Three Essays on Grading Policies, Student Mobility and University-to-Work Transition

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"E alla fine in qualche modo sono uscito
senza calci, senza spinte e senza lode
niente ottanta, forse per darmi una lezione
mi hanno appioppato un 79.
E ho capito che chi vince generalmente muore giovane
le sconfitte invece ti tengono in vita
che in fondo tutto è come il Tetris, i successi svaniscono
mentre gli errori restano lì a fare da calamita
Ma soprattutto che così come San Valentino è
un'invenzione dell'industria dei cioccolatini per i cuori afflitti
la maturità altro non è
che una grande invenzione di Mr. Antonello Venditti."
(Pinguini Tattici Nucleari - *79*)

"Ero in mezzo ai punkabbestia e mi han fatto un'intervista
sulla condizione della classe media studentesca
non so se l'han mandata in onda la televisione non è mia
e io non posso accenderla.
Avrei dovuto immaginarlo prima che un giorno al posto del futuro
mi sarei trovato un tanfo di presente vecchio e già scaduto
Ho da telefonare a casa, dovevo farlo senza nostalgia
invece ho chiesto aiuto e mi son venuti a prendere."
(Samuele Bersani - *D.A.M.S.*)

"Mio padre in fondo aveva anche ragione
a dir che la pensione è davvero importante
Mia madre non aveva poi sbagliato a dir
che un laureato conta più d'un cantante.
[...]
Ma s'io avessi previsto tutto questo
dati causa e pretesto
forse farei lo stesso..."
(Francesco Guccini - *L'avvelenata*)

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CHAPTER 1

Introduction and Motivations

The main aim of this thesis is to shed light on some issues that are adding fuel to the ongoing public debate about the Italian Higher Education system. In particular, the three studies presented in the following chapters will focus on students, their choices, possibilities and future outcomes. The main spotlight is devoted in confuting and, if possible, discrediting a number of commonplaces that are shaping a controversy which is becoming more and more similar to a generational clash, rather than a constructive thinking aimed to restore the Italian educational system.

More than a decade is passed since this struggle arose, or at least it started to become undeniable, roughly coinciding with that financial crisis which was going to be the cause for the crunch of the public sector in the southern Europe, and the consequent *austerity* measures that forced governments in rationalizing the provision of funding even for the educational system. Looking back upon that period, the first remarkable sign of the series of commonplaces and prejudices against the Italian student class can be settled by the 4th of October, 2007, when the Minister of Economics and Finance Tommaso Padoa-Schioppa argued that "big babies" should have been kicked out from their native homes[1]. Of course, the epithet was referred to those young adults who were still living with their own parents. He was then followed by the vice-Minister to the Welfare Michel Martone (at the moment the youngest to fulfill such a role in the history of the country), who in 2012 argued that those students not achieving the graduation within the 28 years old are "losers"; always in 2012, Elsa Fornero, Minister for Labor and Welfare, invited newly-workers in not being too "choosy" in accepting their very first job; finally, in 2013, Enrico Giovannini, Minister of Labor, described Italians as a population poorly-matchable with the modern job market, a human capital which does not deserve to be invested on[2].

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[1] *Padoa-Schioppa e i bamboccioni. Una battuta che divise e creò polemica.* Corriere della Sera, 26/05/2010, available at: `https://www.corriere.it/cronache/10_maggio_26/padoa-schioppa-bamboccioni_0aded68e-68b3-11df-9742-00144f02aabe.shtml`

[2] *Choosy, bamboccioni, sfigati e ora inoccupabili: breve storia di come i ministri vedono gli italiani*, Huffington Post, 09/10/2013, available at: `https://www.huffingtonpost.it/2013/10/09/choosy-bamboccioni-sfigati-inoccupabili_n_4069618.html`

From then on, the direction held both by commentators and policy-makers was to assume that the entire fortune of the student class had to be burdened by students themselves, minimizing at most all the necessary reflections about the state of the system as a whole.

On the other hand, the academic literature provides better explanation of this framework, but not always so good as it should be expected. Just as an example, the main motivation for analyzing the role of Italian Universities' grading policies in the first essay comes to the fact that an entire stream of literature takes as given that increasing the average marks provided directly helps in attracting more student enrolments. This, completely ignoring all the systemic reasons at a socio-economic level which are able to drive the decision-making process of students at the moment of applying for their Higher Education Studies.

Among this features, in the first two chapters a particular emphasis will be devoted to the gap between the North and the South of Italy. Ironically, in the meanwhile this thesis is on its final stage, several mass-medias are reviving an old headline that the Italian newspaper "Corriere della Sera" published by the 13th of September, 1972 (Figure 1.1), which predicted this gap to be canceled in 2020. Even though the optimistic prevision, almost fifty years later not only this goal is not reached, but from certain points of view it is more far than during the Seventies. In particular, it will be fully explained how the actual policies of funding allocation among Italian universities, jointly with the lacking of a concrete strategy for the industrial development of the South, are even increasing the inequalities within the Higher Education system as a whole. Indeed, as the provision of funding by the Ministry of Education, University and Research (MIUR) is related with the achievement of the highest positions in the rankings, then a perverse cycle arises, enriching more and more the better universities, constantly impoverishing the others. But in the modern tertiary system, where credentials are the entrance ticket for the job market, a university can become "good" only interrelating itself with a developed and dynamic business fabric.

Fig. 1.1 Source: *Corriere della Sera*, 13th of September, 1972.

Speaking of credentials as the entrance ticket for the job market, more commonplaces than those regarding the internal mobility of southerners will be listed in the third essay. Consequently, as it can be true that Italy still exhibits difficulties in matching its freshly-graduates in the job market, this should not probably be attributed to the quality of its human capital. It is sufficient to highlight how, according to Giovanni Tria, Minister of Economy and Finance at the turn of 2018 and 2019, the brain drain of Italian high-skilled labor force causes a loss of 14 billions of Euros per year, approximately corresponding to the 1% of the GDP[3], a signal that graduates from the country are very appreciated abroad. It would appear much more reliable the hypothesis according to which Italy is still suffering for the unresolved issue of social stratification across levels of education. Several studies will be presented in the next pages, showing clearly how the educational path of Italian students is still very bounded to their socio-economic background. Accordingly, *Lyceums* receive on average students from the upper-classes, who are the most likely to undertake an academic route and, if also well-performing, to reach the top of the job-skilled pyramid. On the other side, students from lower-classes are still more likely to attend a vocational or a technical school and, when they decide to enroll at the tertiary education level, they experiment the strongest economic difficulties. This, jointly with the necessity to move toward those regions with the lowest unemployment rates in order to increase their own chances of upward social mobility and maybe with the urgency of working during the studies in order to sustain themselves. No guarantees to be rewarded by recruiters, but the certainty that someone would like to harangue them for being "losers" if they do not graduate on time.

Thus, in the first essay *"The effect of grading policies on Italian Universities' attractiveness: A Conditional Multinomial Logit approach"*, two proxies for the grading policies of the Italian universities will be calculated and interacted with information about both the territorial characteristics and the reputation of the departments under examination. The issue will be analyzed also in light of the internal migration of the Italian students, a phenomenon emerging as one of the strongest peculiarities exhibited by Italy in conditioning its students' behavior. As expected, and coherently with the main related litrature, Italian students do not seem to be so interested in applying to those universities apparently "easier", while they are much more concerned in anticipating the job market (an idea that will recur also in the third essay) moving toward the richest territories. Far from being an obvious choice, this evidence needs to be examined in light to the fact that the richest regions are also those with the highest cost of life, which constantly increases as much as this places turn out to be more

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[3]*Digitale, Confindustria: "Rischiamo di perdere metà dei fondi Ue". Tria: "Fuga dei cervelli costa 14 miliardi"*, la Repubblica, 16/07/2019, available at: `https://www.repubblica.it/economia/2019/07/16/news/pa_digitale_-231298825/`.

attractive. Moving from the poorer territories of the country rises as a big sacrifice for the students and especially their families, who must sustain them during all the studies because of a public welfare not able to provide enough subsidies for allowing students to be independent. Nonetheless, the race for enrolling at the better universities seems to be more significant for students coming from the poorest regions and from the less academic tracks, disregarding the harshness of departments' grading policies and the moving costs for reaching them.

