	(4.30)	(1.38)	(1.43)
POP	-0.00	0.00	-0.00	-0.00*	-0.00
	(-0.48)	(0.04)	(-0.73)	(-2.00)	(-1.52)
LAZIO	-0.14	-0.19	-0.09	0.05*	0.03*
	(-0.51)	(-0.96)	(-0.91)	(1.92)	(1.84)
LOMBARDIA	0.18	0.20	0.14	0.03	0.02
	(0.73)	(1.03)	(1.50)	(1.65)	(1.28)
CONST	-0.13	-0.05	0.03	-0.06	-0.04
	(-0.12)	(-0.08)	(0.08)	(-0.71)	(-0.58)
Returners Attraction Function					
INNPP	0.03*	0.02*	0.01**	-0.00	-0.00
	(1.82)	(1.71)	(2.06)	(-0.19)	(-0.37)
WAGE	0.00	0.00	0.00	0.00**	0.00*
	(0.81)	(1.49)	(1.50)	(2.19)	(1.92)
TRANS	0.00***	0.00***	0.00***	0.00***	0.00***
	(4.61)	(4.32)	(3.36)	(3.88)	(3.85)
POP	-0.00*	-0.00*	-0.00*	-0.00**	-0.00**
	(-1.98)	(-1.94)	(-1.97)	(-2.52)	(-2.17)
SOUTH	0.14***	0.11***	0.07***	0.03**	0.01**
	(3.58)	(3.41)	(3.99)	(2.71)	(2.15)
CONST	-0.53**	-0.53**	-0.34***	-0.15**	-0.08*
	(-2.06)	(-2.56)	(-2.74)	(-2.28)	(-1.93)
Knowledge Production Function					
RD	-0.74	-0.07	-0.13	-0.83	-1.23*
	(-1.10)	(-0.10)	(-0.22)	(-1.64)	(-1.96)
RD_BUS_PROP	0.12	0.29	0.68	2.68	2.96
	(0.09)	(0.19)	(0.49)	(1.68)	(1.59)
LARGE_RU	7.21***	4.45**	5.25***	-0.53	-0.92
	(4.09)	(2.57)	(3.19)	(-0.37)	(-0.51)
MIGR	3.96*	0.84	18.37**	40.83***	66.43***
	(2.00)	(0.50)	(2.28)	(4.26)	(4.86)
RET	8.94*	12.42*	0.61	-32.59*	-66.42*
	(1.71)	(1.82)	(0.26)	(-1.96)	(-2.03)
STAY	5.55*	3.52*	3.93*	0.61	4.15
	(1.87)	(1.97)	(1.78)	(0.12)	(0.33)
CONST	1.79	4.20***	4.54***	9.70***	10.03***
	(0.68)	(3.18)	(4.70)	(12.55)	(9.44)
N	18	18	18	18	18

Table A6.4.4 Models A1 to A5 – Goodness of fit statistics

	A1 All	A2 Emp	A3 Match	A4 STEM	A5 STEM Match
Migrants Attraction Function					
R2	0.44	0.55	0.69	0.35	0.35
P-Value	0.0600	0.0092	0.0001	0.0001	0.0003
Returners Attraction Function					
R2	0.66	0.62	0.57	0.63	0.59
P-Value	0.0001	0.0003	0.0008	0.0003	0.0008
Knowledge Production Function					
R2	0.51	0.61	0.68	0.52	0.43
P-Value	0.0003	0.0001	0.000	0.0000	0.0000

Chapter 7
Is the grass greener on the other side of the fence? Mobility and job satisfaction

Abstract

This chapter studies the links between spatial mobility and job-related wellbeing. It compares migrants, returners, stayers and new subcategories derived from these groups. Methodologically it applies generalized ordered logit regressions to the ISTAT (2007a) survey on graduates' entry in the labour market. Results indicate that stayers, migrants and returners differ in their patterns of wellbeing and, mostly, that leaving the South is a particularly rewarding choice.

7.1 Introduction

Is it worth it? Am I going to be better off? All migrants have confronted themselves with these questions and, to conclude this thesis, we also tackle this crucial point by analysing how mobility patterns impact on self-reported job satisfaction.

There are both theoretical and policy reasons to do so. Indeed, whilst the dominant approach to migration has primarily targeted its *objective* economic gains (such as employment opportunities or salary), by looking at job-related wellbeing we are able to appreciate its *subjective* consequences, that is, the individual's feelings about her/his move. Furthermore, whilst understanding what makes an employee fulfilled is *per se* a valuable pursuit, recent evidence has pointed out that a satisfied workforce is beneficial both at the firm level (Harter *et al.*, 2002) and at the regional level (Rodriguez-Pose and Vilalta-Bufi, 2005).

Theoretically the study is located at the intersection between the field of the economics of job satisfaction and human capital migration. Empirically, through generalised ordered logit regressions, it evaluates the impact of personal and job-related characteristics on four domains of self-reported wellbeing: satisfaction with the tasks carried out at work, economic treatment, stability and security, and career prospects.

Needless to say, as the focus is on Italian interregional graduate flows, the striking socio-economic disparities at the sub-national level must be taken into account. In what follows, therefore, we pay particular attention to graduates from Southern universities, and effectively explore whether the socio-economic conditions of the Mezzogiorno, influence graduates' satisfaction. To do so, we build new sub-categories of mobility, based on the usual distinction between migrants, stayers and returners.

The chapter is organized as follows. Section 7.2 introduces the background literature. Section 7.3 defines the research questions. Section 7.4 explains the econometric technique used, whilst section 7.5 describes the econometric analysis. Section 7.6 provides a first picture of the phenomenon through descriptive statistics. Section 7.7 reports and discusses the results of the econometric analysis. Section 7.8 concludes.

7.2 The economics of job satisfaction

In order to define the research questions, this section first reviews the literature on job satisfaction, with a specific focus on the role of education (section 7.2.1). Secondly, it outlines the links between migration and wellbeing (section 7.2.2) and finally it introduces the specificities of the Italian case (7.2.3).

7.2.1 Job satisfaction and education

Industrial sociologists and psychologists have long highlighted the links between job-related wellbeing and crucial labour market outcomes, such as quitting, turnover or productivity (i.e. Wanous and Lawler, 1972; Rusbult and Farrel 1983). Despite that, economists have only recently investigated these aspects systematically (Ferrer-i-Carbonell and Fritjers, 2004): although the first economic analysis of job satisfaction go back to the 1970s (Hamermesh, 1977; Freeman, 1978), the branch has developed properly only since the 1990s with the seminal contributions of Clark and Oswald (1994, 1996).[1]

As opposed to psychologist and sociologists, who have taken into account the role of organisational structures and personal traits as well as job characteristics (e.g. House *et*

[1] Until then, indeed, the field was nearly exclusively the domain of industrial sociology and psychology (Ferrer-i-Carbonell and Fritjers, 2004).

al., 1996; Judge *et al.*, 2002), economists have mainly focussed on the latter. This literature has found that wage and work hours are respectively positively and negatively related to job satisfaction (Clark and Oswald, 1996; Lydon and Chevalier, 2002) and that job security and job interest are more relevant than salary in determining overall wellbeing (Clark, 1995). Interestingly, scholars have also found that women, which on average earn less and occupy lower positions, tend to be more satisfied than men, because they have lower expectations about their careers (e.g. Clark, 1997; Sloane and Williams, 2000; Souza-Poza and Souza-Poza, 2000).

The analysis of job satisfaction can also shed light on the impact that education has on workers' wellbeing, which is at the core of the present chapter. Intuitively the two should be positively related as, at least in principle, education provides access to well-remunerated jobs, with good employment conditions and the possibility for professional development (Ross and Van Willigen, 1997). However, the empirical evidence does not fully support this intuition (Fabra and Camison, 2009). Several studies have found a negative impact of education on satisfaction (e.g. Clark, 1996; Clark and Oswald, 1996; Watson *et al.*, 1996; Gazioglu and Tansel, 2006), others have shown that the relationship is either positive or not significant (Idson, 1990; Ross and Reskin, 1992), and a third group has found that the impact of education varies across domains of satisfaction (Groot and Maassen van den Brink, 1999; Vila and Garcia-Mora, 2005). These contrasting findings are resolved by formally distinguishing between the *direct* and *indirect* effects of education (Fabra and Camison, 2009). A higher qualification level influences satisfaction *indirectly* by giving access to better employment opportunities, and *directly* by generating higher expectations. This implies that, in an empirical setting, when the job characteristics (i.e. the indirect effects) are controlled for, a negative effect of education on job satisfaction indicates that the expectations of the worker have not been met. These observations are supported by a large body of research highlighting that overeducated workers[2] are less satisfied than workers with a correct education-job match, precisely because their expectations and ambitions are not being fulfilled (Hersch, 1991; Battu *et al.*, 1999; Allen and van der Velden, 2001; Ganzach, 2003; Cabral Viera, 2005).[3] Interestingly, Quinn and Rubb (2005) have also

[2] I.e. workers with a level of education higher than their job requires.
[3] Rosen (1973), had already pointed out that overeducated workers tend to earn less than those with their same level of education that experience a job-education match (see chapter 1 for more details).

found that a job-education mismatch is itself an incentive to migrate, precisely because of the dissatisfaction and worse economic conditions it generates.

When it comes to graduates, understanding the role of education means evaluating how the university experience has facilitated entry in the labour market. The (very small) literature on the topic has again confirmed the importance of the education-job match (Vila and Garcia-Mora, 2005; Mora *et al.*, 2007; Schomburg, 2007). At the same time, it has highlighted that the field of studies, by impacting on job opportunities, also influences job satisfaction. In particular, Mora *et al.* (2007) find that graduates from scientific and engineering disciplines tend to be relatively more satisfied. Scholars have also found that job-related wellbeing is higher for those who enjoyed their university experience, that it increases with the level of parental education (Mora *et al.*, 2005, Mora *et al.*, 2007; Schomburg, 2007) and that is not affected by the graduation mark (Mora and Ferrer-i-Carbonell, 2009). Remarkably, even for recent graduates, there are clear gender imbalances. However, whilst studies covering the whole working-age population found women to be more satisfied than men, due to their lower expectations, the opposite holds in this case (Mora and Ferrer-i-Carbonell, 2009). Female graduates are less satisfied than their male colleagues, because they have their same ambitions and yet face discrimination and achieve fewer results.

7.2.2 *Migration and job satisfaction: direct and indirect effects*

Migration can theoretically lead to higher levels of job (and life) satisfaction. This positive link is effectively implicit in the traditional theory where migration results from a utility maximisation process, in which the benefits of moving outweigh the costs (Ziegler and Britton, 1981). Furthermore, it has been empirically proven that migration leads to higher extrinsic (earnings) and intrinsic (greater autonomy) job-related rewards (Greenwood, 1975), which are key elements of work wellbeing (Gruenberg, 1980; Janson and Martin, 1982).

Despite these clear connections, the actual job (and life) satisfaction of migrants has very seldom been explored. Whilst Martin and Litcher (1983) find little evidence that mobility translates into increases in self-reported wellbeing, other scholars have highlighted how various mobility characteristics indeed impact on satisfaction. For instance, De Jong *et al.* (2002) find that life satisfaction varies across migration typologies (such as single or repeated movers), and also depends on how recent the move itself was. Lundholm and Malmberg (2006) focusing on interregional mobility in the Nordic countries, show that satisfaction also depends on the migrant's expectations and motives. Finally, Lin *et al.* (2009) point out that the skill-level also influences the migration-satisfaction link, as they find that foreign faculty in American universities tend to feel overall more rewarded at work than native faculty.

This scattered evidence suggests that migrants' specific characteristics are relevant in determining satisfaction and encourages further research in the area. In taking on this challenge, we apply the distinction between *direct* and *indirect* effects, mentioned above, to spatial mobility. Specifically, we argue that any mobility choice (migrating, returning, staying, and their subcategories) can affect job satisfaction indirectly, by allowing access to more rewarding jobs, or directly, by creating expectations on the outcome of the move. In an empirical setting, these two effects will manifest differently; an example will clarify this point. Let us assume, for the sake of argument, that we are studying satisfaction with career opportunities and our observations are divided simply between migrants and non-migrants. In this case, once the job characteristics are controlled for, a not-significant migration coefficient denotes that only the indirect effects have occurred. A negative and significant coefficient indicates that expectations regarding a specific job domain have not been met. Finally a positive and significant coefficient indicates that moving, as such, was instrumental to achieve a higher level of fulfilment with career opportunities. In turn this suggests that career opportunities were important in shaping the decision to move.

7.2.3 The Italian case

Italian graduates have difficulties in entering the labour market. As shown by Rostan (2006), four years after graduating they face a relatively lower employment rate than in other EU-12 countries[4] (79% versus 85%). Moreover, the unemployment rate is much higher for young graduates aged 25 to 29, than for those aged 30 to 34 (21.9% versus 8.7%), confirming strong barriers in the transition from university to work (ISTAT, 2006a). At the same time, overeducation in Italy is becoming increasingly common: on the one hand the proportion of graduates working in jobs for which a university degree

[4] Data is taken from the CHEERS (Careers after Higher Education, a European Research Study) survey, which includes Italy, Spain, France, Austria, Germany, the Netherlands, the UK, Finland and Norway.

is not a formal requirement increased from 26.3% to 33% between 1995 and 2001 (Di Pietro and Urwin, 2006); on the other there is evidence that employers may unnecessarily raise the formal educational requirements of their vacancies in order to hire a more qualified workforce to carry out lower-skilled tasks more effectively (*ibid.*). These trends are, unsurprisingly, reflected in the lower satisfaction levels (as well as lower salaries) of Italian graduates in comparison to those in other European countries (Schomburg, 2007).

As one would expect, large interregional disparities exist in terms of graduate opportunities (Coniglio and Peragine, 2007). Three years after graduation the proportion of employed graduates is 74% in the country as a whole, while in the South it drops to 59.2% (ISTAT, 2005b). The quality of employment is also different across the country: 64.6% of graduates in the North have a stable employment three years after graduation, as compared to only 42.3% in the South (ISTAT, 2006b). Not only the jobs available for graduates in the Mezzogiorno are fewer and less secure, but they are also not accessible by merit alone as the area is characterized by very low social mobility (Checchi and Dardanoni, 2002). Indeed, in the South the family of origin has not only a strong impact on educational attainment but also influences the success in the job market (Checchi and Peragine, 2005).

The lack of opportunities and social mobility together with the increasing overeducation have the potential to influence both the decision to move and the level of job satisfaction (especially in the Mezzogiorno) we will explore the links between these phenomena. To the best of the author's knowledge, this aspect has only been tackled by Ciriaci (2006), who has found that Southern migrants tend to be less satisfied than their co-nationals.

7.3 Research questions

The main objective of this chapter is to understand whether different mobility behaviours are associated with different levels of job satisfaction. This is especially important for graduates from the South, to which special attention is paid: as they face harder socio-economic conditions, it is interesting to see whether relocating in the Centre-North is effectively rewarding.

In particular, four domains of job-related wellbeing are analysed: satisfaction with job tasks, economic treatment, stability and security, and career opportunities. Together, these domains provide a detailed picture of job satisfaction: whilst the first two refer to current aspects of the job, the latter two give a good indication of how the individual feels about his/her future. At the same time, the chapter compares the role of personal and social background, as well as education and job characteristics in determining satisfaction. Among these factors, education-job matches and mismatches are especially relevant. On the one hand, it is interesting to assess how the increasing overeducation reported by Di Pietro and Urwin (2006) impacts on subjective wellbeing; on the other, it is necessary to explore whether an education-job match, which effectively means that the graduate is transferring knowledge from the university to the labour market, is beneficial to the graduate.

In analysing these issues the chapter will add a new layer of complexity to the theoretical understanding of the costs and benefits of mobility. At the same time, it will provide a new empirical perspective on the Italian spatial inequality and on the role of universities and human capital for regional development.

7.4 Methodology I: econometric techniques

7.4.1 Generalised ordinal logistic regression

The study of satisfaction is based on subjective evaluations of one's own situation, where survey respondents are asked to rate their own level of wellbeing on a Likert scale. To use such data we need to assume that satisfaction is comparable across individuals[5] and decide whether such comparability is cardinal (as assumed by sociologists and psychologists, whom as a consequence use OLS regressions) or ordinal, as assumed by the economic literature, which in turn uses ordered logit or probit regressions (Ferrer-i-Carbonell and Frijters, 2004). [6] In this chapter we follow the economic tradition and apply a generalised ordered logit (GOlogit) with partial proportional odds levels (Williams, 2006).

[5] This assumption has been challenged by D'Addio *et al.* (2010) and Ferrer-i-Carbonell and Fritjerts (2004).

[6] Whilst OLS may be more intuitive, they should not be used unless cardinality is proven. When OLS are used with ordinal variables the errors are heteroscedastic therefore a key assumption of the model is violated. Despite that, Ferrer-i-Carbonell and Frijters (2004) point out that the results of OLS and ordered regressions are fairly similar in terms of signs and significance.

Before explaining the generalised model, however, the simple ordered logit (Greene, 2002) needs to be described. As for other discrete choice models, the model is based on a latent regression where Y^* is unobserved.

$$Y^* = X'\beta + \varepsilon. \qquad \textbf{(Eq. 7. 1)}$$

Researchers can observe a series of ordered outcomes Y which are related to the latent variable Y^*, namely:

$$\begin{aligned} &Y = 1 \text{ if } 0 < y^* \le \mu_1 \\ &Y = 2 \text{ if } \mu_1 < y^* \le \mu_2 \\ &\ldots \\ &Y = J \text{ if } \mu_{J-1} < y^* \end{aligned} \qquad \textbf{(Eqs. 7.2)}$$

It follows that:

$$P(Y = 1) = P(0 < Y^* \le \mu_1) = P(X'\beta + \varepsilon) \qquad \textbf{(Eq. 7. 3)}$$

As explained in previous chapters, if ε is normally distributed we have the ordered probit regression, whereas if they are independent and identically distributed (i.i.d), we have the ordered logit regression.

The μ, the so-called cut-off points, are the thresholds across the ordered levels. They are themselves unknown and need to be estimated with the β. Through the μ and β and the assumed logistic distribution of the disturbance term, we can estimate the probability that the unobserved variable y* falls within each interval.

For instance in the case of an ordered logit with three μ, the probabilities that any unobserved value y* falls within the three intervals are:

$$P(Y = 1) = \frac{1}{1 + \exp(Z_i - \mu_1)}$$

$$P(Y=2)=\frac{1}{1+\exp(Z_i-\mu_2)}-\frac{1}{1+\exp(Z_i-\mu_1)} \qquad \textbf{(Eqs. 7.4)}$$

$$P(Y=3)=1-\frac{1}{1+\exp(Z_i-\mu_2)}$$

where:

$$Z=\sum_{k=1}^{K}\beta_k X_k \qquad \textbf{(Eq. 7. 5)}$$

and K is the number of independent variables.