Consequently, the second essay *"Movers and Stayers in STEM enrolment: who performs better?"* will analyze the transition from secondary to tertiary education with regard to the students performance during their first year of university studies. The student population will be split in four groups: movers from the South and Islands, movers from the North and Centre, stayers of the South and Islands, and stayers of the North and Centre. Apparently, movers from the South are those who exhibit the worst performance in terms of credit earned during the first year. As this evidence seems to contradict the prior stating that movers represent the more dynamic and resourceful share of a population, then what it is probably captured in this result is once again the difficulty any "emigrant" has to experiment leaving her home-town. Jointly with the *per se* destabilizing transition between two completely different educational systems, here could appear what it is going to be defined as a *transfer shock*.

Finally, the third essay *"Investigating the relationship between Secondary and Tertiary Education and Labor Market Outcomes: Evidences from the University of Florence"* will focus on the transition between the Higher Education system and the job market of graduates at the University of Florence. Checking for the effect of secondary and tertiary education degrees on their job market outcomes, it will be perceivable how the first level will result to be much more consistent in explaining the future skilled-job pyramid positioning, rather than the latter. As already suggested, all the signals of social stratification already arise at the secondary education level, conditioning at this very early stage the future of graduates. As suggested by the *Marxian analysis of credentials* and the *Social closure theory*, unemployed use credentials in order to strive for better jobs, while self-interested occupational groups limit and monopolize the access for their "recruitment queues". In this context, it will be shown how for sure graduating at the university is unavoidable in order to be admitted in the skilled-job market, but at the same time the characteristics of high school degrees, jointly with the willingness for reaching those regions with the higher rates of employment, are much more robust in explaining the future outcomes. Also the decision of working during the higher education studies will be taken into account with regard to three several priors. According to the first, working students are those who need to sustain

themselves for the period of studies, coming from the lower classes and experimenting the harsher economic difficulties. The second hypothesis claims that working students aim to signal their resourcefulness to the future recruiters, expecting to be rewarded obtaining a better positioning in the corresponding recruitment queue. Finally, the fact the majority of students nowadays appear to work during the enrollment in a degree course spurs the idea that attending the university can be experienced as an accessory occupation, a "parking lot" to avoid to remain in a condition of complete inactivity.

Regarding the data and the methodologies employed, this thesis relies almost entirely on administrative data. This was the hardest and fulfilling challenge of this work. In particular, the first two essays employ as a main source of information the Italian University Student Register (ANS) provided by the Ministry of Education, University and Research (MIUR)[4]. Thanks to it, complete records about the career of the entire population of students enrolled in the Italian Higher Education System are available to be analyzed. Moreover, the first paper will merge these information with other sources, such as CENSIS' evaluations of universities and statistics about both universities and cities where they are settled. In addition, Italian National Institute of Statistics (ISTAT) provides information about unemployment rates at the regional level, which will be used also in the third essay. In this respect, analysis in chapter 4 will benefit of a novel dataset which matches individual-level data on the career of students at the University of Florence, Italy, with records on employment contracts for the same students from the Italian Ministry of Labor.

Also the employed methodologies are different. The first essay performs a Multinomial Conditional Logit Model, in order to estimate the probability that a student decides to apply for a certain universities, on the basis of the its own characteristics, rather than those of the individuals. Then, in chapter 3 a three-levels Multilevel analysis will be computed. As fully explained in its content, this kind of analysis is generally considered very suitable to be employed for educational issue. Indeed, it allows to take into account the several levels at which the educational output can emerge, such as the individual intrinsic characteristics, but also the features of the course attended. Finally, the final chapter will present a Survival Analysis for competing risks in order to estimate the probability that a students with certain educational characteristics can reach a given occupational level in the shorter time as possible.

As a general conclusion, this thesis is an attempt of restoring the reputation of the Italian student population, at the same time shading light on the criticalities of the framework

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[4]Database MOBYSU.IT [Mobilità degli Studi Universitari in Italia], research protocol MIUR - Universities of Cagliari, Palermo, Siena, Torino, Sassari, Firenze and Napoli Federico II, scientific reference Prof. Massimo Attanasio (UNIPA), Data Source ANS-MIUR/CINECA.

they have to front during their studies. The emerging picture shows a class of students very available to undertake hard decisions, leaving their hometowns and investing a large part of their own and familiar revenues in order to move toward the better universities and the healthiest territories in terms of job market conditions. Reading the obtained results through the lenses of the available academic literature it is possible to discern the signs of the attempt to escape from the trap of social stratification, which seems to determine their own fate since the high school. No evidences of "big babies", "losers" or "choosy" in the analyzed data, but a human capital that strongly deserves to be invested on. Now the give is to the policy-maker, who have the duty not only to recover the Italian educational system, but also the business fabric of the country, working actively for reducing the gaps among regions, at the same time reinforcing the interconnections between universities and job market all over the *peninsula*.

The effect of grading policies on Italian Universities' attractiveness: A Conditional Multinomial Logit approach

Through the decades, the Higher Education System globally experimented a huge increase in the average marks that each student receives. Among several hypotheses, in this article the idea that grading is one of the tool that every department can use in order to attract a larger amount of students will be stressed. Regarding the Italian case, the speed in obtaining a degree is among the criteria considered by the Ministry of Education in order to evaluate universities, financing them proportionally. As a shortcoming, this can boost an artificial increase in marks. So, the number of students becomes important for those universities with the worst ranking positions, in order to finance themselves through fees. On the other side, it is reasonable to expect that a student emigrates toward places which offer higher chances of receiving a job. In other words, mobility might be driven by the search for better working conditions, and not by the 'ease' of the faculty. Testing this hypothesis, a Multinomial Conditional Logit Model will be implemented in order to measure the probability of choosing a certain destination depending on the harshness and reputation of a University and on the rates of unemployment at a regional level.

keywords: Higher Education, grading policies, students choices, Multidimensional Conditional Logit Model.

2.1 Introduction

The main aim of this work is to investigate the capability of *grading policies* in attracting students within the Italian Higher Education system. This question affects a debate which arose at least during the seventies, when Juola (1976) empirically tested the idea that American faculty members could have artificially increased grades, mainly in order to "quiet down" the student bodies' protests caused by the Vietnam War. Consequently,

several scholars have tried to consider grading policies as a kind of a strategy, played by the directorates of the degree courses, in order to attract a larger amount of students in their programs. There are apparently two priors that across the literature characterize this phenomenon: the first is that soft grading policies are negative *per se*. The second is that they are an outcome desired by students. As a definition, Eiszler (2002) states: *"Grade Inflation [...] is, student attainment of higher grades independent of increased levels of academic attainment."* Consequently, students have to be so myopic to desire a easier University Education, no matter if they are less prepared, receiving less valuable degrees and getting more difficult sorting in the job market. On the other hand, Finefter-Rosenbluh and Levinson (2015) address this problem taking teachers and professors as the main actors. As the authors claims, *"In this respect, we see the practical ethics of grading and of grade inflation as being two examples of a larger set of dilemmas for educators and educational policymakers about how to enact justice in unjust contexts"*(Finefter-Rosenbluh and Levinson, 2015, p. 5.). Accordingly, it is possible to identify different channels through which soft grading policies can be harmful: *i)* students can lose the incentive for working harder and receive less competencies; *ii)* universities can deprive the degrees of their signalling effect on the job market, losing their own reputation toward employers; *iii)* the entire society can be harmed if the most selective universities would increase grades in order to signal that their students are the best, so speeding up social inequalities.