In equations 7.4 and 7.5, only the constants (i.e. the cut-off points) differ across categories, whilst the β are the same. This implies that a change in any independent variable is expected to have the same effect across levels of satisfaction. In other words, a change in an independent variable will impact on the probability of being not satisfied and on the probability of being very satisfied in the same way. This fact is referred to as the Parallel Odds (P.O.) assumption, which needs to hold for ordered logit models.

The Brant test (Brant, 1990) can be used to check if the P.O. assumption is respected. However, current statistical software do not allow this test to be run when the data is weighted, as in our case.[7] Since we cannot test for the P.O. assumption, we prefer not to use the simple Ologit, and instead apply a generalised version of the model (GOlogit). In a GOlogit both the cut-off points and the parameters vary across levels, as equation 7.6 shows:

$$P(Y_i>j)=g(X\beta_j)=\frac{\exp(a_j+X_i\beta_j)}{1+\exp(a_j+X_i\beta_j)} \qquad \textbf{(Eq. 7. 6)}$$

In other words, the GOlogit frees all parameters from the P.O. assumption, even those

[7] In chapter 3 we explained that the ISTAT *Indagine*, which we are also using in this chapter, provides weights to ensure that the sample is representative at the regional level.

that do not violate it, estimating, as a multinomial logit[8] would do, as many equations as there are satisfaction levels. Clearly, this can result in more parameters than necessary and a consequent loss of efficiency. We therefore estimate a modified version of the GOlogit, the *partial proportional odds* model (Peterson and Harrell 1990), where the P.O. constraint is relaxed only for those variables for which it is necessary.

As explained in Williams (2006), this model is implemented in STATA through the *autofit* command and entails the following steps: first, a totally unconstrained GOlogit model is estimated; secondly, a series of Wald tests are run on each independent variable to see whether its coefficients differ across the equations of the various ordered levels. If the test is not statistically significant the P.O. assumption holds. In this case, the variable with the least significant value on the Wald test is constrained to have equal effects across levels (as would be in a normal ordered logit). The model is then re-fitted with this constraint, and the process is repeated until there are no more variables that meet the P.O. assumption. A global Wald test on the final model with constraints is then performed and, if statistically not significant, it indicates that the parallel odds assumption is not violated.[9] The partial proportional odds regression is, needless to say, computationally more onerous and the convergence times are much longer than with the Ologit or the GOlogit.

7.4.1.1 A note on the interpretation and presentation of the GOlogit

One of the drawbacks of a GOlogit with partial proportional odds is that its results are more complex to report, as for certain explanatory variables the effect on the ordered dependent variable is the same across levels of satisfaction whilst for others it is not.

For the former, the results are to be interpreted in exactly the same way as an ordered logit: a positive and significant coefficient increases the chances of a higher-level response. For the latter we have different coefficients for different levels of satisfaction and the results are to be interpreted as if it were a multinomial logit where:

[8] See chapter 4 for a detailed description of multinomial logit.

[9] As *autofit* basically uses a backward stepwise selection procedure (i.e. starting with the least parsimonious model and gradually imposing constraints), it has many of the same strengths and weaknesses as backward stepwise regression. When theory cannot give insights on which variables violate the parallel-lines assumptions, this is a way to empirically identify it. However, in this case it is suggested to use restrictive significance levels for the Wald tests (Williams, 2006). This is indeed done in the present research, where the levels is set to 0.01.

- Level 1 compares category 1 (not satisfied at all) to categories 2, 3, and 4 (marginally, quite and very satisfied)
- Level 2 compares categories 1 and 2 (not satisfied and marginally satisfied) to categories 3 and 4 (quite and very satisfied)
- Level 3 compares categories 1, 2, and 3 (not satisfied, marginally and quite satisfied) to category 4 (very satisfied).

A positive coefficient indicates that higher values of the explanatory variable increase the chances of being in a higher category than the current one; a negative coefficient indicates that higher values on the explanatory variable increase the likelihood of being in the current or a lower categories. Furthermore, by comparing the sign and significance of the coefficients across levels, we can also appreciate in more detail how each variable impacts on satisfaction. Broadly speaking, two main patterns can be identified: one of concentration and one of polarisation. The former occurs, for instance, when the coefficients for the three levels have the same sign: three positive (negative) coefficients indicate that graduates tend to concentrate among the highest (lowest) levels of satisfaction. Table 7.1 provides a fictitious example of this case:

Table 7. 1 Satisfaction with stability and security

	FEMALE
Level 1	0.15**
	(-0.97)
Level 2	0.10**
	(-0.91)
Level 3	0.24**
	(2.31)

* p<0.10, ** p<0.05, *** p<0.01; t in parenthesis

The latter occurs, for instance, when level 1 has a negative and significant sign and level 3 has a positive and significant. In this case (exemplified in table 7.2), graduates tend to polarise among very high and very low levels of satisfaction.

Table 7. 2 Satisfaction with stability and security

	FEMALE
Level 1	-0.15**
	(-0.97)
Level 2	0.10**
	(-0.91)
Level 3	0.24**
	(2.31)

* p<0.10, ** p<0.05, *** p<0.01; t in parenthesis

The importance of this distinction will become apparent in section 7.7, where we present our results. In section 7.7, to render the text clearer, the variables generating a polarised effect will be presented in a different way than those generating a concentrated one. Specifically, we will only report the coefficients of levels 1, 2 and 3 if the variable violating the P.O. assumption generates a polarised pattern of satisfaction or if it is a mobility category (the latter occurs only in one case). For those generating a concentrated pattern of satisfaction we will only report the level 2 coefficient.[10]

7.5 Methodology II: econometric analysis

7.5.1 Estimation strategy

The analysis relies, as in previous chapters, on the ISTAT survey *Indagine sull' Inserimento Professionale dei Laureati.* The dependent variables of the models are the self-reported satisfaction level of graduates across four employment domains:

1. Job satisfaction with the tasks carried out at work
2. Job satisfaction with economic treatment
3. Job satisfaction with security and stability
4. Job satisfaction with career opportunities

All of them are ranked on a 1-4 Likert scale, namely:

1. Not at all satisfied
2. Marginally satisfied
3. Quite satisfied
4. Very satisfied

[10] Full results for all the variables violating the P.O assumption are reported in appendix 7.3.

As mentioned previously, the first two domains inform us about how the graduate perceives her/his situation in the present, whilst the latter two relate to how he/she sees the future.

Each domain is analysed separately[11] and for three different samples. The first sample (analysed in models A1 to A4) includes the whole population of Italian graduates, the second (models B1 to B4) covers graduates living in the Centre North and the third (models C1 to C4) [12] includes graduates that have studied in the South or returned to it.

7.5.2 Econometric specification

The explanatory variables of the analysis include: the mobility behaviour of the graduate (with new sub-categories, as compared to previous chapters), educational and job characteristics, educational background, social background, age and gender. These are all described below and, as in previous chapters, we indicate in parenthesis the survey question from which they are derived.[13]

1. Mobility behaviour: new sub-categories

The mobility status of the graduate is the key variable for this study. In models A1 to A4, which refer to Italy as a whole, the usual distinction among stayers, migrants and returners[14] is used. However, in order to gain more insights on the satisfaction of Southern graduates we develop new sub-categories in models B and C.

[11] This implicitly assumes that the four domains are independent from each other. This may not be the case as they could be co-determined. In such a situation, the use of a multivariate ordered probit (Greene and Hensher, 2010) would be appropriate. However for this research, the multivariate approach has been rejected for two reasons. Firstly, because, due to computational limits, current software applications only allow bivariate ordered probits to be estimated (for example, through the *bioprobit* command in STATA, by Sajaia, 2008). Thus, we would be able to study jointly only two domains of satisfaction and this would involve making an assumption (without basis) as to which couple is co-determined. Secondly, bivariate ordinal models have themselves several identification problems. Such problems are solved by imposing mathematical constraints, that may themselves bias the estimates (Jeliazkov *et al.*, 2008).

[12] In the notation, the letter refers to the sample whilst the number to the dependent variable used. That is: model A1, B1 and C1 refer respectively to the whole sample (A), to graduates living in the Centre-North only (B) and to graduates of the South (C). All of them analyse satisfaction with the tasks carried out at work.

[13] Appendix 7.1, at the end of the chapter, sums all the variables in a table. Appendix 7.2 reports the survey questions of the variables that have not been used previously.

[14] Returners are those who move from the region of study back to their home region; migrants are those who move from the region of study somewhere else; stayers are those who remain in the region of study. See section 3.4.2 of chapter 3.

In models B we want to understand how graduates from the South who moved to the Centre-North feel in comparison to the rest. Therefore we distinguish among:

1. Stayers in the Centre-North (the reference group in the regression)
2. Centre-North to Centre-North migrants (**CN_TO_CN**)
3. South to the Centre-North migrants (**S_TO_CN**)
4. Returners to (or within) the Centre-North (**RET_CN**)

In models C we want to understand how those who left the South for the Centre-North feel in comparison to those who stayed, moved within or returned to the South. We therefore distinguish among:

1. Returners to the South (the reference group in the regression)
2. Stayers in the South (**S_STAY**)
3. South to South migrants (**S_TO_S**)
4. South to Centre migrants (**S_TO_CE**)
5. South to North West migrants (**S_TO_NW**)
6. South to North East migrants (**S_TO_NE**)

2. Job characteristics:

SALARY (q. 3.6) – the monthly income of the graduate expressed in euros.

PT (q.2.19) – a dummy variable identifying part-time jobs.

PERM (q.2.12) – a dummy variable identifying permanents jobs.

3. Education-job (mis)matches:

The variable identifies whether the graduate is using her/his skills at work. It has been constructed by taking into account the following two questions of the survey:

1. Was the degree formally required by the employer to apply for the job (q.2.26)?
2. Is the degree effectively needed for the job (q.2.29)?

Combining the two, along the lines of Ungaro and Verzicco (2005) and Quintano *et al.* (2008), gives a matrix of four possible education-job (mis)matches, as highlighted below:

Table 7. 3 Education-job (mis)matches

<table>
<tr><td colspan="2" rowspan="2"></td><td colspan="2">Was the degree effectively necessary to do the job?</td></tr>
<tr><td>YES</td><td>NO</td></tr>
<tr><td rowspan="2">Was the degree formally required?</td><td>YES</td><td>OBJ_MATCH: Objective education-job match</td><td>SUB_OVER: Subjective Overeducation</td></tr>
<tr><td>NO</td><td>SUB_MATCH: Subjective education-job match</td><td>OBJ_OVER:[15] Objective overeducation</td></tr>
</table>

A match or mis-match is defined as *objective* when the opinion of the graduate on the effective need of her/his qualifications is coherent with the formal requirements of the job. An objective education-job match (mismatch) arises therefore when the graduate believes (does not believe) that her/his education level is effectively needed in the job and when the degree was (was not) also a formal requirement of the employer.

Whenever the opinion of the graduate and the employer’s requirement differ, on the other hand, a subjective match or mismatch arises. Specifically when a graduate feels that the degree is needed in her/his work, though the employer did not require it, the graduate is experiencing a subjective job-education match. When the graduate is in a job for which the degree was formally required but is effectively unnecessary he/she is experiencing subjective overeducation.[16]

4. Educational background

STEM (q.I.3 and q.I.4) – a dummy that identifies whether the graduate studied scientific or engineering degrees.

GRADE (q.1.10) – the graduation mark.

SAME_D (q1.24) – a dummy identifying whether the graduate would enrol again in the same degree. It is used to understand whether the graduate was satisfied with the university experience.

[15] OBJ_OVER is the base category of the variable against which, in the econometric regressions, the other three will be compared in the econometric analysis.

[16] Many indicators of education-job match and overeducation have been used. See Verhaest and Omey (2006), for an overeview.

5. Social background and personal charachteristics

PAREDU (q.4.3 and q.4.4) – a categorical variable that identifies whether at least one of the parents of the graduate was educated to secondary level (PAREDU_S) or to tertiary level (PAREDU_T). This variable captures the effect of social background on the graduates' level of satisfaction.

DISTANCE – the distance in 100km between origin and destination.[17] We include this variable because moving further away from home may bare higher psychological costs.

AGE (q.5.9) – the age of the graduates

FEMALE (I.6) – a dummy identifying whether the graduate is a female.

Table 7.4 below sums up all the models of the analysis.

[17] The reader is referred to chapter 5, section 5.5.1, for a more precise description of this variable.

Table 7. 4 Summary of econometric analysis

<table>
<tr><th>Sample</th><th>A: Whole graduate population</th><th>B: Graduates living in the Centre-North</th><th>C: Graduates who studied in or returned to the South</th></tr>
<tr><td></td><td colspan="3">Dependent variables</td></tr>
<tr><td></td><td colspan="3">1. Satisfaction with job tasks
2. Satisfaction with economic treatment
3. Satisfaction with stability and security
4. Satisfaction with career prospects</td></tr>
<tr><td></td><td colspan="3">Independent variables</td></tr>
<tr><td>Mobility categories</td><td>• Stayer
• Migrant
• Returner</td><td>• Stayer in the CN
• Migrant within the CN
• Migrant from the South
• Returner to/within the CN</td><td>• Returner to the South
• Stayer in the South
• South to South Migr.
• South to Centre Migr.
• South to N-West Migr.
• South to N-East Migr.</td></tr>
<tr><td>Other</td><td colspan="3">Job characteristics: salary, part-time/full time, permanent/temporary
Skill use: objective overeducation, subjective overeducation, subjective match, objective match
Educational background: scientific background, grade, satisfaction with degree
Social background: parental education
Personal characteristics: distance from the region of study, gender and age</td></tr>
</table>

7.6 Descriptive statistics

This section introduces some descriptive statistics to depict the links between mobility and satisfaction. It first describes the level of satisfaction, across domains, of the different mobility categories. Secondly it describes, through maps, the geography of job-related wellbeing. Finally, it provides a mobility matrix for South-to-South migrants, as this new category has never been described before in this thesis.[18]

All the data is derived from the ISTAT (2007a) survey on graduates' entry in the labour market, described in chapter 3.

[18] For information on the spatial distribution of migrants and returners across macro-areas see chapter 3, section 3.5.

7.6.1 Mobility and satisfaction

Table 7.5 below reports the proportion of *very satisfied* and *quite satisfied* Italian graduates by mobility category, across the four domains of satisfaction.

Table 7. 5 Proportion of very and quite satisfied graduates in Italy

	Job tasks	Economic treatment	Stability and security	Career opportunities
Returners	86.08%	60.10%	64.30%	65.78%
Stayers	84.45%	59.88%	68.55%	60.70%
Migrants	86.10%	62.70%	73.85%	64.18%

Source – author's calculations from ISTAT (2007a).

Migrants are the most satisfied across three out of four dimensions, namely: job tasks, economic treatment, and stability and security. In terms of career opportunities returners are the group with the highest proportion of very and quite satisfied graduates.

However, whilst for satisfaction with job tasks and economic treatment the proportion of very and quite satisfied graduates is very similarly across the three groups (the difference between the highest and the lowest is respectively 1.65% and 2.82%), this is not the case for the long-term dimensions of satisfaction. In the case of satisfaction with stability and security, the proportion of highly or very satisfied migrants is 73.85%, followed by 68.55% for stayers and 64.3% for returners. Similarly, the proportion of graduates very and quite satisfied with career opportunities is 65.78% for returners, 64.18% for migrants and 60.70% for stayers. This suggests that the mobility category has more impact on the long term domains of satisfaction.

Table 7.6 below reports similar information for graduates in the Centre-North.

Table 7. 6 Proportion of very and quite satisfied graduates in the Centre-North

	Job tasks	Economic treatment	Stability and security	Career opportunities
Returners	86.1%	60.1%	64.3%	65.8%
Stayers in the CN	84.5%	59.9%	68.6%	60.7%
Migrants in the CN	87.2%	63.7%	74.8%	63.4%
Migrants from the South	83.9%	60.7%	71.9%	65.7%

Source – author's calculations from ISTAT (2007a).

A similar pattern emerges when we focus only on the Centre-North. Migrants tend to be the most satisfied with job tasks, economic treatment and stability and security, and the latter is again the domain where the levels of satisfaction are more dispersed. Indeed 74.8% of migrants are quite or very satisfied, as compared to 68.6% of stayers, 71.9% of migrants from the South and 64.3% of returners. Interestingly, migrants from the South are, in most cases, less satisfied that migrants from the rest of Italy. The only exception is the career opportunities domain, where the proportion of very and quite satisfied is 65.7% as compared to 63.4% for migrants from the rest of Italy.

Table 7.7 below reports similar information but for the Southern graduates only.

Table 7. 7 Proportion of very and quite satisfied Southern graduates

	Job tasks	Economic treatment	Stability and security	Career opportunities
Returners to the South	84.2%	56.8%	60.1%	64.3%
Stayers in the South	83.1%	52.7%	59.7%	57.5%
Migrants South-to-South	79.8%	57.8%	71.5%	57.3%
Migrants South-to-Centre	85.4%	60.0%	73.0%	69.4%
Migr. South-to-NorthWest	84.2%	60.3%	72.3%	64.6%
Migr. South-to-NorthEast	83.1%	61.0%	64.7%	65.5%

Source – author's calculations from ISTAT (2007a).

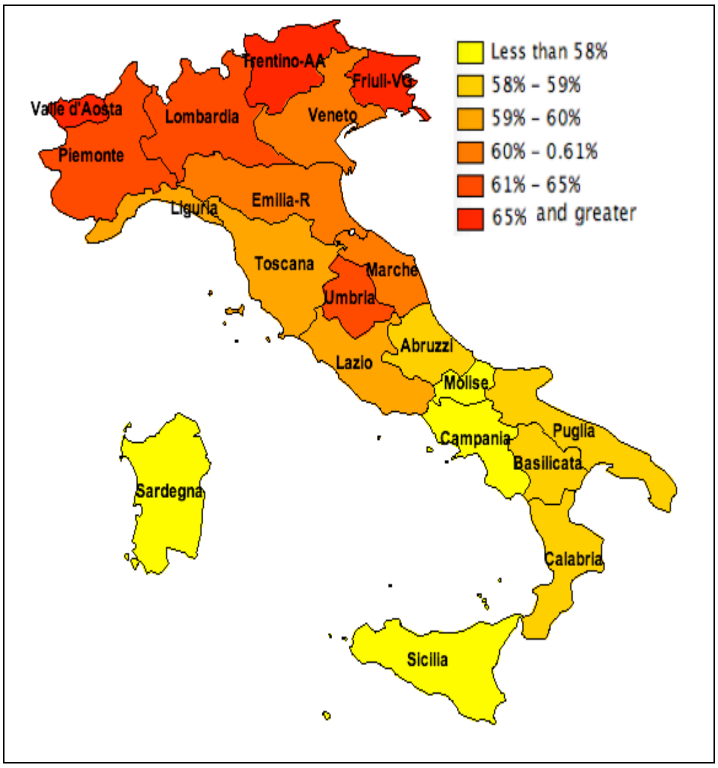
The groups that are overall less satisfied are stayers in the South, South-to-South migrants and returners to the South. Stayers have the lowest proportion of very and quite satisfied graduates in terms of economic treatment (52.7%) and stability and security (59.7%). South-to-South migrants have the lowest proportion of satisfied graduates in terms of job tasks (79.8%) and career opportunities (57.3%, very close to that of stayers 57.5%). Returners to the South have very low level of satisfaction in both stability and security and economic treatment (60.1% and 56.8% respectively). Migrants from the South to the Centre are those reporting the highest satisfaction in the long terms domains: 73.01% for stability and security and 69.35% in terms of job opportunities.

From the previous tables it emerges that stayers and returners in the South are, in the four domains, less satisfied than stayers and returners across Italy. Moreover, migrants from the South, regardless of their destination, tend to be less satisfied than migrants across Italy, in all domains except for career opportunities.[19] Overall, these tables suggest that mobility provides access to jobs, which are more fulfilling and that, for migrants leaving the South, long term opportunities are important drivers for and rewards of migration.

7.6.2 Geography and satisfaction

Maps 7.1, 7.2, 7.3 and 7.4 report the proportion of quite and very satisfied graduates in all the domains. The regions are colour-coded according to the presence of fulfilled graduates: from light yellow (where the presence is lowest) to dark red (where the presence is highest). The colour coding of each map is based on different intervals, which are defined in the legends.

Map 7. 1 Proportion of very and quite satisfied graduates with job task



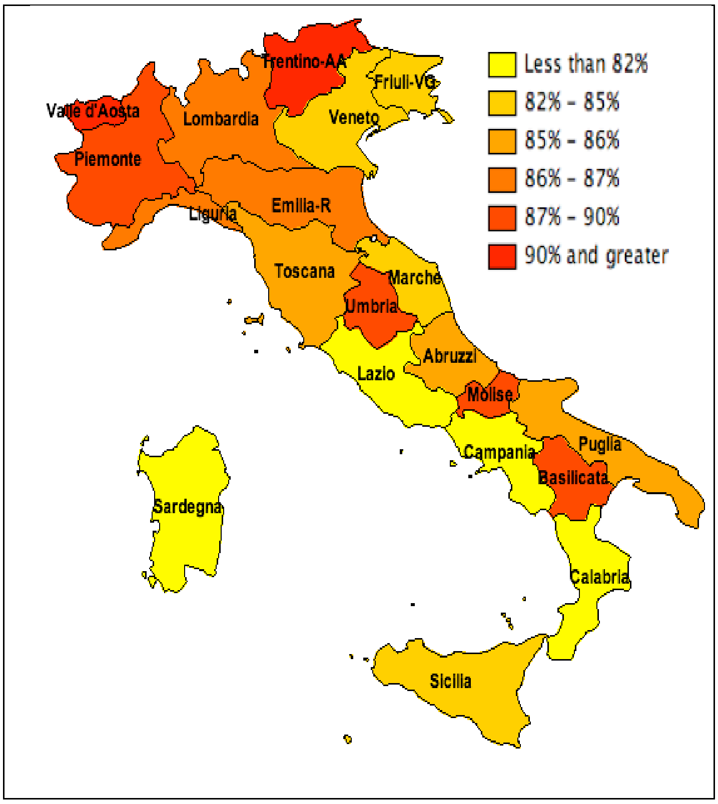
Source – author's calculations from ISTAT (2007a).

Map 7.1 shows clearly that the regions of the North offer the most rewarding careers in term of job satisfactions, whilst the regions of the South lie at the opposite end of the

[19] In this case for Italy as a whole 64.18% of migrants report being very or quite satisfied, whilst the proportion is higher for migrants from the South, who move towards the Centre (69.35%), the North-West (64.55%) or the North East (65.48%).

spectrum. In particular, the region with the highest proportion of satisfied graduates is Valle d'Aosta (86.8% of graduates are quite or very satisfied), whilst Sicilia has the lowest proportion (48.9%). The regions of the Centre are in an intermediate situation, with the exception of Umbria, which with over 62% satisfied graduates, outperforms its neighbouring regions.

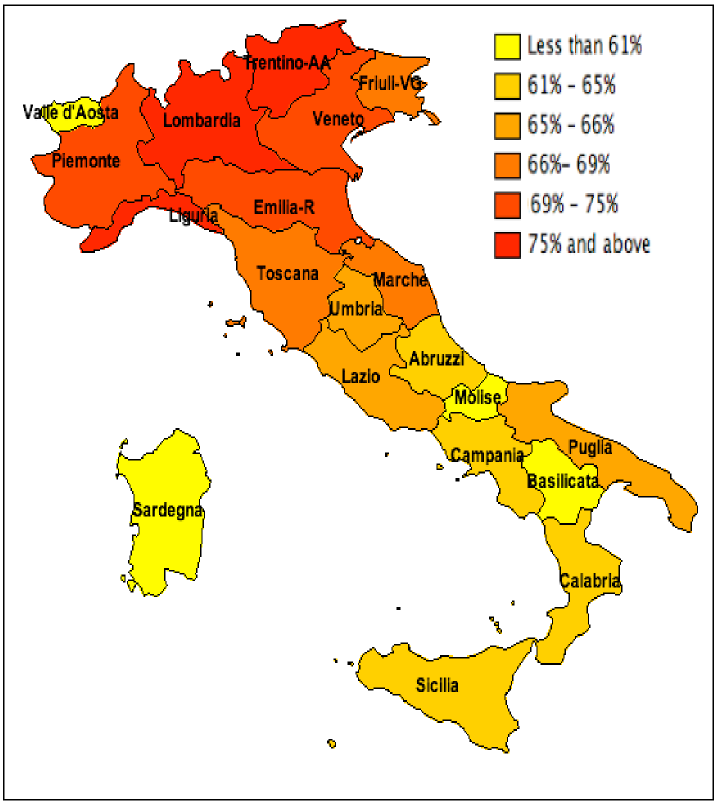
Map 7. 2 Proportion of very and quite satisfied graduates with economic treatment



Source – author's calculations from ISTAT (2007a).

When it comes to economic treatment the situation is less clear-cut. Although the regions of the South have overall lower levels of satisfaction, the regions of the Centre-North display a mixed pattern. Lazio is the region with the lowest proportion of satisfied graduates (81.3%), closely followed by Sardegna, Calabria, Campania and Sicilia. Valle d'Aosta has again the highest proportion of satisfied graduates, followed by Trentino (95% and 93%) respectively. Interestingly, few regions of the South have a fairly high proportion of satisfied graduates: Puglia, Abruzzi, Molise and Basilicata outperform many regions of the Centre and North-West. This may be a bit puzzling, given that the average wage is lower in the Mezzogiorno. It suggests, however, that graduates in different areas have different expectations about their economic treatment, which in turn, impacts on their levels of satisfaction.

Map 7. 3 Proportion of very and quite satisfied graduates with stability and security

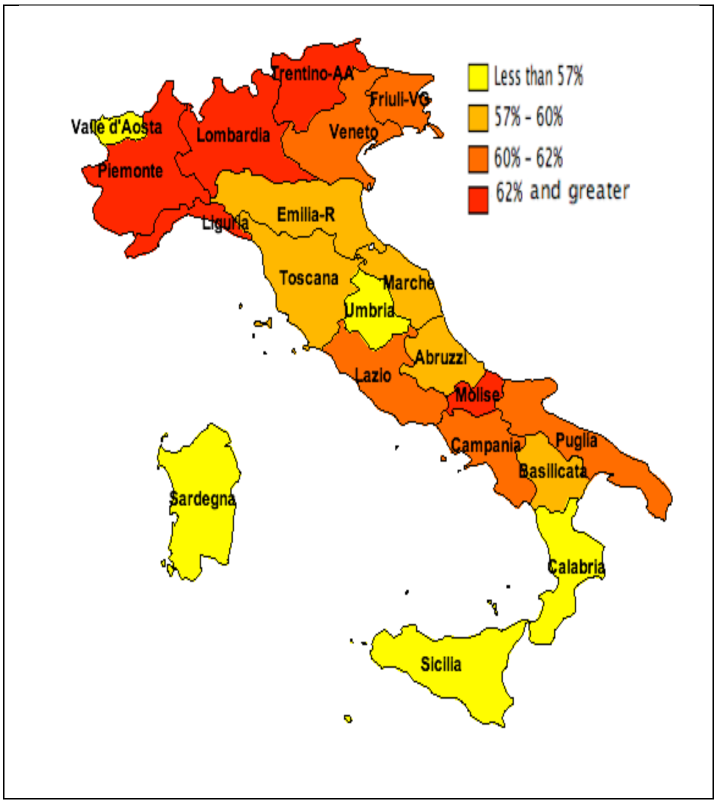


Source – author's calculations from ISTAT (2007a).

The sub-national divide in terms of satisfaction with stability and security is striking. All the regions of the North West and North East, with the exception of Valle d'Aosta, have high proportion of satisfied graduates (in Lombardia the proportion is 78.2%, the highest in the country), whilst in the South (with the exception of Puglia), all regions have less than 65% satisfied graduates. The regions of the Centre show intermediate levels of satisfaction. [20]

[20] The situation of Molise and Valle d'Aosta is peculiar, and deserves further investigation. The former has really low levels of satisfaction with job tasks and stability and security, and really high levels in terms of economic treatment and career opportunities. Valle d'Aosta has really high levels of satisfaction in the short-term domains and low levels of satisfaction in the long-term domains.

Map 7. 4 Proportion of very and quite satisfied graduates with career opportunities



Source – author's calculations from ISTAT (2007a).

Finally, map 7.4 reports the proportion of very and quite satisfied with career opportunities and presents, as for economic treatment, some scattered patterns. Again the regions of the North (and especially the North West, with the exception of Valle d'Aosta) outperform the rest of the country. Trentino is the region with the highest proportion of satisfied graduates (72%), followed by Lombardia (66.7%) and Molise (66.5%). Campania and Puglia, in the South, have similar levels of satisfaction of Veneto and Friuli Venezia Giulia in the North West. Sicilia, Calabria and Sardegna have the lowest levels of satisfied graduates, together with Umbria, in the Centre and Valle d'Aosta, in the North West.

7.6.3 South-to-South migrants: their spatial distribution

To conclude it is important to give some more detail on the spatial direction of migrants and returners within the South, as it has never been tackled before in the thesis.

Overall, there are 2,183 South-to-South migrants, who represent 7.5% of total migrants and 21.8% of total migrants from the Mezzogiorno. The table below reports their regions of origin and destination.

Table 7. 8 Mobility matrices: percentage of migrants and returners on the Italian total

	DESTINATION								
ORIGIN	Abruzzo	Molise	Campania	Puglia	Basilicata	Calabria	Sicilia	Sardegna	Total
Abruzzo	0.0%	4.1%	4.6%	3.7%	0.3%	0.0%	0.0%	0.0%	12.8%
Molise	1.9%	0.0%	1.7%	0.6%	0.0%	0.0%	0.0%	0.0%	4.3%
Campania	1.5%	1.3%	0.0%	4.1%	9.4%	3.5%	2.8%	0.1%	22.6%
Puglia	1.2%	0.2%	2.5%	0.0%	11.1%	4.2%	1.4%	0.4%	20.9%
Basilicata	0.0%	0.0%	0.4%	0.4%	0.0%	0.0%	0.0%	0.0%	0.7%
Calabria	0.0%	0.0%	0.0%	0.5%	0.6%	0.0%	2.7%	0.4%	4.2%
Sicilia	0.7%	0.0%	0.5%	0.9%	0.3%	30.5%	0.0%	0.1%	32.9%
Sardegna	0.5%	0.0%	0.4%	0.4%	0.0%	0.0%	0.2%	0.0%	1.5%
Total	5.8%	5.6%	10.1%	10.7%	21.6%	38.2%	7.0%	1.1%	100.0%

Source – author's calculations from ISTAT (2007a).

Calabria and Basilicata are attracting a large share of migrants. In particular, 30.5% of South-to-South migrants move from Sicilia to Calabria, 11.1% move from Puglia to Basilicata and 9.4% move from Campania to Basilicata.[21] Overall, Sicilia is the region losing the majority of South-to-South migrants (32.9%), followed by Campania and Puglia (22.6% and 20.9% respectively).

7.7 Econometric results

Having introduced the key data for the chapter we now present the results of the econometric analysis. This section presents separately the results for graduates as a whole (7.7.1), those for graduates in the Centre-North (7.7.2) and those for graduates from the South (7.7.3).

7.7.1 Results for all graduates

Table 7.9 reports the results of models A1 to A4, which refer to the whole graduate population.

[21] As highlighted in chapter 3 these figures may include some misclassified returners.

Table 7. 9 All graduates

	Job tasks –A1	**Economic treatment –A2**	**Stability and security –A3**	**Career opportunities – A4**
MIGRANT	0.27**	0.18	0.13	0.16
	(2.47)	(1.60)	(1.09)	(1.35)
RETURNER	0.02	0.14	-0.17	0.06
	(0.12)	(0.91)	(-1.02)	(0.34)
PT	-0.28**	0.32*** [ab]	-0.49*** [a]	-0.37***
	(-2.47)	(2.61)	(-3.80)	(-3.31)
PERM	-0.07	0.12*	2.56*** [a]	0.40***
	(-1.04)	(1.71)	(25.03)	(5.96)
SALARY	0.04***	0.14*** [a]	0.04***	0.05***
	(5.16)	(12.55)	(4.53)	(5.94)
SUB_OVER	0.27**	-0.16	0.04	0.35***
	(2.54)	(-1.46)	(0.34)	(3.11)
SUB_MATCH	1.22*** [a]	-0.01	0.10	0.65***
	(8.08)	(-0.09)	(0.87)	(5.68)
OBJ_MATCH	1.74*** [a]	0.13	0.21**	0.96***
	(15.10)	(1.57)	(2.34)	(11.07)
SAME_D	0.81*** [a]	0.33*** [a]	0.39***	0.56*** [a]
	(7.94)	(4.15)	(5.14)	(7.07)
STEM	-0.05 [a]	-0.13*	-0.05 [a]	-0.40*** [a]
	(-0.50)	(-1.88)	(-0.58)	(-5.56)
GRADE	-0.01	-0.01**	-0.01**	-0.02***
	(-1.38)	(-2.04)	(-2.16)	(-5.03)
PAREDU_S	0.08	0.17**	0.19**	0.18***
	(1.16)	(2.40)	(2.53)	(2.61)
PAREDU_T	0.10	0.06	0.06	0.10
	(1.21)	(0.73)	(0.72)	(1.14)
AGE	-0.03**	-0.05***	-0.04***	-0.08***
	(-2.12)	(-3.87)	(-2.82)	(-5.60)
FEMALE	0.12*	0.06 [ab]	-0.01	-0.32***
	(1.65)	(0.74)	(-0.10)	(-4.58)
DISTANCE	-0.00***	-0.00**	-0.00	-0.00
	(-2.88)	(-2.26)	(-1.49)	(-0.19)
CONSTANT1	2.72***	3.05***	2.95***	4.95***
	(3.66)	(4.26)	(3.91)	(7.12)
CONSTANT2	1.26*	0.90	1.33*	3.35***
	(1.73)	(1.27)	(1.76)	(4.89)
CONSTANT3	-0.82	-2.18***	-0.48	1.16*
	(-1.13)	(-3.09)	(-0.64)	(1.71)
Pseudo R2	0.08	0.05	0.16	0.06
N	7717.00	7704.00	7696.00	7655.00

$p<0.10$, ** $p<0.05$, *** $p<0.01$; t in parenthesis;
a: P.O. assumption is violated; *b:* polarizing effects

Table 7. 10 Variables with polarising effect in Model A2

	PT – A2	FEMALE – A2
Level 1	-0.31** (-2.07)	-0.25* (-1.88)
Level 2	0.32*** (2.61)	0.06 (0.74)
Level 3	0.39** (1.98)	0.36*** (2.90)

* p<0.10, ** p<0.05, *** p<0.01; t in parenthesis

The variables accounting for the mobility status are not significant in the majority of cases. This means that mobility has mostly indirect effects on wellbeing. However, when in comes to job tasks (model A1), the coefficient for migrants is positive and significant, suggesting that migrants value and are fulfilled by jobs that they enjoy doing. This finding complements and validates our results in chapter 4, where it was highlighted that migrants move in order to learn and contribute to knowledge creation. Here we confirm that this is a rewarding behaviour.

Job characteristics have, as expected, a strong influence on satisfaction. Having a part-time job negatively influences the level of satisfaction in all domains (PT is negative and significant), with the exception of economic treatment (A2). In this case, PT does not respect the P.O assumption and, as shown in table 7.10, it generates polarised levels of satisfaction: part-timers are either very satisfied or very dissatisfied, perhaps depending on whether their situation is voluntary or not. Having a permanent job does not influence satisfaction with the tasks performed (PERM is not significant in A1). However it has a positive influence on all the domains of satisfaction and, in particular, on stability and security (A3), where the coefficient has the largest magnitude. The results also confirm that a higher salary is associated with higher levels of satisfaction across all domains. Unsurprisingly the coefficient for SALARY is the highest when it comes to economic treatment (A2).

The effects of the education-occupation (mis)matches vary significantly across domains. Matches or mismatches bare no influence on satisfaction with economic treatment (none of the categories are significant in model A2), whilst for stability and security (A3) only OBJ_MATCH is significant and indicates that those whose education is objectively adequate to the job requirements tend to be more satisfied. In models A1 and A4, which refer to satisfaction with job tasks and with career opportunities, SUB_MATCH, OBJ_MATCH and SUB_OVER are all positive and significant and of decreasing magnitude. In other words, those who are objectively matched are the most satisfied, followed by those who are subjectively matched and those who are subjectively overeducated.

University background and experience are also important in explaining job-related wellbeing. Being happy with the degree achieved is, as expected, associated with higher levels of satisfaction, across all domains (SAME_D is positive and significant). Having a background in STEM disciplines bares no influence on satisfaction with job tasks (A1) and stability and security (A3), whilst decreases satisfaction with economic treatment and career opportunities. This may be explained by the economic specialisation of Italy, which does not demand STEM skills. Finally, having a higher grade is associated with lower levels of wellbeing with economic treatment, stability and security and career opportunities (GRADE is negative and significant in models A2, A3 and A4). Those with higher grades, it seems, had higher expectations that are not being met.

As for the effects of personal background and characteristics, we find that having a parent with tertiary education bares no influence on satisfaction, on any of the domains (PAREDU_T is never significant), whilst having a parent with secondary education increases satisfaction with economic treatment, stability and security as well as career opportunities (PAREDU_S is positive and significant in A2, A3 and A4). AGE is negative and significant across domains, suggesting that older graduates are more frustrated with their employment outcome: job-related concerns and unmet expectations seem to become more important with age.