Understanding if soft grading policies are able to affect the students' decision making process could be extremely relevant in the Italian context. As pointed out by Viesti (2018), Italy is suffering a tendency towards a classist Higher Education system, which is more and more difficult to be attained for those students who come from low-income families. Moreover, it seems to be prominent the neo-liberal view of considering Higher Education as a market, providing a private good to be sold to consumers. In this framework, in order to evaluate universities and allocate funds, the Ministry of Education, University and Research (MIUR) included the speed in which students obtain degrees. However, without considering their background nor the capability of each university in attracting the best students. The incentives are ambiguous: on the one side, universities have much more propensity in organizing better services for students such as tutoring activities; on the other side, if it is true that grading is able to attract students, then, since universities could be tempted to artificially increase average marks, a perverse incentive arises. This work tries to check if really such policies are actually able to attract newly-graduated high-school students who have to decide where to apply for their Higher Education studies.

In the next section, the relationship between students, departments and grading policies will be described through a main recurrence to the literature about Grade Inflation. Then, the Italian departments' perspective is presented in light of the changes that the

Higher Education System has experimented both at national and global level in the last thirty years. Moreover, the choice behavior of students will be addressed with a main reference to the literature about students' mobility, coherently with the peculiar Italian framework, which sees Italy splitted in two parts which exhibits remarkable gaps. In the third section, the dataset is presented. Moreover, some information about Multinomial Conditional Logit Model are provided, together with a brief description of the limitations of the analysis. Finally, estimations are shown for different specifications and four robustness checks based on some socio-demographic characteristics of the students sampled. As it will be highlighted, softening grading policies will emerge as a very poor strategy in order to attract students, especially those who come from those socio-demographic categories which experiment the worst reputation.

2.2 Theoretical Background

2.2.1 Grading Policies and University Harshness

Despite all the insights about the negative effects of Grade Inflation in the Higher Education System, Jewell et al. (2013) develop a theoretical model based on the assumption that students can benefit from higher grades through the greater time they could spend in leisure activities rather than studying. From this perspective, inflating grades become a costless tool in order to reach the desired number of students, increasing the teaching output and, consequently, the department output. Ostrovsky and Schwarz (2010) and Chan et al. (2007) try to link grading policies with the Labor Market. The underlying assumption is that grading could be strategically employed by the Departments in order to blend the mediocre students into the good ones. In both cases their conclusion seems to be that inflating grades and overwhelming the employers through information suppression are Departments' unavoidable strategies. Thus, fostering the competition among universities with the aim to place on the Labor Market the greatest number of students as possible. From this point of view, soft grading policies emerge as a strategy in which departments have everything to gain.

This setting is questioned by Ehlers and Schwager (2016), who insert in their model a reputation cost for those Universities that inflate grades. Indeed, if employers start to penalize students coming from inflating-grades universities, then the following cohorts will prefer to avoid this kind of universities, so signaling they award a much more valuable degree. But, if this is true, then all the theory about "student consumerism" results weakened. Accordingly, if institutions engage so much in grading policies, it is due both to the financial pressure which results in the necessity of enrolling a large number of students, and to a customer-based concept according to which students have to be compensated for the big amount of money spent in their higher education. Consequently, as Chowdhury (2018) argues that students should be educated about grading

policies, the literature does not provide any strong evidence about the myth according to which grades increase in order to indulge students' desires (Boretz 2004, Marsh and Roche 2000).

Despite these evidences, there is not so much literature available about the relationship between grading policies and students' behaviour in Italy. A broad link between the harshness experienced by students and their performance is addressed by Bratti and Staffolani (2013), who highlight a trade off between performance and time allocation, expecting that, in the attempt of maximizing their own utility, students should actually prefer a easier educational path. Aina et al. (2011) investigate the relationship between Universities' characteristics, local characteristics and students' time-to-degree in Italy. Their finding is that if the second always positively affects the third, on the other side the first generates the same effects only if territorial characteristics are not included. This suggests the presence of factors which are exogenous to the Departments themselves in order to fully explain students' behavior in relationship with the choice of department. Specifically considering grading policies, Bagues et al. (2006, 2008) find that between 1998 and 2004 the Italian Higher Education System experiments a perverse incentive structure, which causes an overall skill mismatch at the labour market. According to their findings, grading policies are softer if a Department is experiencing a low rate of students' enrolment, which causes a reduction in its funding provision. Moreover they find that those departments which provide higher average marks are more likely to introduce in the labour market overeducated students. This means that they will have to front lower wages and a higher probability to be unemployed. Finally, De Paola (2008) observes that grading policies in Italy are actually a tool suitable in order to attract a larger amount of students, when a Department faces a low demand, maybe paying only a small cost in terms of reputation.

2.2.2 The Italian Departments' perspective

As already stated, one of the main views about the causes of soft grading policies regards the need of increasing the departments' funding through an always larger number of students. If this is true, it is probably due to the substantial change in the governance of the Universities experienced during the last three decades. Focusing on the Italian case, the Higher Education System developed from the Medieval Age, when universities were private and transnational instruments with the aim to select and to train the future élite, to the *Risorgimento*, when they became components of the public administration, substantially managed and completely financed by the state. In the Postwar period, as the idea of the Universal access to Education arose, the élitarian vocation became weaker, and the view according to which universities should contribute to the economic development of the country and to the professional training of the students was reinforced. The consequence was to move toward the New Public Management,

which guaranteed autonomy to the departments, the State allocating resources according to managerial criteria such as performance, cost-benefit analysis and other indicators (Battini 2011). In this framework, decentralization was compensated by evaluation. The information asymmetry with the stakeholders of the Education System was reduced creating a pressure for results, but with very unclear goals to be reached. At the same time, the differences between Southern and Northern Universities, apparently inflated by the territorial disparities between those macroareas (Ciani and Mariani 2014), resulted in strong differences in the allocation of resources among departments. Even when more specific targets are settled - as in 1998 funds were provided in order to reduce imbalances between North and South - the rules were so detailed that universities faced strong difficulties in satisfying those criteria (Perotti 2002). In the first place, departments tried to front this scenario updating their educational assortment, moving from 1859 different degree courses in 1999 to 5953 in 2007, also because the new 3-years bachelor degrees were not interpreted as a way to prepare students for the job market, but as a first step of a 5-years complete program (Petrosino and Schingaro 2016, Capano et al. 2017). Nowadays, Italy registers 4541 degree courses, an expenditure for the Higher Education lower than the OECD average and it is second-last in the number of graduates among the EU countries, also because it is always more difficult to access the System for low income families. From 2004 to 2018 the number of students reduces about 20%, teachers about 17% and courses 22.5%. The financial resources provided by the Ministry of Education are divided into a *base fee* and a *reward fee*. The base fee decreases up to the 26.8% between 2008 and 2015. On the other side, the weight of the reward fee on the total increases progressively. Consequently, if Northern universities experiment a reduction in their financing around 4,3%, more than 12% was suffered by the Southern ones. In particular, the number of students contributes to determine the amount of resources which can be devoted to hire new professors, and the speed of students in obtaining the degree is an indicator of the success of the universities. At the same time, Italy requires the highest students' fees among the European countries with comparable systems. The reward fee provides more money to healthy institutions and less to the weak ones, so increasing the overall gap and chasing a distorted definition of *value* (Banfi and Viesti 2016, Capano et al. 2017, Cingari 2016, Viesti 2016, 2018). In this framework, in which departments are more dependent by students' fees, but also by their success in a short time, it is not difficult to argue that universities can react making themselves easier. In such a framework, it is very hard to argue that the drivers of the students' choice for the degree course should be searched so deeply into the universities' intrinsic characteristics.