The effect of gender is mixed across domains. Whilst being female bares no effect on stability and security (FEMALE is not significant in A3) and influences positive satisfaction with job tasks (A1), it impacts negatively on satisfaction with career opportunities (A4). Female graduates, in other words, perceive long-term barriers in their professional development. In terms of economic treatment, the variable has a polarising effect: female graduates tend to be either very satisfied or dissatisfied, as shown in table 7.10. This warrants further investigation on the conditions that may drive this result. Finally, DISTANCE is negative across all specifications, though it is only significant for job tasks and economic treatment: moving further away does bare costs that influence wellbeing, but only in the short-run.

The pseudo R2s range from 0.05 to 0.16, in line with similar research. However, a better way to evaluate the goodness of fit is to look at the predictive power of the models, shown in table 7.11.[22]

Table 7. 11 Percentage of correctly predicted cases

		% correctly predicted
Job tasks	**A1**	50.9%
Economic treatment	**A2**	51.8%
Stability and security	**A3**	49.0%
Career opportunities	**A4**	46.3%

All the models predict more cases than chance alone would (25%). Model A2 has the highest predictive power (51.8%) and model A4 the lowest (46.3%).

7.7.2 Results for the Centre-North

Table 7.12 reports the results for graduates in the Centre-North. Table 7.13 gives the three coefficients for FEMALE, in both models B1 and B3, where the variable generates a polarised effect.

[22] The percentage of correctly predicted cases has been achieved in two steps. First we have calculated, for each domain, the probability of each outcome (i.e. the probability of being dissatisfied, marginally satisfied, quite satisfied and very satisfied), secondly the outcome with highest probability among the four was considered as the predicted one. In other words, suppose that the predicted probability of an individual to fall in category 1, 2, 3 and 4 is respectively 0.2, 0.3, 0.25 and 0.25 we define category 2 as the predicted outcome.

Table 7. 12 Graduates in the Centre-North

	Job tasks – B1	**Economic treatment – B2**	**Stability and security – B3**	**Career opportunities –B4**
CN_TO_CN	0.27**	0.11	0.03	0.11
	(2.36)	(0.94)	(0.20)	(0.91)
RET_CN	0.11	0.35*	-0.01	0.27
	(0.51)	(1.88)	(-0.04)	(1.49)
S_TO_CN	-0.07	0.30*	-0.18	0.56***
	(-0.33)	(1.66)	(-0.87)	(3.06)
PT	-0.22	0.39** [a]	-0.36** [a]	-0.30** [a]
	(-1.59)	(2.54)	(-2.28)	(-2.02)
PERM	-0.09	0.10	2.54***	0.42***
	(-1.16)	(1.23)	(27.30)	(5.62)
SALARY	0.04***	0.14***	0.04***	0.05***
	(4.11)	(10.78)	(3.83)	(4.74)
SUB_OVER	1.35***	0.09	0.18	0.65***
	(7.86)	(0.78)	(1.34)	(5.12)
SUB_MATCH	0.27** [a]	-0.10	-0.03	0.34***
	(2.31)	(-0.82)	(-0.21)	(2.66)
OBJ_MATCH	1.88*** [a]	0.22**	0.29***	0.94***
	(14.27)	(2.36)	(2.83)	(9.69)
SAME_D	0.67***	0.37***	0.33***	0.59***
	(7.79)	(4.61)	(3.92)	(7.11)
STEM	-0.23***	-0.07	-0.15**	-0.32***
	(-3.02)	(-0.91)	(-1.98)	(-4.60)
GRADE	-0.00	-0.01**	-0.01*	-0.02***
	(-0.74)	(-2.02)	(-1.93)	(-4.59)
PAREDU_S	0.08	0.18**	0.26***	0.20**
	(0.95)	(2.20)	(3.05)	(2.55)
PAREDU_T	0.03	-0.01	0.03	0.10
	(0.31)	(-0.12)	(0.31)	(1.06)
AGE	-0.04**	-0.06***	-0.05***	-0.08***
	(-2.24)	(-3.84)	(-2.71)	(-5.33)
FEMALE	0.03 [a b]	0.08 [a]	-0.13 [a b]	-0.31***
	(0.26)	(0.82)	(-1.22)	(-3.94)
DISTANCE	-0.00	-0.00**	0.00	-0.00
	(-0.87)	(-2.39)	(0.53)	(-1.41)
CONSTANT1	3.65***	3.50***	3.25***	5.53***
	(4.42)	(4.38)	(3.78)	(7.13)
CONSTANT2	1.38*	1.13	1.53*	3.54***
	(1.71)	(1.41)	(1.77)	(4.57)
CONSTANT3	-0.95	-1.98**	-0.83	1.23
	(-1.17)	(-2.49)	(-0.96)	(1.59)
Pseudo R2	0.08	0.05	0.17	0.06
N	6264.00	6257.00	6250.00	6215.00

p<0.10, ** p<0.05, *** p<0.01; t in parenthesis;
a: P.O. assumption is violated; *b:* polarizing effects

Table 7. 13 Variables with polarising effect in Model B1 and B3

	FEMALE – B1	FEMALE – B3
Level 1	-0.80*** (-3.81)	-0.25* (-1.68)
Level 2	0.03 (0.26)	-0.13 (-1.22)
Level 3	0.17* (1.88)	0.22** (2.17)

p<0.10, ** p<0.05, *** p<0.01; t in parenthesis

Models B1 to B4 indicate that the area of origin does shape expectations and in turn satisfaction. Migrants from the disadvantaged South (S_TO_CN) are significantly more fulfilled in economic terms (model B2) and career opportunities (B4), whilst those moving within the Centre-North (CN_TO_CN) are more rewarded by their job tasks (B1). The latter, may take career opportunities and economic rewards as granted and place more value on the actual nature of the job. For those coming from the Mezzogiorno, on the other hand, economic conditions and long-term opportunities seem more pressing. Furthermore the results highlight that different mobility categories seek and achieve different rewards: returners to the Centre North (RET_CN) are significantly more satisfied about their economic treatment (B2): as they are now living with their family of origin, they have more disposable income than they were used to.

The results in term of job-characteristics largely confirm those for Italy as a whole, with few differences. A part-time job, in this case, does not influence satisfaction with job tasks in B1, whilst it did in A1; secondly, a permanent position (PERM) increases satisfaction in the long-term domains (models B3 and B4), but not in terms of economic treatment (PERM was significant also in A1).

The education-job (mis)matches have similar effects than in models A1 to A4, the only difference is that an objective job-education match has now a positive effect also on satisfaction with economic treatment (OBJ_MATCH is positive and significant in B2). Having a background in STEM disciplines also decreases satisfaction in most domains, though it is not significant for economic treatment (B2). GRADE, PAREDU and AGE have the same impact as in models A1 to A4, whilst gender exerts slightly different effects. Indeed, female graduates tend to have polarised patterns of satisfaction with job tasks (B1) and with stability and security (B3), as shown in table 7.13. Finally, DISTANCE is only significant in B2, indicating that moving further away decreases satisfaction with economic treatment.

As for the goodness of fit, we find that the pseudo R2 is lowest for model B2 (0.05) and highest for satisfaction with stability and security (0.17), whilst the proportion of correctly predicted cases (table 7.14) is highest for B1 (52.7%) and lowest for B4 (47.1%).

Table 7. 14 Percentage of correctly predicted cases

		% correctly predicted
Job tasks	**B1**	52.7%
Economic treatment	**B2**	52.6%
Stability and security	**B3**	51.2%
Career opportunities	**B4**	47.1%

7.7.3 Results for Southern migrants

Table 7.15 proves the results for models C1 to C4. Table 7.16 reports the coefficients for S_TO_S (South-to-South migrants) in model C2, as the variable does not respect the P.O. assumption.

Table 7. 15 Southern graduates and returners to the South

	Job tasks – C1	Economic treatment – C2	Stability and security – C3	Career opportunities – C4
S_STAY	0.19	0.04	0.58*	0.11
	(0.65)	(0.12)	(1.91)	(0.31)
S_TO_S	-0.11	0.60 [a]	0.76*	0.49
	(-0.33)	(1.48)	(1.85)	(1.07)
S_TO_CE	0.06	0.33	0.74**	0.62*
	(0.21)	(1.06)	(2.33)	(1.75)
S_TO_NW	0.83***	0.54	1.02***	0.79*
	(2.66)	(1.47)	(2.76)	(1.93)
S_TO_NE	0.74**	0.40	0.59	0.61
	(2.06)	(0.97)	(1.43)	(1.43)
PT	-0.33*	0.18	-0.66***	-0.27
	(-1.75)	(0.98)	(-3.31)	(-1.55)
PERM	0.11	0.18	2.20*** [a]	0.37***
	(0.83)	(1.42)	(14.07)	(2.82)
SALARY	0.06***	0.15*** [a]	0.04**	0.06***
	(3.36)	(7.07)	(2.27)	(4.51)
SUB_OVER	0.33	-0.45**	0.18	0.72***
	(1.43)	(-2.16)	(0.76)	(3.13)
SUB_MATCH	0.90***	-0.52**	-0.04	0.89***
	(4.16)	(-2.29)	(-0.17)	(3.93)
OBJ_MATCH	1.48***	-0.25	0.15	1.21***
	(8.01)	(-1.60)	(0.92)	(7.26)
SAME_D	1.02*** [a]	0.52***	0.66***	0.86***
	(6.06)	(3.72)	(4.65)	(6.27)
STEM	-0.36***	-0.30**	-0.31***	-0.66***
	(-2.95)	(-2.51)	(-2.58)	(-5.47)
GRADE	-0.02	-0.01	0.00	-0.03***
	(-1.53)	(-1.43)	(0.18)	(-2.65)
PAREDU_S	0.08	0.16	-0.04	0.04
	(0.57)	(1.17)	(-0.32)	(0.32)
PAREDU_T	0.35**	0.37**	0.19	-0.01
	(2.35)	(2.55)	(1.25)	(-0.08)
AGE	-0.01	-0.00	-0.01	-0.08***
	(-0.47)	(-0.15)	(-0.25)	(-2.90)
FEMALE	0.19	0.17	-0.22*	-0.39***
	(1.51)	(1.38)	(-1.77)	(-3.18)
DISTANCE	-0.00**	-0.00*	-0.00	-0.00
	(-2.03)	(-1.80)	(-0.77)	(-0.90)
CONSTANT1	3.16**	1.45	0.33	5.24***
	(2.15)	(0.98)	(0.21)	(3.46)
CONSTANT2	1.27	-0.06	-1.33	3.25**
	(0.86)	(-0.04)	(-0.87)	(2.17)
CONSTANT3	-1.08	-2.71*	-2.97*	1.05
	(-0.73)	(-1.78)	(-1.95)	(0.70)
Pseudo R2	0.09	0.07	0.13	0.08
N	1949.00	1943.00	1942.00	1935.00

* p<0.10, ** p<0.05, *** p<0.01; t in parenthesis; *a*: P.O. assumption is violated

Table 7. 16 S_TO_S and satisfaction with economic treatment

	S_TO_S – C2
Level 1	-0.61
	(-1.30)
Level 2	0.60
	(1.48)
Level 3	1.17**
	(2.21)

* p<0.10, ** p<0.05, *** p<0.01; t in parenthesis

Table 7.15 shows that mobility indeed impacts on wellbeing and that, overall, leaving the South is a rewarding choice. Southern migrants to the North West (S_TO_NW) and North East (S_TO_NE) tend to have the highest levels of satisfaction in terms of job tasks (C1) and the coefficient with highest magnitude is that of the North West, indicating that this is the most attractive area. Model C3 highlights that stayers and migrants (except those who move to the North East) are more satisfied with their stability and security than returners to the South (the base category): the coefficients of S_STAY, S_TO_S, S_TO_CE, S_TO_NW are in fact all positive and significant. Moreover, looking at the magnitude of the coefficients, we find again that migrants to the North West are more likely to experience higher level of satisfaction than the rest. In terms of satisfaction with career opportunities (C4) we find that those who are currently in the South -be them returners, stayers or migrants- tend to be less satisfied than those who live in the Centre or the North-West: S_TO_CE and S_TO_NW are in fact positive and significant. As of economic treatment (model C2), the only mobility category to be significant is that of South-to-South migrants (S_TO_S). The variable violates the P.O. assumption, and table 7.16 shows that these graduates tend to concentrate among the highest level of satisfactions (i.e. its level 3 coefficient is significant). This result is at first surprising, though it will be explained in section 7.7.3.1, in conjunction with the coefficients on job-education (mis)matches.

Moving on to job characteristics we find that a part-time job decreases satisfaction with job tasks and with stability and security (PT is negative and significant in C1 and C3). Having a permanent position (PERM), on the other hand, increases wellbeing with the long-term domains of satisfaction: stability and security and career opportunities (C3 and C4). Finally, as in models A and B, a higher salary increases satisfaction across domains.

Models C1 and C4 confirm that graduates objectively matched (OBJ_MATCH) are the most satisfied in terms of job tasks and career opportunities, followed by those subjectively matched (SUB_MATCH). In model C3 (satisfaction with stability and security), none of the categories is significant. Finally, when it comes to economic treatment (C2) we find that subjectively matched and subjectively overqualified graduates are significantly less satisfied than the rest. This peculiar finding will be explained in section 7.7.3.1 below.

The effect of university experience, background and performance is again similar to the other regressions. Those who would re-enroll in the same degree tend to enjoy higher satisfaction across domains (SAME_D is always positive and significant). Those who graduated in STEM disciplines tend to be again less fulfilled than the rest, whilst those with higher grades are less satisfied in term of career opportunities (GRADE is negative and significant in C3).

When it comes to parental education, however, the pattern is completely different. Whilst for graduates in the Centre-North (and for graduates as a whole) satisfaction increases when one of the parents has a secondary degree, this is not the case in the South: PAREDU_S is never significant. On the other hand, those whose parents have a university degree tend to be more satisfied in the short-term domains: PAREDU_T is positive and significant in models C1 and C2. Clearly there are some differences in the social structure and labour dynamics of the South, as compared to the rest of Italy. These results support D'Antonio and Scarlato (2007) who point out that access to professional occupations (such as lawyers or doctors) is in the Mezzogiorno more dependent on family networks. Furthermore they are in line with SVIMEZ (2007), which highlights that in the South, those from the most privileged backgrounds are more capable, than in other parts of Italy, to keep their relative positions in society.

To conclude, whilst AGE was negative and significant across all domains in the previous two sets of models, it now affects only satisfaction with job opportunities. As for gender, we confirm that female graduates tend to be less satisfied with career opportunities and stability and security (FEMALE is negative and significant in C3 and C4). Finally, distance is again negative and significant in the short terms domains (C1 and C2).

The pseudo R2 of the models range from 0.09 to 0.13, in line with similar research. The proportion of correctly predicted cases is also good. Model C1 (job tasks) has the highest proportion (53.5%), and model C4 (career opportunities) the lowest (45.2%).

Table 7. 17 Percentage of correctly predicted cases

		% correctly predicted
Job tasks	**C1**	54.5%
Economic treatment	**C2**	51.3%
Stability and security	**C3**	45.8%
Career opportunities	**C4**	45.2%

7.7.3.1 Satisfaction with economic treatment, skill use and migration

We have pointed out above, that two unexpected results emerge in the model of satisfaction with economic treatment. On the one hand, subjectively matched or subjectively overeducated graduates are less satisfied than those objectively overeducated or matched (SUB_OVER and SUB_MATCH are negative and significant). On the other, South-to-South migrants tend to be highly fulfilled, despite the fact that they are working in an area with lower wages (the Mezzogiorno) and they have faced the costs of relocation. The two results are related: understanding the former sheds light on the latter.

Subjectively matched and overeducated graduates share only one feature common: their opinion about the qualifications their job needs, contrasts with that of the employer. This basic disagreement is at the source of their unmet expectations, and in turn, of their dissatisfaction. Two symmetric employers' (mis)behaviours may cause these outcomes. As highlighted by Di Pietro and Urwin (2006), employers may hire graduates for jobs that do not require a degree to benefit from their high-skills, whilst offering a salary that still reflects the unskilled nature of the job. This situation would generate dissatisfaction across subjectively overeducated workers. On the other hand, subjectively matched graduates may be frustrated because employers are deliberately hiring them for unskilled jobs in order to pay lower wages.[23]

If a misjudgement on the educational requirements of a job is affecting graduates' wellbeing, the ability to chose jobs more carefully may ensure higher satisfaction. This may be the case for South-to-South migrants, who are scanning jobs across a more familiar environment. Due to their higher knowledge of the local labour market, they may be able both to avoid potentially unsatisfactory employment and to adjust their expectations according to the nature of the job.

Whilst this hypothesis deserves further investigation, table 7.18, reporting the education-job match across mobility categories, serves as a first validation. Indeed it shows that only 16.9% of South-to-South migrants are subjectively overqualified or subjectively matched. This is the lowest proportion across all categories and it is much below than that for migrants to the North West (27.3%), to the Centre (22.8%) or to the North East (21.2%).

Table 7. 18 Education job-match among Southern graduates

	Returners to the South	**Stayers in the South**	**South-to-South migrants**	**Migrants to the CE**	**Migrants to the NW**	**Migrants to the NE**	**Total**
Subjective Outcomes	20.9%	18.6%	16.9%	22.8%	27.3%	21.2%	20.1%
Objective Outcomes	79.1%	81.4%	83.1%	77.2%	72.7%	78.8%	79.9%
	100%	100%	100%	100%	100%	100%	100%

Source – author's calculations from ISTAT (2007a).

This, together with the results of model C4 suggests that those who have moved to the Centre-North, as compared to those who have moved within the South, have traded long-term rewards for short-term ones.

[23] It is interesting to point out that these variables were not significant in the previous two models of satisfaction with economic treatment (B2 and A2). One possible explanation is that such behaviour is most common among Southern employers, an alternative or complementary one is that migrants who leave the Mezzogiorno may accept temporarily jobs with subjective overeducation and/or subjective matches, or that they may be discriminated in comparison to graduates from other areas.

7.8 Conclusions

This chapter has analysed the links between graduate mobility and job satisfaction in Italy, paying special attention to Southern graduates. We have tackled this unexplored issue by highlighting that migration affects wellbeing both *indirectly*, by providing access to new opportunities, and *directly* by generating expectations.

Through generalised ordered logit (GOlogit) models with partial proportional odds, we have studied satisfaction with job tasks, with economic treatment, with stability and security and with career opportunities These have provided information on how graduates feel in the short and long run.

The empirical analysis has confirmed many of the findings of the previous literature. A higher salary, a permanent contract and a full-time job are overall linked to higher levels of satisfaction, with very little differences across Italian regions. Education-job matches and mismatches are also crucial. Notwithstanding some exceptions, an objective match increases wellbeing across the four domains, whilst overeducation has the opposite effect. Education characteristics also influence satisfaction, with similar effects across the country. As expected, those who had a positive university experience tend to be more satisfied at work. On the other hand, those with higher graduation marks and with a scientific background tend to be less satisfied across the majority of domains.