2.2.3 Italian Students' Choices between Mobility and Universities' Characteristics

In the previous section it is highlighted why Italian Universities could find useful to intervene on their own policies in order to attract and pull in students. On the other side, it is necessary to address the issue if those kind of strategies could be actually effective. Empirical studies on Italy have already demonstrated how the ministerial rules for the allocation of funds and the advent of the financial crisis in Europe caused an increase in the competition among universities each other. This competition was aimed mainly in attracting more applicants in order to increase their revenues both from governmental and student sides (Cattaneo, Malighetti, Meoli and Paleari 2017). As an example, Cattaneo et al. (2019) show how departments intervene on their education offering strategically in order to adapt to the new competitive scenarios. The reaction of the student population is to become more selective with the choice of the degree course, also because of the poor conditions of the job market in Italy, which requires to improve as much as possible the signal provided by the studies' degrees (Cattaneo et al. 2018).

The Italian framework is peculiar: in the South there are only two university courses at the same time which can be reached by at least the 95% of the population in less than 60 minutes, against a national average amounting to 8. According to ANVUR (National Agency for the Evaluation of University and Research, trans.). and MIUR evaluations, none of these courses for Southern regions provides quality at least corresponding to the national average, and so southerners migrate for an average distance of 143 km, in comparison to the average distance of 40 km covered by North-Westerners and 86 km of national average (De Angelis et al. 2016). Territorial disparities in Italy are undeniable, and this evidence makes difficult to think that what attracts students in a far away university could be the possibility of receiving inflated grades, even admitting the existence of spillovers and reputation effects. Enea (2018), focusing on the transition from bachelor to master degrees, finds that *conditioned to the decision of moving, a Northern University is chosen with a 75% chance.* As he points out, the presence of a much more dynamic labor market in Northern regions is a strong reason why South of Italy loses its best students. Also D'Agostino et al. (2019) addresses the relationship between local labor markets and education system as a fundamental source of mobility between students.

Accordingly, government policies based on attractiveness and university ratings to provide financing for tertiary education, risk to overestimate the performance of the North because of its socio-economic wealth. If the Ministry of Education allocates funds proportionally without considering this, a cycle arises in which appealing universities are intrinsically able to attract better students, consequently better professors and researchers, improving their ratings and attracting even more very good students, so in-

creasing the gap with the "worst" universities (Giambona et al. 2017, Viesti 2018). Indeed, through the MIUR evaluations Ciriaci (2014) is able to conclude that Italian students are attracted by the high-quality universities, and if these are present in their residence region, students are less likely to move. Her conclusion is confirmed by Bratti and Verzillo (2019), denoting how a higher quality of research is significant in reducing the outgoing flows. Nevertheless, a consistent effect across studies emerges with regard to the negative effect of the geographical distance and tuition fees (Pigini and Staffolani 2016), and the negative correlation between the spatial distribution of university students and the chance of a specific region of maintaining its competitiveness (Bruno and Genovese 2012). Apparently, nothing suggests that students could be driven by the wish of easier degrees, but they seem to take their choices according with the chances to improve their own life conditions. Regarding this, Croce and Ghignoni (2011), confirm how the migration choice is taken in order to find the more suitable job, in line with the specific skills acquired. Anyway, in their estimations, a higher final mark is always significant in increasing the probability of employment and decreasing the chance of overeducation. Another finding by Croce and Ghignoni (2004) allows them to state that *"...educational level appear to be more important in deciding* to which workers *the firm has to offer an opportunity of training, whereas unemployment rate and wage compression affect the decision of* how many workers *making this offer"* (p.27). If this is true, and unemployment rate is able to affect the number of new employees, and if this evidence is taken on board by those students that have to decide if and where emigrate, than the idea reinforces that internal quality of a university for sure matters, but much less than the quality of the territory in which it is settled.

According to the different views exposed, in the next section a model will be presented, which tries to address the presence of grade policies together with the unemployment rates that students have to front. Consequently, students' choices will be analyzed with regard to these two aspects, stressing the idea that a soft grading policy, if used by degree course directorates in order to attract students, is a much less powerful tool than some streams of literature probably expected.

2.3   Data and Model

In this section Data and Model will be described in order to proceed to the estimation of the probability to choose migration for Italian students between 2009 and 2011.

2.3.1   Data

Thanks to the Italian University Student Register (ANS) provided by the Ministry of Education, University and Research (MIUR)[1] it is possible to analyze the records of

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[1]Database MOBYSU.IT [Mobilità degli Studi Universitari in Italia], research protocol MIUR - Universities of Cagliari, Palermo, Siena, Torino, Sassari, Firenze and Napoli Federico II, scientific reference

students' career between 2008 and 2014. Due to the necessity of analyzing some aggregate information through degree courses as a whole, in this analysis the sample is restricted to the period 2009-2011. In this way, it is possible to capture more or less all the students enrolled during a certain academic year in a given course. The analysis is also restricted to the public bachelor courses excluding the macro area of medical studies, which presents too many peculiarities, such as a national competitive exam in order to be admitted in. Moreover, it is also excluded the macro area of Architecture, because of some difficulties in distinguishing between the two different departments hosted by the University of Rome "La Sapienza". Thus, the remaining Areas are: Agricultural; Economics and Business; Pharmaceutical; Law; Engineering; Literature and Philosophy; Foreign Language and Literature; Veterinary; Psychology; Communication Science; Education Science; Mathematics, Physics and Nature; Sports Science; Political Science; Statistics; Sociology.

For each student several individual information are available which can affect the decision of applying for a university far away from her residence. In particular, it is possible to identify the Macro-Region of residence (North, Centre, or South and Islands), the gender, the type of high school attended, if it was a *Lyceum*, a technical or a professional school, and the High School Final Mark.

Moreover, thanks to the database available at the National Italian Institute of Statistics (ISTAT), the rates of unemployment for Italian regions were obtained in order to investigate if they were able to condition the students' mobility choices. In particular, for the analysis the rate of unemployment at regional level for people aging between 25 and 34 years old has been chosen. It seems reasonable in light to the fact that a plausible driver for students' mobility could be the possibility of finding a job in a short time after graduation.

Finally, for each degree course in Italy, the *Grade Ratio (GR)* is calculated as:

$$GR_{d|y} = \frac{\frac{1}{n_{d|y}} \sum_{i=1}^{n_{d|y}} \bar{v}_{i|d,y}}{\frac{1}{n_{c|y}} \sum_{i=1}^{n_{c|y}} \bar{v}_{i|c,y}} \geqslant 0, \qquad (2.1)$$

where, n represents the number of students, d represents each single course, c represents the degree class at which that course belongs to, y is the academic year, i is the single student and $\bar{v}$ is the average grade obtained. So, this Grade Ratio represents the average grade provided by a single course in a single year divided by the average grade provided in a single degree class in the same year. In other words, if $GR_{d|y} > 1$, it does mean that the department exhibits - in a certain measure - a softer grading policy than the average of the other courses belonging to the same degree class.