The study also highlighted that family background influences satisfaction in very different ways across Italy. In the Centre-North those whose parents have a secondary degree tend to be more satisfied in both short and long term domains than the rest of the graduates. In the South, it is those whose parents have a tertiary degree to be significantly more fulfilled, however, only in the short-term dimensions. This confirms recent work by SVIMEZ (2007), which points out how the Southern social elites are more able to preserve their status across generations. In particular our finding may capture the strong social barriers to enter professional categories (such as lawyers or doctors) existing in the South (D'Antonio and Scarlato, 2007).

A gender imbalance clearly emerged from our models: female graduates, across the country, tend to be less satisfied with career opportunities. This indicates that the labour market still discriminates women in the long run, which is an issue should concern policy makers.

The most striking results, however, regard the impact of mobility on satisfaction. Our models confirm that fulfilment depends both on the mobility category and on the area of origin and destination of the graduate. Both these aspects, indeed, shape expectations and in turn satisfaction. When comparing graduates in the Centre-North we found that those who moved within the area are more satisfied with job tasks whilst those who came from the Mezzogiorno, place more importance on economic treatment. Furthermore, we found that returners to the Centre-North, are more satisfied with economic treatment than the rest, as they are now living with their family of origin and therefore dispose of more income. Our analysis of the Southern graduates, on the other hand, suggests that leaving the South is overall a rewarding choice. In both short and long term domains of wellbeing, those who left the Mezzogiorno are more satisfied than those who stayed, and especially, than those who returned. The North West, in particular, is the area that provides the most fulfilling opportunities both for the short and the long term.[24]

Overall, these results confirm that the link between mobility and satisfaction at work is an important one. Furthermore they highlight that geography, as well as job and individual characteristics, plays an important role. At the theoretical level this means that expectations and job satisfaction are not only shaped by personal experiences, background and achievements, but also by the socio-economic geographical features.[25]
At the empirical level, these findings add another dimension to the long-standing debate on Italian spatial inequality. The Southern rigid social environment and labour market inhibits opportunities and aspirations for local graduates, which seek and find fulfilment in other parts of the country. For them, the grass is truly greener on the other side of the fence.

[24] We highlighted, in the text, that there is an exception to this rule. South-to-South migrants are more satisfied with economic treatment because they have more realistic expectations about their situation and the nature of their jobs.
[25] Incidentally, the results also encourage exploring the links between migration, job satisfaction and regional economic performance, as done by Rodriguez-Pose and Vilalta-Bufi (2005).

Appendix 7.1 – Synopsis of the variables

1. Mobility behaviour: new sub-categories
CN_STAY – Stayers in the Centre-North (the reference group in the regression)
CN_TO_CN – Centre-North to Centre-North migrants
S_TO_CN – South to the Centre-North migrants
RET_CN – Returners to (or within) the Centre-North

RET_SOUTH – Returners to the South (the reference group in the regression)
S_STAY – Stayers in the South
S_TO_S – South to South migrants
S_TO_CE – South to Centre migrants
S_TO_NW – South to North West migrants
S_TO_NE – South to North East migrants

2. Job characteristics
SALARY – the monthly income of the graduate expressed in euros.
PT – a dummy variable identifying part-time jobs.
PERM – a dummy variable identifying permanents jobs.

3. Education-job (mis)matches
OBJ_OVER – Objective overeducation
SUB_OVER – Subjective Overeducation
OBJ_MATCH – Objective education-job match
SUB_MATCH – Subjective education-job match

4. Educational background
STEM –identifies graduates in scientific or engineering degrees
GRADE – the graduation mark.
SAME_D –identifies whether the graduate would enrol again in the same degree..

5. Social background and other characteristics
PAREDU_S – one of the parents of the graduate has a secondary education degree.
PAREDU_T – one of the parents of the graduate has a tertiary education degree.
DISTANCE – the distance in 100km between origin and destination.
AGE
FEMALE

Appendix 7.2 – Survey questions

In this appendix we report the survey questions of the new variables introduced in chapter 7. For the remaining variables we just indicate in where the information is available.

SALARY, PT, PERM, GRADE: appendix 4.2.

STEM: appendix 6.2.

OBJ_OVER, SUB_OVER, OBJ_MATCH and SUB_MATCH: chapter 7 section 7.4.2

DISTANCE: chapter 5 section 5.5.1.

SAME_D: Q.1.24

If you were to chose again, would you enrol in the same degree that you achieved in 2001.

PAREDU: Q.4.3 and q.4.4

Q.4.3 When you were 14 what was the education level of your father?
(illiterate, primary, middle school, upper secondary, university diploma, university degree or doctorate)

Q.4.4 When you were 14 what was the education level of your mother?
(illiterate, primary, middle school, upper secondary, university diploma, university degree or doctorate)

PAREDU = 0 if both mother and father had a degree lower than upper secondary
PEREDU = 1 (PAREDU_S) if the highest degree of the mother or the father is a upper secondary degree
PAREDU = 2 (PAREDU_T) if the highest degree of the mother or the father is a university degree.

Appendix 7.3 – P.O violation results

This appendix reports the full set of results for the variables violating the P.O. assumption

Table A7.3.1 P.O. Assumption violated whole sample

	Job tasks –A1	**Economic treatment –A2**	**Stability and security –A3**	**Career opportunities –A4**
Level 1				
PT		-0.31**	-0.81***	
PERM			2.62***	
SUB_MATCH	1.41***			
OBJ_MATCH	2.33***			
SAME_D	1.18***	0.69***		0.92***
STEM	0.42**		0.11	0.00
FEMALE		-0.25*		
Level 2				
PT		0.32***	-0.49***	
PERM			2.56***	
SUB_MATCH	1.22***			
OBJ_MATCH	1.74***			
SAME_D	0.81***	0.33***		0.56***
STEM	-0.05		-0.05	-0.40***
FEMALE		0.06		
Level 3				
PT		0.39**	-0.20	
PERM			2.15***	
SUB_MATCH	0.75***			
OBJ_MATCH	1.25***			
SAME_D	0.58***	0.34**		0.52***
STEM	-0.38***		-0.32***	-0.49***
FEMALE		0.36***		

Table A7.3.2 P.O. Assumption violated: graduates in the Centre-North

	Job tasks –B1	**Economic treatment –B2**	**Stability and security – B3**	**Career opportunities –B4**
Level 1				
PT		-0.25	-0.74***	-0.71***
SUB_MATCH	1.39***			
SUB_OVER	2.55***			
FEMALE	-0.80***	-0.23	-0.25*	
Level 2				
PT		0.39**	-0.36**	-0.30**
SUB_MATCH	1.35***			
SUB_OVER	1.88***			
FEMALE	0.03	0.08	-0.13	
Level 3				
PT		0.39	-0.05	-0.05
SUB_MATCH	0.77***			
SUB_OVER	1.23***			
FEMALE	0.17*	0.42***	0.22**	

Table A7.3.3 P.O. Assumption violated: graduates from the South

	Job tasks – C1	**Economic treatment – C2**	**Stability and security – C3**
Level 1			
S_TO_S		-0.61	
PERM			2.18***
SALARY		0.24***	
SAME_D	1.29***		
Level 2			
S_TO_S		0.60	
PERM			2.20***
SALARY		0.15***	
SAME_D	1.02***		
Level 3			
S_TO_S		1.17**	
PERM			1.43***
SALARY		0.12***	
SAME_D	0.40**		

Conclusions
Graduates on the move: Knowledge flows *as* Italian dualism

Abstract

This section concludes this doctoral dissertation. It restates its goals and its main empirical and theoretical contributions. It identifies the policy implications of the work, and the directions for future research.

I. Introduction

The challenge we set up at the beginning of this thesis was to develop a comprehensive study of skilled migration, which revolved around a distinctive feature of the phenomenon: the ability of talent to transfer knowledge across space.

We have tackled this topic both at the theoretical and empirical level. As for the former, drawing upon a wide interdisciplinary literature, we have reframed our understanding of skilled mobility in terms of *knowledge flows*. This new perspective has been applied to study the behaviour of recent graduates in Italy, a fascinating case for our purposes. As a highly dualistic economy, in fact, Italy has a long history of internal population flows from the less developed South to the Centre-North. These however, have only recently involved the highly skilled.

Methodologically the analysis has been based on a survey of graduates' entry in the labour market, conducted by the Italian statistical institute in 2004, on the 2001 cohort of graduates. We have defined three mobility categories, *migrants, returners* and *stayers*, and compared them through wide array of discrete choice models (DCMs) as well as simultaneous equation models (SEM).

In this final part we summarise our theoretical and empirical contributions and draw some policy implications. In particular, section II reviews briefly the theoretical framework of the research. Section III sums up how each hypothesis has been tested and confirmed along the thesis. Section IV concludes highlighting the policy implications of the work and the direction for future research.

II. A new view of migration

To frame theoretically our analysis of skilled mobility we have drawn on a wide array of disciplines, spanning from the economics and sociology of migration, the literature on human capital and regional innovation and the study of job-satisfaction. These different streams have been combined to explore a simple idea: as the inflows or outflows of skilled individuals alter the local innovation capacities, taking into account the knowledge they embody and that embedded in their areas of origin and destination, is crucial to understand their mobility patterns.

Developing this observation we have shed light on the drivers and implications of graduate flows, at the micro, meso and macro level. At the micro level we have highlighted that the will to learn and apply one's own knowledge may influence the decision to move. Furthermore, as remuneration is not the only reward that human capital seeks, we suggested that looking at job satisfaction, rather than objective labour market outcomes (such as wages), provides better information on the micro-consequences of mobility. At the meso level, taking knowledge flows into account means understanding how social networks of talent underpin, shape and reinforce human capital flows. At the macro level, on the other hand, it means that economic differentials cannot fully explain human capital migration and that the innovation systems of the regions of origin and destination need to be brought in. This is not only because more innovative regions offer more learning opportunities, but also because different regional systems will be able to integrate different types of skills. It follows that graduate migration can potentially have worrying consequences on sub-national disparities: if the best workers leave backward areas to move to more innovative regions, the gap between the two may increase as the process may generate a self-reinforcing mechanism of knowledge creation and skill-concentration on the one hand, and of underdevelopment and skilled emigration on the other.

The new approach to migration has been applied to the case of Italy. The country is characterised by a slack economy, with its roots in the public and private inability to create knowledge, and in an inefficient education system. Furthermore, the poor performance of the country masks large sub-national disparities, with the Mezzogiorno, historically less developed than the Centre-North, struggling to catch up with the rest of the country and draining an increasing number of graduates.

III. The empirical analysis: Italian graduates on the move

Throughout the thesis we have analysed the patterns of mobility of young graduates, through the ISTAT (2007) survey *Indagine Professionale Sull'Inserimento Professionale dei Laureati.*[1] Specifically, we have defined and explored the differences between three groups: migrants, returners and stayers.[2]

We have first looked at their geographical spread and found that whilst migrants tend to leave the South, returners tend to move back to it. Secondly, we have studied their behaviour by formulating four sets of hypotheses and testing them in chapters 4, 5, 6 and 7. Below, we sum up each of the four sets and highlight the key results of the analysis.

Hypotheses 1

- *Human capital seeks both the opportunity to learn and to apply his/her knowledge.*
- *Migrants, returners and stayers, differ in both respects.*

These two hypotheses have been tested in chapter 4, where we have compared the three mobility categories through multinomial logit regressions (and multinomial probit as a robustness check). We have found that returners have overall a poorer academic performance, and are less attracted than migrants to regions with a strong regional innovation system (RIS). Most interesting, when focusing exclusively on employed

[1] I.e. *Survey on graduates' entry in the labour market.*

[2] Stayers are those who remain in the region of study, returners, those who move back to their home region after having attended university and migrants, those who leave the region of study to relocate somewhere else. See chapter 3, section 3.4.2 for their definition.

graduates the results have pointed out that migrants, by applying their knowledge in their jobs, integrate in the innovation system more than the rest of graduates, confirming that they seek learning opportunities when deciding to move. In analysing these aspects, we have extended the traditional approach to migration, which sees the phenomenon purely in economic terms, to include the role of personal and regional knowledge.

Hypotheses 2

- *Economic performance is not the only regional feature attracting skilled individuals. Quality of life as well as regional innovation matter.*
- *Graduate mobility has a strong collective nature as it is sustained through social networks.*
- *Migrants, stayers and returners have different preferences.*

These propositions have been explored in chapter 5, through conditional logit and multinomial probit models. We have found that whilst migrants and stayers prefer regions with higher employment, this is not the case for returners. Furthermore we have shown that although all graduates prefer highly innovative regions, this is more strongly the case for migrants. Graduates also enjoy living in areas with a high quality of life, and migrants, are particularly attracted to regions that offer cultural amenities. Chapter 5 has also proven that networks are key mechanisms that sustain and direct graduates' mobility: in other words, those who move (be them returners and migrants) make a collective rather than an individual choice. In conducting this meso and macro level study, the chapter has effectively integrated sociological and economic views of migration, achieving a more realistic representation of it.

Hypotheses 3

- *Graduate mobility and regional innovation mutually reinforce each other: talent concentrates in the most innovative regions and contribute to their innovative performance, which in turn makes them more attractive.*
- *Graduates with a scientific and engineering background have a distinct effect on regional innovation*
- *Migrants, stayers and returners have different effects on regional knowledge.*

These aspects were explored in chapter 6, where impact of migrants and returners has been assessed through a series of simultaneous equation models. These have taken into account, concurrently, the role of regional knowledge in attracting skills and the impact of skills on regional knowledge. The analysis has shown that two cumulative processes are generated by the two types of movers: one in which the most innovative regions attract largely migrants which contribute to local innovation and to making the area more appealing to human capital; a second one in which returners tend to move back to the less dynamic regions of the South, where they cannot participate in collective learning processes, thereby making the areas less attractive to other high-skilled individuals. Such processes are especially strong when it comes to graduates with scientific or engineering background. This chapter has, in other words, proven that when it comes to the highly skilled, population flows actually widen, rather than reduce, spatial inequalities.

Hypotheses 4

- *Mobility impacts on job satisfaction, as the environment of the region of origin and destination influences expectations and therefore wellbeing.*
- *Migrants, stayers and returners differ in their levels of wellbeing.*

These hypotheses have been tested, in chapter 7, through a set of generalised ordered logit regressions with partial proportional odds. We have analysed the patters of job satisfaction both on short-term employment domains (such as job tasks and economic treatment) and long-term domains (such as career opportunities and stability and security). The models have highlighted that fulfilment depends both on the mobility category and on the area of origin and destination of the graduate, as both shape expectations and in turn satisfaction. In so doing, chapter 7 has broadened traditional approaches to the study of wellbeing. We have found that those who moved within the Centre-North seek and find fulfilment in the tasks their jobs involve, whilst those who came from the Mezzogiorno, place more importance on economic treatment. Overall, we have shown that leaving the Mezzogiorno is a rewarding choice, in both short and long term domains of wellbeing.

IV. Policy implications: higher education, collective learning and migration

The four empirical chapters of the thesis have demonstrated the value of looking at migration in terms of knowledge flows, and provided a thorough understanding of the drivers and consequences of the phenomenon. The key policy implications of the work revolve largely around the role of the education system and the skills it produces within the RIS.

Our results suggest that investment in tertiary education will translate into collective learning (and as a consequence economic growth) only in those regions that are able to integrate graduates in their innovation system. That is, in those regions where there is a high degree of complementarity between the labour force (of which graduates are a strategic component), the private sectors and the other institutions within the system, including universities. Such complementarity seems only partially achieved in Italy, as the difficulties that Italian graduates face in entering the labour market indicate that the skills provided by the tertiary education systems are not easily absorbed.

This suggests that the university sectors needs to be more closely aligned with the broader development agenda, easing the integration of graduates in the labour market by coordinating education, industrial and innovation policies. In particular it seems that more attention should be paid to understanding the key skills required in different areas, and perhaps (though more research is needed) the current education system should provide a more diversified type of training, rebalancing the mix between vocational and academic studies.

Addressing these issues is especially important for the Mezzogiorno, which, through its intense brain drain, proves unable to benefit from its investment in higher education: in the terminology of Nelson and Phelps (1965), the local level of techno-economic development is not high enough as to benefit from the highly skilled. Although difficult, the South must tackle these issues urgently, for at least two reasons. First, skilled migration is cumulative in its nature: the more graduates leave, the more they will keep leaving, as they feed into social networks, which support and perpetuate their movements. Secondly, and most relevantly, the brain drain is cumulative in its effects as it contributes to a virtuous cycle of skilled concentration and knowledge creation in the most developed parts of the country, and of skilled depletion and lack of innovation in the least developed ones.

Finally far-sighted policy measures must be accompanied by further investigation. This should monitor the trends we identified in this thesis, by conducting similar analysis on future editions of the *Indagine*. Furthermore, it should tackle in more depth the role, scope and geography of social networks. Finally, graduate migration should also be explored through case studies at the regional and at the university levels. Such comprehensive action is imperative to enhance knowledge-based growth and avoid worsening the already marked Italian sub-national disparities.

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The Indagine: synopsis and full questionnaire in Italian[1]

Varia-bile	Descrizione variabile	
Num_laur	Identificativo del laureato	
Ateneo	Ateneo	
Corso	Corso di laurea	
Gruppo	Gruppo di corsi di laurea	
Area	Area disciplinare	
sesso	Sesso	
CURRICULUM VITAE		
Q1_1	Tipo di maturità posseduta	
Q1_2	Voto maturità	
Q1_3a	Altro titolo universitario conseguito	1=Un' altra laurea; 2=Un altro diploma universit. 3=Nessuno di questi
Q1_3b	Ulteriore altro titolo	1=Un' altra laurea 2=Un altro diploma universit.
Q1_4a	Altro diploma universit. Conseguito prima o dopo il 2001	
Q1_4b	Altra laurea conseguita prima o dopo il 2001	
Q1_5	Motivo iscrizione ad un nuovo corso	
Q1_6	Blank	Riservato Istat
Q1_7	Laurea in corso o fuori corso	
Q1_8	Anni fuori corso	1=Un anno di fuori corso; 2=Due anni di fuori corso 3=Tre anni di fuori corso 4=Quattro anni o più
Q1_9	Voto massimo laurea	
Q1_10	Voto di laurea	001=Minore o uguale a 79; 002=Tra 80 e 89; 003=Tra 90 e 94; 004=Tra 95 e 99 puntuale per i voti successivi
Q1_11	Lode	
Q1_12	Mese di laurea	
Q1_13	Frequenza alle lezioni	
Q1_14	Corsi universitari precedentemente interrotti	
Q1_15	Tipo di corso interrotto	
Q1_16	Gruppo disciplinare del corso interrotto	
Q1_17	Sede universitaria nella stessa città in cui viveva	
Q1_18	Trasferimento in altra città	
Q1_19	Motivo del mancato trasferimento	
Q1_20	Per quanto tempo si è trasferito	
Q1_21	Abitazione dopo il trasferimento	
Q1_22	Frequenza a corsi privati preparazione esami	
Q1_23	Lavoro durante gli studi	
Q1_24	Si iscriverebbe di nuovo allo stesso corso	
Q1_25	Tipo di corso a cui si iscriverebbe	
Q1_26	Gruppo disciplinare del corso a cui si iscriverebbe	(Allegato C Cartellino C)
Q1_27	Motivo per cui non si reiscriverebbe allo stesso corso	
Q1_28	Conoscenza della riforma dell'università	
Q1_29a	Giudizio sulla riforma: qualità dell'offerta formativa	
Q1_29b	Giudizio sulla riforma: preparazione culturale dei laureati	
Q1_29c	Giudizio sulla riforma: capacità di formare profili professionali adeguati	
Q1_29d	Giudizio sulla riforma: fenomeno degli abbandoni	

[1] The questionnaire and a detailed explanation of the characteristics of the survey are available online at http://www.istat.it/dati/catalogo/20070227_00/inf_07_03_laureati_e_studio_inserimento_professionale_laureati_2004.pdf

Q1_29e	Giudizio sulla riforma: fenomeno dei fuori corso	
Q1_29bis	Giudizio complessivo sulla riforma	
Q1_30	Conseguimento dell'abilitazione professionale	
Q1_31a	Formazione ulteriore: dottorato di ricerca	
Q1_31b	Formazione ulteriore: specializzazione post-laurea	
Q1_31c	Formazione ulteriore: master universitario	
Q1_31d	Formazione ulteriore: master extrauniversitario	
Q1_31e	Formazione ulteriore: corso di laurea	
Q1_31f	Formazione ulteriore: corso di Diploma universitario	
Q1_31g	Formazione ulteriore: borsa di studio	
Q1_31h	Formazione ulteriore: stage o tirocinio	
Q1_31i	Formazione ulteriore: corso di formazione professionale o aggiornamento (oltre 3 mesi/ 300 ore)	
Q1_31l	Formazione ulteriore: altra attività di studio e formazione	
Q1_32	L'attività di formazione è retribuita?	
Q1_33	Tipo di corso di laurea iniziato	
LAVORO		
Q2_1	Lavora?	
Q2_2	Motivo per cui non lavora	
Q2_3	Blank	Riservato Istat
cpl	Professione del laureato	
Q2_4	Posizione nella professione	
Q2_5	Posizione professione lavoratori autonomi	
Q2_6	Partita IVA	
Q2_7	Ritenuta d'acconto	
Q2_8	Posizione professione lavoratori dipendenti	
Q2_9	Contributi previdenziali	
Q2_10	Tipo di lavoro	
Q2_11	Motivo del lavoro occasionale/stagionale	
Q2_12	Lavoro a tempo determinato o indeterminato	
Q2_12b	Lavoro a tempo indeterminato fin dall' inizio?	
Q2_13	Motivo del lavoro a tempo determinato	
Q2_14	Tipo di contratto	
Q2_15	Settore di attività	
Q2_16	Settore dei servizi	
Q2_17	Settore dell'industria	
Q2_18	N° dei dipendenti impresa, ente o studio	
Q2_19	Tempo pieno o ridotto in part-time	
Q2_20	Part-time per scelta o per mancanza di altro lavoro	
Q2_21	Ore di lavoro retribuite a settimana	
Q2_22	Blank	Riservato Istat
Q2_22a	Reddito mensile percepito	Fino a €2000 arrotondamento in base 10; da oltre €2000 fino a €3000 arrotondamento in base 100; 3333= oltre €3000, 0000=reddito non indicato
Q2_23	Trasferimento per lavoro	
Q2_24	Inizio lavoro prima o dopo la laurea	
Q2_25a	Anno di inizio del lavoro	
Q2_25b	Mese di inizio del lavoro	
Q2_26	Laurea requisito necessario	
Q2_27	Tipo laurea necessaria	
Q2_28	Era richiesta una votazione minima	
Q2_29	Necessità effettiva della laurea	
Q2_30a	Dopo la laurea: miglioramento della posizione lavorativa	
Q2_30b	Dopo la laurea: miglioramento del trattamento economico	
Q2_31a	Soddisfazione: mansioni svolte	
Q2_31b	Soddisfazione: stabilità/sicurezza	
Q2_31c	Soddisfazione: grado di autonomia del lavoro	
Q2_31d	Soddisfazione: utilizzo conoscenze universitarie	
Q2_31e	Soddisfazione: trattamento economico	
Q2_31f	Soddisfazione: possibilità di carriera	

Q2_32	Canali di accesso al lavoro attuale	
Q2_33	Aiuto di qualcuno all'inizio attività	
Q2_34	Tipo di aiuto	
Q2_35	Persona che ha dato l'aiuto	
Q2_36	Opportunità di lavoro dopo la laurea	
Q2_37	Accettate o rifiutate?	
Q2_38	Motivo rifiuto	
Q2_39	Tipo di lavoro precedente	
Q2_40	Lavoro precedente a tempo determinato/indeterminato	
Q2_41a	Anno inizio del lavoro	
Q2_41b	Mese inizio del lavoro	
Q2_42	Motivo dell'interruzione	
Q2_43	Cerca lavoro?	
Q2_44	Motivo per cui non cerca lavoro	
Q2_45	Cerca un nuovo lavoro?	
RICERCA LAVORO		
Q3_1	Periodo dell'ultima iniziativa di ricerca intrapresa	
Q3_2	Orario preferito (tempo pieno o part-time)	
Q3_3	Lavoro desiderato (dipendente o autonomo)	
Q3_4	Disponibilità a lavorare all'estero	
Q3_5	Disponibilità a cambiare città	
Q3_6a	Blank	Riservato Istat
Q3_6b	Reddito minimo mensile desiderato	
Q3_7	Disponibilità a cominciare entro 15 giorni	
FAMIGLIA DI ORIGINE		
Q4_1	Ha fratelli/sorelle	
Q4_2	Quanti fratelli/sorelle	
Q4_3	Titolo studio del padre	
Q4_4	Titolo studio della madre	
Q4_5	Condizione occupazionale del padre	
Q4_6	Blank	Riservato Istat
cppl	Professione del padre del laureato	
Q4_7	Padre: posizione nella professione	
Q4_8	Padre: posizione professione lavoratori indipendenti	
Q4_9	Padre: posizione professione lavoratori dipendenti	
Q4_10	Padre: settore di attività	
Q4_11	Condizione occupazionale della madre	
Q4_12	Madre: posizione nella professione	
Q4_13	Madre: posizione professione lavoratori indipendenti	
Q4_14	Madre: posizione professione lavoratori dipendenti	
Q4_15	Madre: settore di attività	
DATI ANAGRAFICI		
Q5_1	Cittadinanza italiana	
Q5_2	Quale cittadinanza straniera	
Q5_3	Blank	Riservato Istat
Q5_4	La regione dell'ateneo è la stessa regione di residenza al momento dell'iscrizione?	1=stessa regione; 2=altra regione
Q5_5	Regione di residenza attuale	
Q5_6a	Con chi convive abitualmente	
Q5_6b	Convivenza 2° opzione	
Q5_6c	Convivenza 3° opzione	
Q5_7	Blank	Riservato Istat
Prov_lav	Provincia in cui lavora	1=stessa provincia di residenza 2=altra provincia
Q5_7b	Regione di lavoro	(Allegato C Cartellino F)
Q5_8	Obblighi di leva	
Q5_9	Età in classi	1= fino a 24 anni; 2=25 e 26 anni; 3=27, 28 e 29 anni; 4= 30 anni e più
Q5_10	Stato civile	
Q5_11	Ha figli?	
coeff	Coefficiente di riporto all'universo	

CURRICULUM

1.1. [**NOME**] in quale tipo di istituto ha conseguito la maturità?

- liceo scientifico.. 01 ❑
- classico .... 02 ❑
- linguistico .... 03 ❑
- artistico .... 04 ❑

- scuola magistrale .... 05 ❑
- istituto magistrale .... 06 ❑

- istituto d'arte.. 07 ❑

- istituto tecnico per geometri .... 08 ❑
- tecnico industriale .... 09 ❑
- tecnico commerciale .... 10 ❑
- altro tipo di istituto tecnico .... 11 ❑

- istituto professionale per il commercio, turismo e pubblicità .... 12 ❑
- professionale industriale .... 13 ❑
- altro tipo di istituto professionale .... 14 ❑

- *non risponde* .... 99❑

1.2. Qual è stato il suo voto di maturità?

- *Voto in sessantesimi*................................. |__|__|

- *altro (specificare voto)* ……………………… |__|__|__|
  (specificare voto massimo previsto) |__|__|__|

1.3. Oltre alla laurea conseguita nel 2001, possiede anche un'altra laurea o un diploma universitario o di scuola diretta a fini speciali? Le segnalo che sono possibili più risposte.

1.3_A- *una laurea*……………………………………………………….. 1 ❑ ⟶
(quesito 1.4_A/1.4_B)
1.3_B- *un diploma universitario o di scuola diretta a fini speciali*……….. 2 ❑
1.3_C- *no, nessuno di questi*.. 3 ❑ ⟶
(quesito 1.6)

1.4. _A Il diploma universitario o di scuola diretta a fini speciali l'ha conseguito prima o dopo il 2001?

- *prima*.....................................1 ❑ ⟶ *(quesito 1.4_B/1.6)*
- *dopo*..................................….2 ❑.⟶ …..*(quesito 1.4_B/1.5)*
- *non risponde*…………..……...9 ❑⟶ *(quesito 1.4_B/1.6)*

1.4. _B L'altra laurea l'ha conseguita prima o dopo il 2001?

<u>*Per l'intervistatore:*</u> *Se è l'intervistato dice di aver conseguito, oltre alla laurea conseguita nel 2001, altre lauree (più di una) dire:* "Si riferisca a quella conseguita per prima"

- *prima*.....................................1 ❑ ⟶ *(quesito 1.5/1.6)*
- *dopo*.....................................2 ❑

- *non risponde*………….........…9 ❑ → *(quesito 1.5/1.6)*

1.5. Qual è stato il motivo principale per cui, dopo aver conseguito la laurea nel 2001, ha deciso di iniziare un **nuovo** corso?

- era insoddisfatto degli sbocchi professionali offerti dalla laurea ....1 ❑
- aveva maturato nuovi interessi …...2 ❑
- o era rimasto deluso dai contenuti del corso ?…...3 ❑
- *altro* ....4 ❑

- *non risponde* ....9 ❑

1.6. Nel 2001 ha concluso un tradizionale corso di laurea della durata di 4 o più anni *(comprese le nuove lauree specialistiche a ciclo unico)*?

Se dalle informazioni preesistenti risulta che l'intervistato ha conseguito una laurea di durata triennale (di primo livello) la domanda che deve essere posta è la seguente:

Nel 2001 ha concluso un nuovo corso di laurea di durata triennale (*di primo livello*)?

- *NO*………………………..1 ❑
- *SI*……………………...2 ❑

1.7. Quando si è laureato era iscritto in corso o fuori corso ?

- *fuori corso*.. 1 ❑
- *in corso*...:.......... 2 ❑ → *(passare a q. 1.9)*

* - *non risponde*... 9 ❑ → *(passare a q. 1.9)*

1.8. A quale anno fuori corso?

- *1° fuori corso*... 01 ❑
- *2° fuori corso*... 02 ❑
- *3° fuori corso*... 03 ❑
- *4° fuori corso*... 04 ❑
- *5° fuori corso*... 05 ❑
- *6° fuori corso*... 06 ❑
- *7° fuori corso*... 07 ❑
- *8° fuori corso*... 08 ❑
- *9° fuori corso e più*................................... 09 ❑

* - *non risponde*... 99 ❑

1.9. [**NOME**] all'epoca in cui lei si è laureato, qual era il voto massimo previsto per il conseguimento della laurea?

- *Massimo voto:* .... |__|__|__|

* - *non risponde*... 999 ❑

1.10. Qual è stato il suo voto di laurea?

- *voto:* .... |__|__|__| *(quesito 1.11/1.12)*

* - *non risponde* .... 999 ❑ *(quesito 1.12)*

1.11. Con lode?

- *NO*…… .... 1 ❑
- *SI*…… .... 2 ❑

* - *non risponde* .... 9 ❑

1.12. In quale mese si è laureato?

- *Gennaio* .... 01 ❑
- *Febbraio* .... 02 ❑
- *Marzo* .... 03 ❑
- *Aprile* .... 04 ❑
- *Maggio* .... 05 ❑
- *Giugno* .... 06 ❑
- *Luglio* .... 07 ❑
- *Agosto* .... 08 ❑
- *Settembre* .... 09 ❑
- *Ottobre* .... 10 ❑
- *Novembre* .... 11 ❑
- *Dicembre* .... 12 ❑

- *non risponde* .... 99 ❑

1.13. Durante il corso di laurea ha frequentato le lezioni:

- mai/quasi mai.............………………………… 1 ❑
- saltuariamente............……………………….. 2 ❑
- con regolarità............……………………….. 3 ❑
- oppure la frequenza era obbligatoria?........ 4 ❑

- *non risponde*………………………………................ 9 ❑

1.14. Prima di iniziare il corso di laurea concluso nel 2001, era stato precedentemente iscritto ad un altro corso universitario che ha successivamente interrotto?

- *NO* … .... 1 ❑ *(quesito 1.17)*
- *SI* …… .... 2 ❑
- *non risponde* .... 9 ❑ *(quesito 1.17)*

1.15. Il corso che ha interrotto era un corso di laurea, un corso di diploma universitario o una scuola diretta a fini speciali?

- *un corso di laurea*..1 ❑
- *un corso di diploma universitario o di scuola diretta a fini speciali (incluso ISEF)*………….. .... 2 ❑
- *non risponde*………… ....……………… 9 ❑

1.16. A quale area disciplinare apparteneva il corso che ha interrotto ? Le leggo adesso i possibili gruppi di corsi.

- Gruppo Scientifico .... 01 ❑
- Chimico- Farmaceutico .... 02 ❑
- Geo-Biologico .... 03 ❑
- Medico .... 04 ❑
- Ingegneria .... 05 ❑
- Architettura .... 06 ❑
- Agrario .... 07 ❑
- Economico-Statistico .... 08 ❑
- Politico-Sociale .... 09 ❑
- Giuridico .... 10 ❑
- Letterario .... 11 ❑
- Linguistico .... 12 ❑
- Insegnamento .... 13 ❑
- Psicologico .... 14 ❑
- Educazione fisica .... 15 ❑

- *non risponde* .... 99 ❑

1.17. [**NOME**] la sede universitaria dove lei ha prevalentemente seguito gli studi, si trovava nella stessa città in cui viveva prima di iscriversi o in una città diversa?

- *nella stessa città* .... 1 ❑ *(quesito 1.21)*
- *in una città diversa* .... 2 ❑

- *non risponde*.. 9 ❑*(quesito 1.21)*

1.18. Per seguire gli studi universitari si è trasferito in questa città?

- *NO*… .... 1 ❑
- *SI*… .... 2 ❑ *(quesito 1.20)*

- *non risponde*.. 9 ❑ *(quesito 1.22)*

1.19. Non si è trasferito perché poteva seguire le lezioni andando e tornando in giornata, oppure perché non ha potuto o voluto cambiare città?

- *potevo seguire le lezioni andando e tornando in giornata*... 1 ❑

- *non ho potuto o voluto cambiare città*.. 2 ❑

- *non risponde*... 9 ❑

(per tutti passare a q 1.21)

1.20. Si è trasferito per la maggior parte degli studi o solo per un periodo ?

- *per la maggior parte* .... 1 ❑
- *per un periodo* .... 2 ❑ ⟶ *(quesito 1.21)*

- *non risponde*.. 9 ❑

Dopo il trasferimento dove ha abitato in prevalenza:

- in abitazione di proprietà … .... 1 ❑
- in affitto .... 2 ❑
- in pensionati .... 3 ❑
- in una casa dello studente .... 4 ❑
- o presso parenti o amici ? .... 5 ❑
- *altro*.. 6 ❑

- *non risponde*.. 9 ❑

1.21. Durante gli studi universitari ha frequentato corsi privati di preparazione agli esami?

- *NO*… .... 1 ❑
- *SI*… .... 2 ❑

- *non risponde*... 9 ❑

1.22. Durante il corso di laurea ha svolto:

- lavori occasionali o stagionali .... 1 ❑
- lavori continuativi .... 2 ❑
- o non ha mai lavorato ?........................... 3 ❑

- *non risponde*.. 9 ❑

1.23. Se lei dovesse scegliere oggi, si iscriverebbe di nuovo allo **stesso** corso di laurea in cui ha conseguito il titolo nel 2001?

- *NO* .... 1 ❑
- *SI* .... 2 ❑ *(quesito 1.28)*

- *non risponde*.. 9 ❑

1.24. Si iscriverebbe:
- ad un corso di laurea della durata di 4 o più anni (*incluso ISEF e le nuove lauree a ciclo unico*) .... 1 ❑
- ad un corso di laurea di durata triennale *(di primo livello)* del nuovo ordinamento .... 2 ❑
- ad un corso di diploma universitario o di scuola diretta a fini speciali .... 3 ❑
- o non si iscriverebbe a nessun corso universitario? .... 4 ❑→ *(passare q. 1.26)*

- *non risponde* .... 9 ❑

1.25. Sceglierebbe un corso dell'area:
- scientifica .... 01 ❑
- chimica - farmaceutica .... 02 ❑
- geo-biologica .... 03 ❑
- medica .... 04 ❑
- ingegneria .... 05 ❑
- architettura .... 06 ❑
- agraria .... 07 ❑
- economico-statistica .... 08 ❑
- politico-sociale .... 09 ❑
- giuridica .... 10 ❑
- letteraria .... 11 ❑
- linguistica .... 12 ❑
- insegnamento .... 13 ❑
- psicologica .... 14 ❑
- educazione fisica … .... 15 ❑
- o difesa e sicurezza? … .... 16 ❑

- *non risponde* .... 99 ❑

1.26. Qual è il motivo principale per cui non si iscriverebbe **nuovamente** allo stesso corso di laurea?

- è insoddisfatto degli sbocchi professionali offerti dalla sua laurea .... 1 ❑
- ha maturato nuovi interessi .... 2 ❑
- è rimasto deluso dai contenuti del corso .... 3 ❑
- o per l'eccessiva durata degli studi? .... 4 ❑
- *altro* ... . 5 ❑

- *non risponde* .... 9 ❑

1.27. Lei è a conoscenza delle trasformazioni introdotte dalle università nella durata dei corsi di laurea, a seguito della recente riforma del sistema universitario?