Another indicator for the "harshness" of a course was calculated, which was called

the *Dropout Ratio*, in order to represent the rate of retirements from a certain bachelor program. Of course, all those causes which are independent by the will of a student (such as death) are excluded.

$$DR_{d|y} = \frac{\frac{1}{n_{d|y}} \sum_{i=1}^{n_{d|y}} r_{i|d,y}}{\frac{1}{n_{c|y}} \sum_{i=1}^{n_{c|y}} r_{i|c,y}} \geqslant 0, \tag{2.2}$$

where *r* can be interpreted as a binary indicator which assumes value 1 if someone retired and 0 otherwise. If it is greater than 1, it does mean that the course presents a rate of retirements greater than the average experimented in its degree class in Italy.

As it is intuitive to understand how grades can be used as a proxy for courses' easiness, the fact that dropouts can explain harshness can be discussed more deeply. As highlited by Mossi et al. (2013), one of the duties of departments is to provide the highest standard of discipline, with only a small number of dropouts. This allows them to be framed into directorates' policies, namely a suitable covariate for our model.

As it may be noticed, the choice is taken to not adjust this two indicators for the geographical areas of the country. This comes for two reasons: *i)* this correction would make sense only believing that departments are actually adapting their grading policies strategically in order to attract students, but the only claim here is that departments could adopt this strategy if they would trust those streams of literature which take by given that students are attracted by "easy" university straightforwardly; *ii)* checking for the effect of regional macro-areas the results remain almost perfectly unchanged, with only small changes in the size of those coefficients highly correlated with the geographical Italian characteristics (i.e. unemployment rates). This, without any benefit for the model diagnostics.

Returning to the description of covariates, the distance between the residence and each possible destination of students is calculated through the Vincenty (1975) formula, starting from the geographical coordinates of the Italian cities.

Finally, other universities' characteristics are obtained from the CENSIS, an Italian Research Centre which every year publishes for one of the main Italian newspapers a guide for the choice of the University. This peculiarity makes those guides very suitable for an analysis about the drivers of the students' decision behavior. From this source several information are taken: the score obtained by each department, the students/professors ratio, the students/residents ratio, and the number of scholarships provided (even if this variable presents a large amount of missing values). Moreover, other information about the territorial conditions can be acquired. In particular, an indicator about the cost of life in each city hosting a university is obtained combining the average prices of coffee, bread, public transport and a "pizza and beer" dinner. As a further matter, the average rent for a room is considered as a proxy for the wealth and the appeal of the considered cities.

Summarizing, Grade and Droput Ratios are calculated at degree course level according to the MIUR codes; Unemployment Rate at the region of university level; Distance, Cost of Life, Rent and Student-Resident Ratio at the city level; CENSIS Score and Students-Professors Ratio at the Macroarea within university level, according to the CENSIS classification.

In the table below it is possible to control the correlation coefficients for the four main variables in examination: Grade Ratio (GR), Dropout Ratio (DR), Unemployment Rate (of the destination) (UU) and Distance (DIST). Indeed, keeping into consideration the remarkable gap between North and South in Italy, and the prior which states that grade inflation could be a tool for the poorest universities in order to attract a larger amount of students, a legitimate doubt could arise about a problem of correlation about GR and UU. As it can be seen, this correlation seems to be low enough and anyway always negative, suggesting that universities settled in the wealthiest locations are those exhibiting softer grading policies. Moreover, also the correlation between grades and rate of retirements appears very low, even though that they should show a strong negative correlation each other, if part of a precise strategy acted by the directorates.

	GR	DR	UU	DIST	GR	DR	UU	DIST
	Correlation Matrix							
	Overall				North			
GR	1.00				1.00			
DR	-0.1479	1.00			-0.1472	1.00		
UU	-0.1880	0.0538	1.00		-0.1926	0.0534	1.00	
DIST	0.0011	0.0207	0.0700	1.00	-0.1612	0.0553	0.8419	1.00
	Centre				South and Islands			
GR	1.00				1.00			
DR	-0.1415	1.00			-0.1522	1.00		
UU	-0.1859	0.0534	1.00		-0.1845	0.0544	1.00	
DIST	0.0463	0.0591	0.0597	1.00	0.1540	-0.0273	-0.7344	1.0000

Table 2.1 Correlation coefficients for Grade Ratio (GR), Dropout Ratio (DR), Rate of Unemployment for the regions of destination (UU) and Residence-University Distance (DIST).

A particular observation is deserved by the three subsets based on residence Macro-Areas. Coherently with the picture emerged from the literature, unemployment rates show a strong positive correlation for the Northern students, a strong negative correlation for the Southern students, and are basically uncorrelated for those coming from the Centre of Italy.

2.3.2 Model

The issue of understanding how students take the decision about where to go for their higher education studies presents several problems. Indeed, the choice behavior presents unobservable characteristics in individuals, but also patterns that can be deduced from the attributes of the alternatives themselves. In order to address this framework, McFadden et al. (1973) proposes the Multinomial Conditional Logit Model as a tool for analyzing a quantitative choice behavior. In this setting, the objects of choice and sets of alternatives available for every student are represented by each Italian University, conditional to the choice of a certain Macro-Area of study. Davies et al. (2001) highlights the main advantages to use this model for the case of locational choices by individuals. Besides the fact that it is possible to analyze a wide range of different alternatives, it is very important to point out the crucial role that Multinomial Conditional Logit allows to play for the distance between residence and destination. As it is easy to assume a deterring effect for distance, so it is impossible to include it in standard Logit models based on individual characteristics. In a nutshell, the reason lies in the fact that the distance depends not only by the location of a student, but also by the one of the univeristy itself. From this point of view, this variable incorporates a characteristic of the object of choice, and consequently it must be compared with the distance of the student from each possible alternative, as the Multinomial Conditional Logit allows for. Following Guimaraes et al. (2005) , let Z_{us} stands for the characteristics of the uth alternative for individual s. Denoting with α the vector of parameters, U will be the number of unordered alternative Universities where each student can choose to apply. Consequently, each alternative in each choice generates its own utility as:

$$U_{us} = Z_{us} + \epsilon_{us}. \tag{2.3}$$

So, with ϵ_{us} i.i.d., each student chooses the University which maximizes its utility with probability p_{us}:

$$p_{us} = \frac{exp(Z_{us})}{\sum_{u=1}^{U_s} exp(Z_{us})} = \frac{exp(\alpha'x_{us})}{\sum_{u=1}^{U_s} exp(\alpha'x_{us})}, \tag{2.4}$$

where, U_s represents the set of alternatives fronted by each student and x_{us} are the covariates. When these are restricted to the characteristics of individuals, the model collapses into a standard Multinomial Logit. Conversely, the variable $d_{us} = 1$ has to be defined if students s choices the University u (0 otherwise), in order to express the Likelihood Function as:

$$L_{CL} = \prod_{s=1}^{N} \prod_{u=1}^{U_s} p_{us}^{d_{us}}. \tag{2.5}$$

Thanks to this specification, it is possible to consider the situation in which, across individuals, the number of choices and relative characteristics differ. On the contrary, it could be necessary to implement a Grouped Conditional Logit Model.

Another way to model this kind of data could be through a Poisson model, which returns the same estimations in case as the present, in which locational determinants are purely location-specific (Guimaraes et al. 2004). Nonetheless, Schmidheiny and Brülhart (2011) highlights how the underlying economic implication is substantially different. Indeed, Multinomial Conditional Logit Model is more suitable to analyze the framework described by our data, representing zero-sum reallocations of students across universities. From this point of view, it seems realistic in this context the intrinsic assumption according to which location characteristic does not affect the total number of students who decide to apply for Higher Education, but only their own choice on where to apply.

The estimation strategy will proceed as follows: firstly, Grade and Dropout Ratios, Unemployment Rate of the (possible) destination and Distance between residence and destination will be inserted as covariates. Consequently, control variables will be added in order to check the robustness of the main covariates.