- *NO* .... 1 ❑ *(quesito 1.30)*
- *SI* .... 2 ❑
- *non risponde* .... 9 ❑ *(quesito 1.30)*

1.28. Come sa, l'università ha sostituito i vecchi corsi di laurea "lunghi", con nuovi corsi di tre anni seguiti, nel caso in cui il laureato decida di proseguire, da corsi di due anni che conducono alla laurea specialistica. Secondo lei, rispetto al vecchio sistema didattico, il nuovo sistema "3+2" migliorerà (notevolmente o leggermente), peggiorerà (notevolmente o leggermente) o lascerà invariati i seguenti aspetti?

1.29_A
- la qualità dell'offerta formativa, migliorerà notevolmente, migliorerà leggermente, peggiorerà leggermente, peggiorerà notevolmente o resterà invariata ?.

1.29_B
- e la preparazione culturale complessiva dei laureati ?.

1.29_C
- e la capacità dell'università di formare profili professionali adeguati alle richieste del mercato del lavoro?

1.29_D
- e rispetto al fenomeno degli abbandoni degli studi la situazione migliorerà, peggiorerà o resterà invariata?
1.29_E
- e rispetto al fenomeno dei fuori corso?

1.29bis Il suo giudizio complessivo sulla riforma degli ordinamenti didattici è:

- molto positivo......………...…….. 1 ❑
- abbastanza positivo......………... 2 ❑
- né positivo né negativo....……... 3 ❑
- abbastanza negativo......……….. 4 ❑
- molto negativo………………….. 5 ❑
- *non risponde*………………….. 9 ❑

1.29. Dopo la laurea ha superato esami di stato per l'abilitazione all'esercizio di un'attività professionale?

- *NO* .... 1 ❑
- *SI*.. 2 ❑

- *non risponde* .... 9 ❑

1.30. [**NOME**] le farò adesso alcune domande sulle attività di studio e formazione successive al 2001. Mi dica, per ciascuna, se la sta frequentando, l'ha già conclusa, l'ha interrotta o non l'ha mai svolta.

1.31._A
- un dottorato di ricerca: lo sta frequentando, lo ha già concluso, lo ha interrotto o non l'ha mai svolto?
1.31._B
- una specializzazione post-laurea (*esclusi corsi di perfezionamento e master*) ?
1.31._C
- un corso di perfezionamento o un master universitario?.
1.31._D
- un master extrauniversitario?
1.31._E
- un altro corso di laurea?
1.31._F
- un corso di diploma universitario o di scuola diretta a fini speciali?
1.31._G
- una borsa di studio o di lavoro?
1.31._H
- uno stage, tirocinio o praticantato?
1.31._I
- un corso di formazione professionale o di aggiornamento *(di durata superiore a sei mesi o a 600 ore)?*
1.31._L
- un'altra attività di studio e formazione *(includere i corsi di formazione professionale/aggiornamento fino a sei mesi o a 600 ore)*?

1.31. L'attività di formazione in cui è attualmente impegnato è retribuita? Non consideri eventuali rimborsi spese.

- *NO*..............……………….1 ❑
- *SI*.....................…………..2 ❑

- *non risponde*....................…9 ❑

1.33. Dopo il conseguimento della laurea nel 2001 ha iniziato:

- un corso di laurea tradizionale che dura quattro o più anni
(*comprese le nuove lauree specialistiche a ciclo unico)*......……...…… 1 ❑

- un nuovo corso di laurea di durata triennale (*di primo livello*).............. 2 ❑
- o di un nuovo corso di laurea specialistica di durata biennale?.............. 3 ❑
- *non risponde*… .... 9 ❑

SEZIONE2 LAVORO

2.1. **Attualmente** svolge un'attività lavorativa retribuita? Le segnalo che l'apprendistato e i contratti di Formazione e lavoro vanno considerati come lavoro mentre le prestazioni che danno luogo solo a rimborsi spese non vanno considerate.
- *NO, non lavoro*................ 1 ❑
- *SI, lavoro*......................... 2 ❑ → *(quesito 2.3)*
- *non risponde*...................... 9 ❑

2.2. Qual è il motivo principale per cui non lavora?
- *voglio proseguire gli studi.*... 01 ❑
- *sto per iniziare un lavoro / sto aspettando una risposta* .... 02 ❑
- *sto svolgendo una attività formativa retribuita*.. 03 ❑
- *non riesco a trovare lavoro.* .... 04 ❑
- *non trovo lavori che mi interessino.*... 05 ❑
- *per motivi personali*
(obblighi di leva, salute, matrimonio, assistenza familiari) .... 06 ❑
- *sono in attesa di tornare al mio posto di lavoro.*... 07 ❑
- *non mi interessa / non ne ho bisogno*.. 08 ❑
- *altro*... 09 ❑
- *sto lavorando.*.. 10 ❑
* - *non risponde* .... 99 ❑
(passare a q. 2.36)

2.3. [**NOME**] qual è la sua professione? Le raccomando di non usare termini generici come funzionario, impiegato o operaio.

____

- *non risponde*……....................... 9 ❑

2.4. Adesso le farò alcune domande relative alle caratteristiche del suo lavoro. Lei attualmente svolge un:

- lavoro autonomo……………………………………………………1 ❑
- lavoro di collaborazione coordinata e continuativa
(incluso lavoro a progetto)………..……………….……………...2 ❑ *(quesito 2.9)*
- lavoro di prestazione d'opera occasionale ……………………………3 ❑ *(quesito 2.7)*
- o un lavoro alle dipendenze?……………………………………… …4 ❑ *(quesito 2.8)*

- *non risponde*..………….. 9 ❑ *(quesito 2.10)*

2.5. Tra le seguenti voci quale descrive meglio la sua posizione? Prima di rispondere, la prego di aspettare che le legga tutte le risposte previste.

- E' un imprenditore .... 1 ❑
- un libero professionista .... 2 ❑
- un lavoratore in proprio *(ad es. commerciante, artigiano, coltivatore diretto, ecc.)*........ 3 ❑
- un coadiuvante nell'azienda di un familiare.. 4 ❑
- è socio di una cooperativa.. 5 ❑
- o un lavoratore autonomo senza specifica qualificazione *(ad es. collaboratrice familiare, trasportatore, conducente, commerciante ambulante)*? .... 6 ❑
- *Altro*.. 7 ❑

- *nessuna di queste*.. 8 ❑
- *non risponde.* .... 9 ❑

2.6. Viene retribuito utilizzando la partita IVA?

- *NO* .... 1 ❑
- *SI* .... 2 ❑ *(quesito 2.10)*

* - *non risponde*... .... 9 ❑

2.7. Viene retribuito con una ritenuta d'acconto?

- *NO* .... 1 ❑ *(quesito 2.10)*
- *SI* .... 2 ❑ *(quesito 2.10)*

* - *non risponde* ... .9 ❑ *(quesito 2.10)*

2.8. Tra le seguenti voci quale descrive meglio la sua posizione? Prima di rispondere, la prego di aspettare che le legga tutte le risposte previste.

- E' un dirigente .... 01 ❑
- *un quadro, un funzionario (inclusi direttivi, ricercatori, insegnanti di scuola media inferiore, superiore, elementare o materna e ufficiali delle Forze Armate*.. 02 ❑
- un impiegato ad alta/media qualificazione *(analisti di dati, geometri e periti tecnici,capi segreteria, infermieri professionali, contabili, archivisti, sottufficiali delle Forze* Armate, ecc.) 03 ❑
- un impiegato esecutivo *(addetti agli sportelli, telefonisti, segretari, commessi di negozio, militari di carriera delle Forze Armate, Polizia e/o assimilati di grado inferiore a sottufficiali, ecc.)*... 04 ❑
- o un operaio o un capo operaio o un lavoratore senza specifica qualificazione *(uscieri, bidelli, portieri)* .... 05 ❑
- *Altro* .... 06 ❑
- *non risponde* .... 09 ❑

2.9. Il suo datore di lavoro versa regolarmente i contributi previdenziali?

- *NO* .... 1 ❑
- *SI* .... 2 ❑

*- *non risponde*.... ... . 9 ❑

2.10. Il suo lavoro è occasionale, stagionale o continuativo?

- *Occasionale o Stagionale*..................1 ❑
- *Continuativo*..................................... 2 ❑ *(quesito 2.12)*
- *non risponde*... ... ...9 ❑ *(passare al quesito 2.12)*

2.11. Ha un lavoro occasionale o stagionale per mancanza di altre opportunità o per scelta?

- Per mancanza di altre opportunità..................1❑ (quesito 2.14)
- Per scelta……………………………...........2❑ (quesito 2.14)
- Il mio lavoro non è occasionale/stagionale.….3❑
- non risponde…………..9❑ (quesito 2.14)

2.12. Il suo lavoro è a termine (*a tempo determinato*) oppure non ha scadenza (*a tempo indeterminato*)?

- *A termine (a tempo determinato)*...... 1 ❑ *(quesito 2.13)*
- *Non ha scadenza*.............................. 2 ❑
- *non risponde*... ... ... 9 ❑ *(quesito 2.14)*

2.12bis. Ha iniziato questo lavoro con un contratto a termine o fin dall'inizio aveva un contratto senza scadenza?

- *Ha iniziato con un contratto a termine.…………………………………* 1 ❑ *(quesito 2.15)*
- *Fin dall'inizio aveva un contratto senza scadenza.............................* 2 ❑ *(quesito 2.15)*
- *non risponde...*9 ❑ *(quesito 2.15)*

2.13. Lavora a tempo determinato perché non ha trovato un lavoro senza scadenza o per scelta?

- *Non ha trovato un lavoro senza scadenza (a tempo indeterminato).*……………1 ❑
- *Per scelta*……………………………………………………............……………2 ❑
- *Il mio lavoro non è a tempo determinato* ....3 ❑
- *non risponde* ………............................ 9 ❑

2.14. Lei con quale tipo di contratto lavora?

- Con un contratto di Formazione e lavoro ....01 ❑
- Con un contratto di apprendistato ....02 ❑
- Con un contratto collettivo nazionale di lavoro ....03 ❑
- Lavora per una agenzia interinale ....04 ❑
- Con un contratto di collaborazione coordinata e continuativa o a progetto05 ❑
- Con un contratto di prestazione d'opera occasionale...............................06 ❑
- Con un altro tipo di contratto a termine..07 ❑
- oppure lavora senza un contratto?...08 ❑
- con un contratto verbale...09 ❑
- con un contratto a tempo indeterminato..10 ❑

* - non risponde 99❑

2.15. [NOME] mi dica in quale dei settori che le leggerò svolge la sua attività lavorativa

- Agricoltura, Caccia e Pesca................... 1 ❑ *(Quesito 2.18)*
- Industria.. 2 ❑ *(Quesito 2.17)*
- Servizi………… .... 3 ❑
- *non risponde*………......................9 ❑ *(Quesito 2.18)*

2.16. Prima di rispondere a questa domanda, la prego, di nuovo, di aspettare che le legga tutte le risposte previste. Lavora

Per il programma CATI: è possibile una sola risposta

- nel commercio, alberghi e pubblici esercizi ....……........ 01 ❑
- nei trasporti, viaggi, poste e telecomunicazioni .... 02 ❑
- nel credito e assicurazioni *(inclusa intermediazione finanziaria)*………………………… 03 ❑
- nelle attività professionali e di consulenza *(studi legali, di progettazione, attività immobiliari e di noleggio, sondaggi e analisi di mercato, ricerca, pubblicità ecc.)* 04 ❑
- nell'informatica e attività connesse *(sviluppo di software, elaborazione dati, manutenzione e riparazioni di elaboratori elettronici)* ……………........…………. 05 ❑
- nell'istruzione e la formazione *(ad eccezione degli istruttori di attività sportive)* .... 06 ❑
- nella sanità e assistenza sociale *(ospedali, studi medici, ecc.)* ....………. 07 ❑
- nella pubblica amministrazione e difesa *(ministeri, regioni, enti locali, organi costituzionali ecc.)*…………………………………………………………………… 08 ❑
- o in altri servizi pubblici, sociali e alle persone *(cinema, TV, palestre, musei, attività presso le famiglie, ecc)*?……………………………………………………………….. 09 ❑
- *non risponde*...……. 99 ❑

2.17. Prima di rispondere a questa domanda, la prego, di nuovo, di aspettare che le legga tutte le risposte previste. Lei lavora:

Per il programma CATI: è possibile una sola risposta

- In un'industria che estrae minerali *(carbon fossile, petrolio greggio, minerali)* ....1 ❑
- Nella produzione e distribuzione di energia elettrica, acqua e gas ....2 ❑
- Nelle costruzioni...3 ❑
- Nel settore chimico, petrolchimico e farmaceutico...4 ❑
- Nell'industria meccanica e dei mezzi di trasporto ....5 ❑
- In un altro tipo di industria manifatturiera?..6 ❑

- *nessuno di questi* ....8 ❑
- *non risponde* ....9 ❑

2.18. Quante persone, oltre lei, lavorano abitualmente nell'impresa, ente o studio nel quale svolge la sua attività?

- *Nessuno oltre lei*.... .... 1 ❑
- *da 1 a 9 persone*..................... 2 ❑
- *da 10 a 49 persone*................. 3 ❑
- *da 50 a 99 persone*................. 4 ❑
- *da 100 a 249 persone*............. 5 ❑
- *250 e oltre*……………...............6 ❑
- *non risponde*………................9 ❑

2.19. Lei lavora a tempo pieno o con un orario ridotto part-time ?

- *a tempo pieno* .... 1 ❑ *(quesito 2.21)*
- *part-time*.................................... 2 ❑
- *non risponde*……………………… 9 ❑ *(quesito 2.21)*

2.20. Lavora part-time per mancanza di altre opportunità o per scelta?

- *per mancanza di altre opportunità*..........1 ❑
- *per scelta*.........................………….........2 ❑
- *non risponde*……...........……………..9 ❑

2.21. Quante sono le ore di lavoro retribuito che svolge abitualmente in una settimana? Includa eventuali ore di straordinario solo se sono retribuite e le svolge abitualmente.

- *N.* |__|__|
- *non risponde*…................ 99 ❑

2.22. Qual è il suo guadagno mensile netto per questo lavoro? Le ricordo che le risposte sono coperte dal segreto statistico.

CLASSI DI REDDITO:

- *fino a 250* .... 01 ❑
- *da più di 250 a 500*... 02 ❑
- *da più di 500 a 750*... 03 ❑
- *da più di 750 a 1.000*.. 04 ❑
- *da più di 1.000 a 1.250*... 05 ❑
- *da più di 1.250 a 1.500*... 06 ❑
- *da più di 1.500 a 2.000*... 07 ❑
- *da più di 2.000 a 2.500*... 08 ❑
- *da più di 2.500 a 3.000*... 09 ❑
- *da più di 3.000 a 3.500*... 10 ❑
- *da più di 3.500 a 4.000*... 11 ❑
- *più di 4.000* .... 12 ❑

* - *non risponde* .... 99 ❑
guadagno ***mensile netto*** *in EURO* |__|__|__|__|__|

2.23. Per svolgere il suo attuale lavoro ha dovuto cambiare città?

- *NO*.. 1 ❑

- *SI*.. 2 ❑
- *non risponde* .... 9 ❑

2.24. Il lavoro che sta svolgendo è iniziato prima o dopo il conseguimento della laurea?

- *Prima*...................................... 1 ❑ → *(quesito 2.30)*
- *Dopo* .... 2 ❑
- *non risponde*……………............... 9 ❑

2.25. In che anno e mese lo ha iniziato?

2.25_A

Anno:

- *2001* .... 1 ❑
- *2002* .... 2 ❑
- *2003* .... 3 ❑
- *2004*................................. 4 ❑
- *altro anno* .... 5 ❑

- *non risponde*……….......... 9 ❑

2.25 _B

Mese:

- *Gennaio* .... 01 ❑
- *Febbraio* .... 02 ❑
- *Marzo* .... 03 ❑
- *Aprile* .... 04 ❑
- *Maggio* .... 05 ❑
- *Giugno* .... 06 ❑
- *Luglio* .... 07 ❑
- *Agosto* .... 08 ❑
- *Settembre* .... 09 ❑
- *Ottobre* .... 10 ❑
- *Novembre* .... 11 ❑
- *Dicembre* .... 12 ❑
- *non risponde*……….......... 99 ❑

2.26. Per accedere al suo attuale lavoro, possedere una laurea era un requisito necessario?

- *NO* .... 1 ❑ *(quesito 2.29)*
- *SI* .... 2 ❑
- *non risponde*……...................... *9* ❑ *(quesito 2.29)*

2.27. Era necessaria una laurea qualsiasi, una laurea di una specifica area disciplinare o esclusivamente il suo tipo di laurea?

- *una laurea qualsiasi*... 1 ❑
- *una laurea di una specifica area disciplinare*....................................... 2 ❑
- *esclusivamente il mio tipo di laurea*.. 3 ❑
- *non risponde.* ....9 ❑

2.28. Era richiesta una votazione minima?

- *NO* .... 1 ❑
- *SI*... 2 ❑
- *non risponde* .... 9 ❑

2.29. *Modificare il testo della domanda in base alla risposta fornita al quesito 2.26.*
Se quesito 2.26=1 o 9

E per svolgere il suo lavoro, secondo lei, possedere una laurea è necessario?
Se quesito 2.26=2 chiedere
E per svolgere il suo lavoro, secondo lei, possedere una laurea è **effettivamente** necessario?

- *NO*……….. 1 ❑
- *SI*……….. 2 ❑
- *non risponde*……….......................... 9 ❑

2.30. _A Acquisire una laurea ha comportato un miglioramento della sua posizione lavorativa?

- *NO*……….. 1 ❑
- *SI*……….. 2 ❑
- *non risponde*…………………… 9 ❑

2.30._B e del suo trattamento economico?

- *NO*……….. 1 ❑
- *SI*……….. 2 ❑
- *non risponde*……………… …….9 ❑

2.31. [**NOME**] lei quanto è soddisfatto del suo lavoro (Molto, Abbastanza, Poco, Per niente, * Non risponde)

2.31_A
- rispetto alle mansioni che svolge, molto, abbastanza, poco o per niente

2.31_B
- rispetto alla stabilità o alla sicurezza del posto di lavoro?

2.31_C
- quanto è soddisfatto rispetto al grado di autonomia sul lavoro, molto, abbastanza, poco o per niente?

2.31_D
- rispetto all'utilizzo delle conoscenze acquisite all'università?

2.31_E
- rispetto al trattamento economico, molto, abbastanza, poco o per niente?

2.31_F
- rispetto alla possibilità di carriera?

2.32. In che modo ha trovato il suo attuale lavoro?
- *per conoscenza diretta del datore di lavoro*..01 ❑
- *su segnalazione a datori di lavoro da parte di familiari/amici/conoscenti* 02 ❑ (*quesito 2.35)*
- *su segnalazione a datori di lavoro da parte dell'università, di centri di formazione o di docenti*..03 ❑
- *a seguito di uno stage o tirocinio presso un'azienda* ....04 ❑
- *per chiamata diretta dell'azienda* ....05 ❑
- *mettendo o rispondendo a inserzioni sui giornali o su Internet* ....06 ❑
- *inviando curriculum ai datori di lavoro (presentandosi di persona, presentando domande, telefonando, ecc)* ....07 ❑
- *per pubblico concorso* ....08 ❑
- *iniziando una attività autonoma (da solo o con altri)* ....09 ❑
- *collaborando ad una attività familiare* ....10 ❑
- *attraverso l'iscrizione presso un ufficio o agenzia pubblico/a di collocamento* ....11 ❑
- *attraverso agenzie private di collocamento o selezione del personale.*12 ❑
- *altro*..13 ❑
- *non risponde* ....99 ❑

2.33. Ritiene che ci sia stata una persona che l'ha aiutata in modo particolare ad iniziare la sua attività lavorativa?

- *NO* ....1 ❑ *(quesito 2.36)*
- *SI* ....2 ❑

* - *non risponde* …........……….…9 ❑ *(quesito 2.36)*

2.34. In che modo questa persona le è stata utile?

- *L'ha aiutata nella preparazione alle prove di selezione?* .... 1 ❑
- *Le ha dato un finanziamento iniziale?* ....2 ❑
- *Le ha messo a disposizione strutture o apparecchiature?*...3 ❑
- *L'ha messa in contatto con il suo attuale datore di lavoro?* ....4 ❑
- *Le ha fornito informazioni che si sono rivelate decisive?* ....5 ❑
- *Altro*.. 6 ❑

* - *non risponde*..9 ❑

2.35. Di chi si tratta? Di un genitore, di un fratello, di un parente o di un'altra persona?

- *un genitore* .... 1 ❑
- *un fratello o una sorella*.. 2 ❑
- *un altro parente* .... 3 ❑
- *un'altra persona* .... 4 ❑

* - *non risponde* .... 9 ❑

2.36. Parliamo adesso delle esperienze lavorative passate. Dopo la laurea e prima di iniziare il suo attuale lavoro, ha avuto qualche altra opportunità di lavoro?

- *NO*…...................................... 1 ❑ *(quesito 2.43)*
- *SI* …... 2 ❑
- *non risponde*……….................. 9 ❑ *(quesito 2.43)*

2.37. L'ha accettata?

- *NO*…...................................... 1 ❑
- *SI* …...................................... 2 ❑ *(quesito 2.39)*
- *non risponde*..........……….…. 9 ❑ *(quesito 2.39)*

2.38. Qual è il motivo principale per cui l'ha rifiutata?

- *avevo già un lavoro/ ero in attesa di un altro lavoro* .... 01 ❑
- *non mi piaceva quel tipo di lavoro*..................... .... 02 ❑
- *il lavoro non mi garantiva stabilità o sicurezza*. .... 03 ❑
- *non ero soddisfatto del trattamento economico* .... 04 ❑
- *volevo seguire ulteriori corsi di studio o di formazione professionale* 05 ❑ *(2.43)*
- *la sede di lavoro era troppo distante* .... 06 ❑
- *avevo impegni familiari o personali (servizio militare, accudire figli o parenti, ecc)*.. .... 07 ❑
- *altro motivo*.. .... 08 ❑
- *non risponde* .... 99 ❑

2.39. Si trattava di un lavoro occasionale, stagionale o continuativo?

- *Occasionale o Stagionale*..................1 ❑ *(quesito 2.42)*
- *Continuativo*....................................2 ❑
- *non risponde*……….........................*9* ❑

2.40. Era un lavoro a termine (*a tempo determinato*) oppure senza scadenza (*a tempo indeterminato*)?

- *A termine (a tempo determinato)......* 1 ❑
- *Senza scadenza..............................* 2 ❑
- *non risponde………..........................* 9 ❑

Mi può dire in che anno e mese lo ha iniziato?

2.41_A

Anno:

- *2001 ... .* 1 ❑
- *2002 ... .* 2 ❑
- *2003 ... .* 3 ❑
- *2004 ... .* 4 ❑
- *altro anno ... .* 5 ❑
- *non risponde…....................................* 9 ❑

2.41_B

Mese:

- *Gennaio..* 01 ❑
- *Febbraio...* 02 ❑
- *Marzo ....* 03 ❑
- *Aprile..* 04 ❑
- *Maggio ....* 05 ❑
- *Giugno..* 06 ❑
- *Luglio…...* 07 ❑
- *Agosto..* 08 ❑
- *Settembre..* 09 ❑
- *Ottobre ....* 10 ❑
- *Novembre ....* 11 ❑
- *Dicembre..* 12 ❑
- *non risponde ....* 99 ❑

2.41. Qual è il motivo principale per cui lo ha interrotto?

- *Avevo trovato un altro lavoro*..01 ❑
- *Era un lavoro a termine*...02 ❑
- *Non mi piaceva quel tipo di lavoro* ....03 ❑
- *Non mi garantiva stabilità o sicurezza* ....04 ❑
- *Non ero soddisfatto del trattamento economico*..05 ❑
- *Non ero soddisfatto delle possibilità di carriera*...06 ❑
- *Volevo studiare* ....07 ❑
- *Avevo impegni familiari o personali (servizio militare, accudire figli, ecc)* ....08 ❑
- *La sede di lavoro era troppo distante* ....09 ❑
- *Per licenziamento/chiusura attività* ....10 ❑
- *Altro* ....11 ❑
- *non risponde* ....99 ❑

2.42. Cerca lavoro?

- *NO* ....…....... 1 ❑
- *SI* ....…......... 2 ❑ *(quesito 3.1)*
- *non risponde*……......................... 9 ❑ . *(quesito 3.1)*

2.43. Qual è il motivo principale per cui non cerca lavoro

- *voglio proseguire gli studi.* .... 01 ❑
- *sto per iniziare un lavoro* .... 02 ❑
- *non trovo lavori che mi interessino.* .... 03 ❑
- *sono in attesa di un concorso* .... 04 ❑

- *sto svolgendo una attività formativa retribuita* .... 05 ❑
- *collaboro ad un'attività familiare* .... 06 ❑
- *per motivi personali (salute, matrimonio, assistenza, altri familiari, ...)* .... 07 ❑
- *per obblighi di leva.* .... 08 ❑
- *altro* .... 09 ❑
- *non risponde* .... 99 ❑

2.44. Attualmente cerca un nuovo lavoro?
- *NO* .... 1 ❑ *(quesito 4.1)*
- *SI* .... 2 ❑
- *non risponde* … … .... 9 ❑

RICERCA LAVORO

3.1. [**NOME**] quanti mesi fa ha preso l'ultima iniziativa concreta per cercare lavoro?
- *non ho ancora preso nessuna iniziativa..* 1 ❑
- *negli ultimi trenta giorni* .... 2 ❑
- *da più di un mese a sei mesi fa* .... 3 ❑
- *oltre sei mesi fa* .... 4 ❑
- *non risponde* .... 9 ❑

3.2. In questo momento preferirebbe lavorare a tempo pieno o part-time?
- *a tempo pieno* .... 1 ❑
- *part-time* .... 2 ❑
- *non ha preferenze* .... 3 ❑
- *non risponde* .... 9 ❑

3.3. Vorrebbe lavorare come dipendente o in modo autonomo?
- *dipendente* .... 1 ❑
- *autonomo* .... 2 ❑
- *non ha preferenze* .... 3 ❑
- *non risponde* .... 9 ❑

3.4. Adesso, sarebbe disposto a lavorare:
- ovunque, sia in Italia che all'estero......... 1 ❑ *(quesito 3.6)*
- oppure solo in Italia?................................ 2 ❑
- *non risponde* .... 9 ❑

3.5. Per lavorare sarebbe disposto a cambiare città?
- *NO* .... 1 ❑
- *SI* .... 2 ❑
- *non risponde* .... 9 ❑

3.6. Qual è la cifra minima che sarebbe disposto ad accettare mensilmente **al netto** per un lavoro come quello che ha appena descritto, cioè ....?

CLASSI DI REDDITO:
- *fino a 250* .... 01 ❑
- *da più di 250 a 500* .... 02 ❑
- *da più di 500 a 750* .... 03 ❑
- *da più di 750 a 1.000* .... 04 ❑
- *da più di 1.000 a 1.250* .... 05 ❑
- *da più di 1.250 a 1.500* .... 06 ❑
- *da più di 1.500 a 2.000* .... 07 ❑
- *da più di 2.000 a 2.500* .... 08 ❑

- *da più di 2.500 a 3.000*.. 09 ❑
- *da più di 3.000 a 3.500*.. 10 ❑
- *da più di 3.500 a 4.000*.. 11 ❑
- *più di 4.000* .... 12 ❑

* - *non risponde* .... 99 ❑

*guadagno **mensile netto** in EURO* |__|__|__|__|__|

3.7. Se trovasse un lavoro con le caratteristiche appena indicate potrebbe iniziarlo entro le prossime due settimane o ci sono dei motivi per cui dovrebbe rinviare?

- *NO, ci sono dei motivi per cui dovrei rinviare*... 1 ❑
- *SI, potrei iniziarlo entro le prossime due settimane* .... 2 ❑
- *non risponde* .... 9 ❑

FAMIGLIA DI ORIGINE

4.1. [**NOME**] ora le chiederò qualche informazione sulla sua famiglia. Ha fratelli o sorelle?

- *NO* .... 1 ❑ (*quesito 4.3)*
- *SI*.. 2 ❑
- *non risponde* .... 9 ❑ (*quesito 4.3)*

4.2. Quanti?

- *uno* .... 1 ❑
- *due* .... 2 ❑
- *tre* .... 3 ❑
- *quattro e oltre* .... 4 ❑
- *non risponde* .... 9 ❑

4.3. Quando lei aveva 14 anni, qual era il titolo di studio di suo padre?

- *analfabeta/senza titolo* .... 1 ❑
- *licenza elementare*.. 2 ❑
- *licenza media (o avviamento professionale)* .... 3 ❑
- *qualifica o diploma di scuola superiore* .... 4 ❑
- *diploma universitario o ex scuole parauniversitarie* .... 5 ❑
- *laurea o dottorato di ricerca* .... 6 ❑

* - *non risponde*...9❑

4.4. E quello di sua madre?

- *analfabeta/senza titolo* .... 1 ❑
- *licenza elementare*.. 2 ❑
- *licenza media (o avviamento professionale)* .... 3 ❑
- *qualifica o diploma di scuola superiore* .... 4 ❑
- *diploma universitario o ex scuole parauniversitarie* .... 5 ❑
- *laurea o dottorato di ricerca* .... 6 ❑

* - *non risponde*... 9 ❑

4.5. Sempre quando aveva 14 anni, suo padre era:

- occupato .... 1 ❑
- in cerca di occupazione............................ 2 ❑
- pensionato .... 3 ❑
- *deceduto* .... 4 ❑ *(quesito 4.11)*
- *altra condizione* .... 5 ❑ *(quesito 4.11)*

* - *non risponde* .... 9 ❑

4.6. Quale era la professione di suo padre? Le raccomando di non usare termini generici come funzionario, impiegato o operaio.

____

- *non risponde* .... 9 ❑

4.7. Suo padre era un:

- Lavoratore dipendente............................. 1 ❑ *(quesito 4.9)*
- o un lavoratore autonomo? .... 2 ❑
* - *non risponde*.. 9 ❑ *(quesito 4.10)*

4.8. La prego, di nuovo, di avere la pazienza di aspettare che le legga le risposte previste. Tra le seguenti voci quale descrive meglio la professione che svolgeva suo padre quando lei aveva 14 anni ?

- Era un imprenditore.. 1 ❑
- un libero professionista .... 2 ❑
- un lavoratore in proprio *(ad es commerciante, artigiano, coltivatore diretto, ecc)*... 3 ❑
- un coadiuvante nell'azienda di un familiare.. 4 ❑
- socio di una cooperativa.. 5 ❑
- un lavoratore autonomo senza specifica qualificazione *(ad es trasportatore, conducente, commerciante ambulante)*? .... 6 ❑
- *Altro*.. 7 ❑

(per tutti passare a quesito 4.10)

- *nessuno di questi* .... 8 ❑
* - *non risponde*..9 ❑

4.9. La prego, di nuovo, di avere la pazienza di aspettare che le legga le risposte previste. Tra le seguenti voci quale descrive meglio la professione che svolgeva suo padre quando lei aveva 14 anni ?

- Era un dirigente *(inclusi docenti universitari, magistrati, generali e colonnelli)*…………………01 ❑
- un quadro, un funzionario *(inclusi direttivi, ricercatori, insegnanti scuola media inferiore o superiore e ufficiali delle Forze Armate di grado inferiore colonnello)*……..…………………………… 02 ❑
- un impiegato ad alta/media qualificazione *(insegnanti di scola elementare o materna, analisti di dati, geometri e periti tecnici, capi segreteria, infermieri professionali, contabili, archivisti, sottufficiali delle Forze Armate ecc)*…………………………………………………………………..03 ❑
- un impiegato esecutivo *(addetti agli sportelli, telefonisti, segretari,commessi di negozio, militari di carriera delle Forze armate, Polizia e/o assimilati di grado inferiore a sottufficiali, ecc)* ....………………………......04 ❑
- un operaio o un capo operaio o un lavoratore senza qualificazione ? *(uscieri, bidelli, portieri)*….05 ❑
- *Altro* .... 06 ❑
* - *non risponde* .... 09 ❑

4.10. In quale settore di attività economica lavorava suo padre

- Agricoltura .... 1 ❑
- Industria .... 2 ❑
- o Servizi? .... 3 ❑
* - *non risponde*... 9 ❑

4.11. Le farò adesso le stesse domande riferite a sua madre. Sempre quando lei aveva 14 anni, sua madre era:

- occupata .... 1 ❑
- in cerca di occupazione........................... 2 ❑
- casalinga.. 3 ❑ (*quesito 5.1*)
- pensionata .... 4 ❑
- *deceduta* .... 5 ❑ *(quesito 5.1)*
- *altra condizione* .... 6 ❑ *(quesito 5.1)*
* - *non risponde*... 9 ❑ *(quesito 5.1)*

4.12. Sua madre era una:

- Lavoratrice dipendente............................. 1 ❑ *(quesito 4.14)*
- o una lavoratrice autonoma?.................... 2 ❑
- *non ha mai lavorato/altra condizione...* 3 ❑ *(quesito 5.1)*

* - *non risponde………………………………*9 ❑ *(quesito 5.1)*

4.13. Tra le seguenti voci quale descrive meglio la professione che svolgeva sua madre quando lei aveva 14 anni ?

- Era un'imprenditrice .... 1 ❑
- una libera professionista .... 2 ❑
- lavoratrice in proprio *(ad es commerciante, artigiano, coltivatore diretto ecc)*........ 3 ❑
- coadiuvante nell'azienda di un familiare... 4 ❑
- socio di una cooperativa... 5 ❑
- o una lavoratrice autonoma senza specifica qualificazione *(ad es commerciante ambulante, collaboratrice familiare*)?....................................... 6 ❑
- *Altro*.. 7 ❑

(per tutti passare q 4.15)

- *nessuno di questi* .... 8 ❑

* - *non risponde* .... 9 ❑

4.14. Tra le seguenti voci quale descrive meglio la professione che svolgeva sua madre quando lei aveva 14 anni ?

- Era un dirigente *(inclusi docenti universitari, magistrati)* .... 01 ❑
- un quadro, un funzionario *(inclusi direttivi, ricercatori e insegnanti di scuola media inferiore o superiore)* .... 02 ❑
- un'impiegata ad alta/media qualificazione *(analisti di dati, geometri e periti tecnici, insegnanti di scuola elementare o materna, capi segreteria, infermieri professionali, contabili, archivisti)*... 03 ❑
- un'impiegata esecutiva *(addetti agli sportelli, telefonisti, segretari, commesse di negozio ecc)* .... 04 ❑
- un'operaia o un capo operaio o una lavoratrice senza specifica qualificazione? *(uscieri, bidelli, portieri)* .... 05 ❑
- *Altro*... 06 ❑

* - *non risponde* .... 09 ❑

4.15. In quale settore di attività economica lavorava sua madre

- Agricoltura .... 1 ❑
- Industria .... 2 ❑
- o Servizi? .... 3 ❑

* - *non risponde* .... 9 ❑

NOTIZIE ANAGRAFICHE

5.1. [**NOME**] Lei ha cittadinanza italiana?

- *NO* .... 1 ❑
- *SI*.. 2 ❑ *(quesito 5.3)*
- *non risponde* .... 9 ❑ *(quesito 5.3)*

5.2. Qual è la sua cittadinanza?

- Paesi Unione Europea ....1 ❑
- altri paesi europei ....2 ❑

EXTRAEUROPEA:

- Africa ....3 ❑
- America ....4 ❑
- Asia ....5 ❑
- Oceania ....6 ❑
- non risponde ....9 ❑

5.3. Lei in che provincia aveva la residenza prima di iscriversi all'Università?
- *provincia* .... |__|__|__|
- *non risponde* .... 998 ❑

5.4. E' la stessa in cui vive abitualmente?

<u>*Per l'intervistatore*</u>*: per abitualmente si intende 4/5 giorni a settimana.*
- *NO* .... 1 ❑
- *SI*.. 2 ❑ ——→ *(quesito 5.6)*
- *non risponde* .... 9 ❑

5.5. Qual è quella in cui vive abitualmente?
- *provincia* .... |__|__|__|
- *non risponde* .... 998 ❑

5.6. Con chi abita prevalentemente? Le segnalo che può fornire più risposte.

- da solo .... 01 ❑
- con la famiglia di origine (*genitore/i e/o fratelli, sorelle*) .... 02 ❑
- con amici .... 03 ❑
- con il coniuge/convivente .... 04 ❑
- con figli .... 05 ❑
- con altri parenti o affini.. 06 ❑
- *altro* .... 07 ❑
- *non risponde* .... 09 ❑

5.7. In quale provincia lavora?

- *provincia* .... |__|__|__|

- *non risponde* .... 998 ❑

5.8. Qual è la sua posizione nei confronti del servizio militare o del servizio civile?

- *assolto prima di iscriversi all'università*………………… ... 01 ❑
- *assolto durante l'università*………………………………… ... 02 ❑
- *assolto dopo la laurea*…………………………………….. ... 03 ❑
- *lo sta assolvendo*…………………………………………… 04 ❑
- *lo deve ancora assolvere*…………………………………... 05 ❑
- *è stato esonerato*…………………………………………… 06 ❑

- *non risponde* .... 09 ❑

5.9. In che anno è nato?
anno .... **19**|__|__|
- *non risponde* .... 09 ❑

5.10. *Modificare il testo della domanda in base alla risposta fornita al quesito D.E.*
Se quesito D.E=1 (maschio):
Lei è celibe, coniugato, convivente o separato?
Se quesito D.E=2 (femmina):
Lei è nubile, coniugata, convivente o separata?

5.11. Ha figli?
- *NO* .... 01 ❑
- *SI*.. 02 ❑
- *non risponde* .... 09 ❑