Then, for this basic model two extensions will be explored. In the first, the interaction terms between Grade and Dropout Ratios and Unemployment Rate. So, it is possible to control if grading policies are able to modify the choice of a student with regard to the occupational health of the places to where she moves. In the second, non-linear effects of Grade and Dropout Ratios are explored through a quadratic function for these two regressors. The intuition behind this specification lies in the fact that if it is true that a student could prefer to move towards the "easiest" universities, it is also true that very extreme values for Grade (Dropout) Ratio can bring to negative (positive) "reputation effects" for a degree course which presents them. Just because grading policies are assumed to work by mean of universities' reputation, in this analysis the two relative variables are associated to the observations for the subsequent academic year. Of course, a student who is thinking to apply in a certain university, cannot know in advance which level of grades and dropouts she will front during her first year of courses.

In order to make easier the interpretation of the results in the quadratic models, Williams (2012) will be followed for interpreting marginal effects. Through this technique it is possible to measure the effect on the conditional mean choice of a change in a specified regressor. This effect will be measured based on the mean value of the other covariates. This study presents also some limitations. First of all, such an analysis implies that the decision of students is taken in two steps: in the first students decide *what* to study, in the second they decide *where* to study it. Consequently, the estimation focuses on this second step. Besides the fact that it is possible that a student is undecided between

studying a certain subject in a certain university, or another subject in another university, in general this assumption could be acceptable enough. Another strong limitation is that, due to to large amount of alternatives, it is very hard to compute all the different dummies in order to include individual characteristics of decision makers (Guimaraes et al. 2005). Consequently, some of them will be explored subsetting the dataset basing on isolated socio-demographic characteristics such residence Macro-Region (North, Centre, or South and Islands), Gender, High School type and High School Final Mark. Moreover, the usage of administrative data prevents to investigate several important unobservable factors affecting the student decision making process, such as their desires and aspirations, their willingness to leave home, the feedback provided by their networks of relationships.

Finally, the large amount of students fronting so many alternatives generates a very inflated dataset. Indeed, the overall sample includes up to 513,624 freshmen over three years, which are multiplied for the number of alternative choices. Thus, the total number of observations amounts roughly to 14 millions. The consequence is that almost every coefficient is statistically significant and doubts arise about the relevance of *p-values* in this context (Kenett and Rubinstein 2017). Thus, thanks to the availability of the population according to considered cohort, it becomes generally sufficient to consider only the magnitude of estimates.

2.4 Estimations and Results

2.4.1 Model Selection

In Table 2.2 results are presented for the Conditional Multinomial Logit Model. In model I the four covariates of main interest for this analysis are included: Grade Ratio, which is our proxy of easiness, Dropout Ratio, our proxy of harshness, Unemployment Rate, the most representative variable with respect to the local conditions of the territories in which each university is settled, and finally the distance between the residence and the university, as the most representative proxy for the students' cost of moving.

The first noticeable thing is that Grade and Dropout ratios seem to have both the effect of attracting students. This evidence is contradictory, but at the same time it appears remarkable how the magnitude of the Grade Ratio's Odds Ratio is very small in comparison with the Dropout Ratio, which is much more higher. On the other side, Unemployment Rate significantly wards off students, and it will remain consistent for all the different specifications presented, as it will be showed. Consistently, the Distance between the residence of each student and the the city in which each University is located will present always a strong deterring effect across different specifications.

In model II, a set of control variables is added, two of them accounting for the territorial conditions and four more specific regarding university characteristics. Life Cost and

Rent are those in the first category. The cost of life - which combines the prices of beer and pizza dinner, bread, coffee and bus tickets - has a negative effect on those departments located in highly expensive cities, as expected. On the other side, the price of renting a room for a student in the city turns out to be an attractor. If this result could appear struggling, the explanation should be searched in the double information

Choice	Conditional Multinomial Logit				
	I	II	III	IV	V
Grade Ratio	1.0488	1.0237	1.0210	1.0231	1.0281
	(0.0020)	(0.0023)	(0.0023)	(0.0023)	(0.0023)
Grade Ratio^2				0.9688	
				(0.0016)	
Dropout Ratio	1.4036	1.3182	1.3171	1.3208	1.6894
	(0.0020)	(0.0022)	(0.0023)	(0.0022)	(0.0054)
Dropout Ratio^2					0.9237
					(0.0008)
Unemployment Rate	0.3470	0.3322	0.3318	0.3345	0.3249
	(0.0015)	(0.0018)	(0.0018)	(0.0018)	(0.0017)
Grade#Unemp.			0.9719		
			(0.0023)		
Dropout#Unemp.			0.9791		
			(0.0015)		
Distance	0.0300	0.0250	0.0250	0.0250	0.0249
	(0.0002)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Life Cost		0.8240	0.8191	0.8245	0.8235
		(0.0034)	(0.0033)	(0.0033)	(0.0033)
Rent		1.2277	1.2238	1.2260	1.1591
		(0.0027)	(0.0027)	(0.0027)	(0.0027)
CENSIS Score		1.1055	1.0950	1.1168	1.1313
		(0.0034)	(0.0034)	(0.0035)	(0.0035)
Stud./Prof.		1.2320	1.2205	1.2401	1.2114
		(0.0045)	(0.0045)	(0.0046)	(0.0046)
Stud./Res.		8.8623	8.5584	8.8489	8.2540
		(0.3411)	(0.3316)	(0.3409)	(0.3198)
Observations	13,996,943	11,217,261	11,217,261	11,217,261	11,217,261
Log-Likelihood	-816755.69	-670750.34	-670602.63	-670557.76	-666480.54
LR(chi2)	1249836.61	1180729.04	1181024.45	1181114.19	1189268.63
Prob > chi2	0.0000	0.0000	0.0000	0.0000	0.0000
Pseudo R^2	0.4335	0.4681	0.4682	0.4683	0.4715

N.B. Unless otherwise specified, each Odd Ratio is statistically significant at 1% level.

$^-$ = Odd Ratio statistically not significant.

Standard Deviations between brackets. All variables are standardized.

Table 2.2 Model Specifications for the Multinomial Conditional Logit Model.

obtainable from this indicator. Indeed, if it is undesirable to pay a rent too high, at the same time exhibiting high rents for a city in this case could be the symptom of being in a rich place both in terms of wealth and opportunities. In this framework, students and their families seem to be willing of big sacrifices when they have to choose how much to invest in their own future.

Regarding the score provided yearly by Censis to the universities, it has a very small power in driving the students' choices, as expected, but still it seems that departments could benefit from it. Finally, the ratio between students and residents in each city it is strongly able to attract students, consistently with the idea that they well-evaluate cities with a large population of their own peers.

Less understandable is to observe the same significant effect for the ratio between students and professors in each university. The same struggling result is reported by Bratti and Verzillo (2019) who explain it guessing that *"[...] these indicators of overcrowding are seizing the level of popularity' (trendiness) of certain courses, so a positive rather than a negative feature of universities (i.e. high demand)"* (p. 15). Complementarly, this result could be mainly driven by the denominator of this ratio, revealing the attractiveness of attending courses with a larger number of students, even independently from their educational offer.
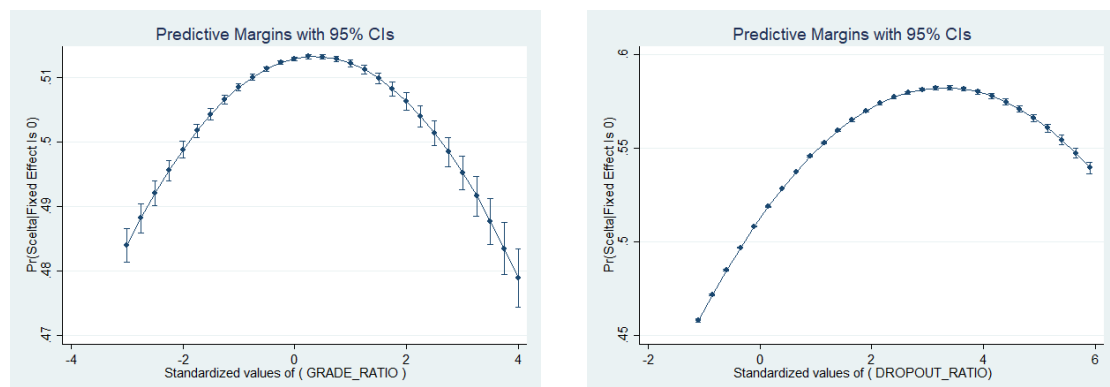
Fig. 2.1 Marginal effects for the quadratic estimates of Grade (left side) and Dropout (right side) Ratios.

In order to exploit the role of grading policies in students' decisions for which university to attend, interaction terms with the Unemployment Rate are added with regard to Grade and Dropout Ratio (Table 2.2). In model III it is showed how the two interactions with the rate of unemployment maintain the effect of pushing out students. But, as in the case of Dropout Ratio a high unemployment rate seems to be able only to mitigate the attractivity of the first covariate, in the case of the Grade Ratio the positive effect of a soft grading policy is completely reverted by the local conditions of the city hosting a certain department. In other terms, a university settled in a poor region which boosts too much its grades is penalized by students, but also a department located in a wealthy region is, even if less.

Remaining on Table 2.2, in the models IV and V quadratic terms are added for Grade and Dropout Ratios, respectively. As better clarified in Figure 2.1, representing margins, both Grade and Dropout Ratios exhibits a significant non-linearity. Concerning the Grade Ratio, both too high and too low values present marginal effects much lower than those exhibited for ranges in the middle. On the other side, the function plotted for the Dropout Ratio is much more increasing, and the predicted probability for the highest extreme value of this variable is much higher than the one predicted for the lower extreme. This suggests that students could positively reward a fair grading policy and, at the same time, also a harsh degree path. This could be the effect of an attempt to receive the better education as possible, obtaining a degree able to provide a good signal on the job market, after the graduation. In the next subsections, these results, obtained for the overall sample, will be checked controlling their robustness on different sub-samples based on socio-demographic characteristics.

2.4.2 Differences by Residence Macro-Regions

| | Conditional Multinomial Logit | | |
| | VI | | |
Choice	North	Centre	South and Islands
Grade Ratio	0.7319	0.9765	1.2172
	(0.0095)	(0.0052)	(0.0057)
Dropout Ratio	1.8814	1.3286	1.6380
	(0.0141)	(0.0069)	(0.0054)
Unemployment Rate	2.4679	0.2767	0.4495
	(0.0404)	(0.0040)	(0.0029)
Grade#Unemp.	0.6264	1.2284	0.8247
	(0.0088)	(0.0114)	(0.0036)
Dropout#Unemp.	1.5026	0.8844	0.8650
	(0.0113)	(0.0058)	(0.0024)
Distance	0.0015	0.0040	0.0706
	(0.0000)	(0.000)	(0.0005)
Controls	Yes	Yes	Yes
Observations	4,523,683	2,258,285	4,435,293
Log-Likelihood	-200073.38	-111619.69	-301826.9
LR(chi2)	622787.95	286811.32	385590.51
Prob > chi2	0.0000	0.0000	0.0000
Pseudo R^2	0.6088	0.5623	0.3898

N.B. Unless otherwise specified, each Odd Ratio is statistically significant at 1% level.
$^-$ = Odd Ratio statistically not significant.
Standard Deviations between brackets. All variables are standardized.

Table 2.3 Multinomial Conditional Logit Model: North, Centre, and South and Islands.

Table 2.3 presents results for the specification with the interaction terms, dividing the overall sample by the three macro-regions in which students can be resident: North, Centre and South and Islands. Some differences emerge to be highlighted. As it is shown, only the subset "South and Islands" is consistent with model III. On the other side, for Northern students the interaction term between Dropout Ratio and Unemployment Rate is greater than 1, as the interaction term between Grade Ratio and Unemployment Rate for Central students. Moreover, the Unemployment Rate seems to have a calling effect for Northern Students. This significance probably reflects both the peculiar condition of the Northern Italy, which is the wealthier macro-region, and the consequences of such an inflated dataset. As showed, Northern subset exhibits also the highest Pseudo R^2, almost double with regard to the Southern one. The most conservative explanation for this result could be that Unemployment Rate is not so important in driving the Northern students' choice, which is much more straightforward than the one of their Southern peers. Moreover, Southern students are the less repelled by the distance from their residence and the University. This result confirms the idea that for them moving far away for attending a degree course it is almost the only option, making much more important to evaluate carefully all the implications of the final choice, even the beneficial presence of a soft grading policy. On the other side, comparing Northern and Central students, they both penalize universities with soft grading, but the first also in the interaction effect, in contrast to the latter.
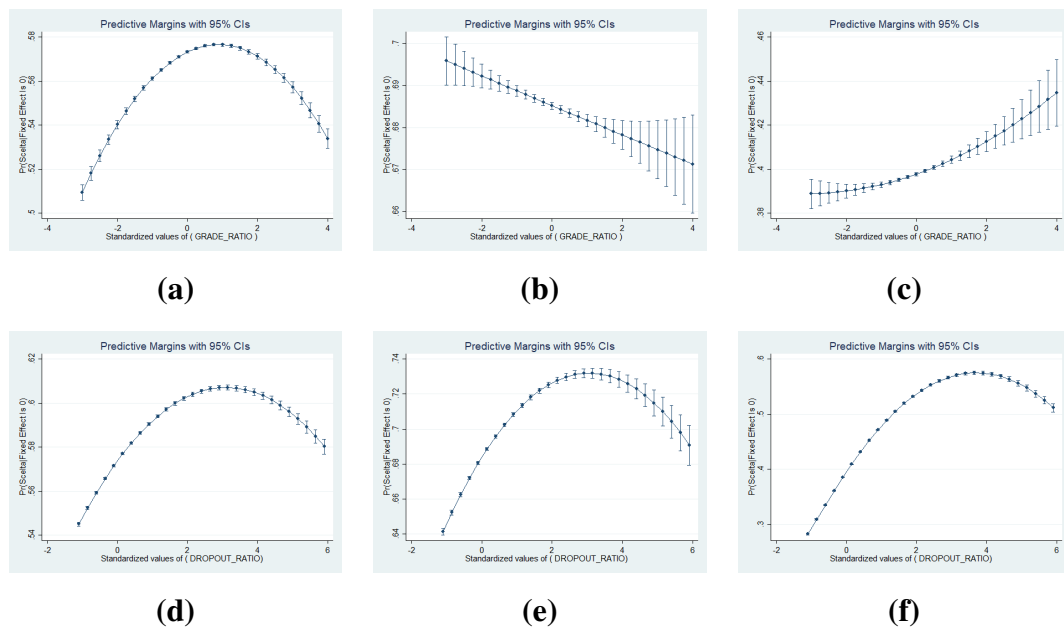
Fig. 2.2 Marginal effects for the quadratic estimates **(a)** GR - North **(b)** GR - Centre **(c)** GR - South and Islands **(d)** DR - North **(e)** DR - Centre **(f)** DR - South and Islands

In other words, Northern students move for shorter distances, paying less attention to the territorial conditions in which the university is settled and more attention to the

grading policies.

The opposite evidence arises regarding Southern students. Nonetheless, the most impressive result materializes looking at Figure 2.2, in which the marginal effects for the quadratic estimations of Grade and Dropout Ratios are plotted.

In the case of students from the centre of Italy (**b**), the quadratic component is not significant and the effect is linearly decreasing. In the case of southerners (**c**), the quadratic component is significant only at 10% level, and it is positive as in the linear coefficient, resulting in a slightly exponential increasing function. Analyzing these results jointly, it comes up that Southern students are those exposed to the hardest choices, careful to move toward wealthier locality and penalizing less the most far universities. At the same time, they also better reward universities which adopt softer grading policies.

2.4.3   Differences by Gender

	Conditional Multinomial Logit	
	VII	
Choice	Female	Male
Grade Ratio	1.0031^{-}	1.0371
	(0.0030)	(0.0035)
Dropout Ratio	1.2709	1.3593
	(0.0030)	(0.0032)
Unemployment Rate	0.3353	0.3263
	(0.0025)	(0.0025)
Grade#Unemp.	0.9830	0.9589
	(0.0032)	(0.0033)
Dropout#Unemp.	0.9890	0.9751
	(0.0021)	(0.0021)
Distance	0.0226	0.0277
	(0.0032)	(0.0002)
Controls	Yes	Yes
Observations	5,731,143	5,486,118
Log-Likelihood	-339063	-330868.49
LR(chi2)	628525.24	553840.67
Prob > chi2	0.0000	0.0000
Pseudo R^2	0.4810	0.4556

N.B. Unless otherwise specified, each Odd Ratio
is statistically significant at 1% level.
$^{-}$ = Odd Ratio statistically not significant.
Standard Deviations between brackets.
All variables are standardized.

Table 2.4 Multinomial Conditional Logit Model: Males and Females.

Looking at the results of the models VII (Table 2.4), almost any differences emerge about the decision behavior of females and males regarding which university to attend. The only apparent distinction is that males seem to be slightly more sensitive to soft grading policies. Indeed, the Grade Ratio is even not significant for women, who appear also to be very discouraged in attending universities exhibiting easier grading policies and settled in cities with high unemployment rates. Anyway, no substantial gender differences emerge from this analysis, in general.
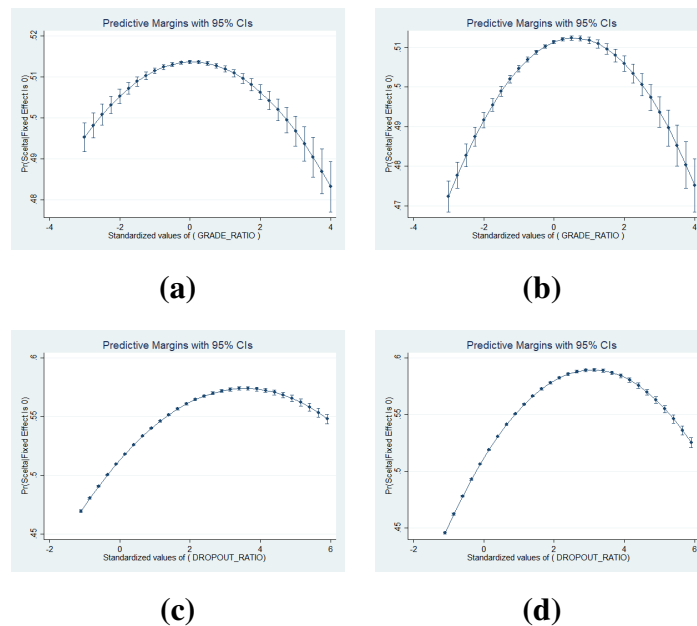
Fig. 2.3 Marginal effects for the quadratic estimates **(a)** GR - Male **(b)** GR - Female **(c)** DR - Male **(d)** DR - Female

2.4.4 Differences by Secondary Education Degree

In this section students are divided among those who attended a *Lyceum* as a Secondary Education School, who attended a *Technical* School, and who attended a *Professional* School. Looking at model VIII, also in this case a contrasting evidence emerges regarding Grade and Dropout Ratio. Indeed, if students from *Lyceum* evaluates well a soft grading policy, Technical and Professional scholars are repelled by it. On the contrary, Dropout Ratio is always rewarded by students' choices. On the other side, the two interaction terms always exhibit Odds Ratios lower than 1, confirming the idea that the territorial conditions in which a university is settled strongly influence the attractiveness generated by departments' policies.

Consistent results are those obtained from Figure 2.4, which shows clearly how the predicted marginal effect for the lower Grade Ratios are much higher in the case of Professional and Technical Schools than in the *Lyceum* case. Nevertheless, the marginal effects predicted for the highest Grade Ratio, and the level at which this tendency is

maximized, are at the end pretty much equal.

Quadratic estimations for the Dropout Ratios (**2.4(d)**, **2.4(e)**, **2.4(f)**) point in the same direction. Indeed, estimating this specification emerged how the Grade Ratio seems to have little importance, even negative in the case of Technical Schools, and not significant in the case of Professional Schools. On the other side, predictions at margins are lower for lower levels of the Dropout Ratio, and higher as they increase. It is noticeable as, also in this case, students with so different backgrounds seem to be so attracted by harsher universities.

	Conditional Multinomial Logit		
	VIII		
	Lyceum	Technical	Professional
Grade Ratio	1.0574	0.9597	0.9744
	(0.0029)	(0.0045)	(0.0084)
Dropout Ratio	1.3386	1.2840	1.1852
	(0.0026)	(0.0046)	(0.0082)
Unemployment Rate	0.3367	0.3265	0.3297
	(0.0022)	(0.0036)	(0.0067)
Grade#Unemp.	0.9778	0.9652	0.9159
	(0.0017)	(0.0046)	(0.0079)
Dropout#Unemp.	0.9772	0.9874	0.9669
	(0.0017)	(0.0032)	(0.0059)
Distance	0.0279	0.0187	0.0181
	(0.0002)	(0.0002)	(0.0004)
Controls	Yes	Yes	Yes
Observations	7,546,579	2,733,180	800,612
Log-Likelihood	-453172.22	-157860.13	-48074.405
LR(chi2)	786698	290821.29	96988.00
Prob > chi2	0.0000	0.0000	0.0000
Pseudo R^2	0.4647	0.4795	0.5022

N.B. Unless otherwise specified, each Odd Ratio is statistically significant at 1% level.

$^-$ = Odd Ratio statistically not significant.

Standard Deviations between brackets. All variables are standardized.

Table 2.5 Multinomial Conditional Logit Model: Lyceum, Technical, and Professional Schools.

2.4.5 Differences by High School Final Marks

Finally, some considerations about the final mark obtained at the end of the High School by students. For the sake of simplicity, the overall data are subsetted dividing the sample according to the most realistic psychological thresholds conceivable : from 60 to 79; from 80 to 89; from 90 to 100 with Honor.

Looking at model IX, students with the lowest evaluations does not seem to be affected by soft grading policies, contrarily with the expectations. On the other side, students with highest evaluations are attracted by higher Grade Ratios. The effect of the Dropout Ratio is consistent with the evidence examined above for all the three categories. In a nutshell, for each subset a soft grading policy has at least a null effect on a same level of unemployment rate.

This evidences are substantially confirmed by the quadratic estimates in Figure 2.5. Indeed, if the effect of the Dropout Ratio is pretty much the same across those subsets, the effect of the Grade Ratio appears to be more negative in the case of poorly-evaluated students, than in the case of their high-graded colleagues.
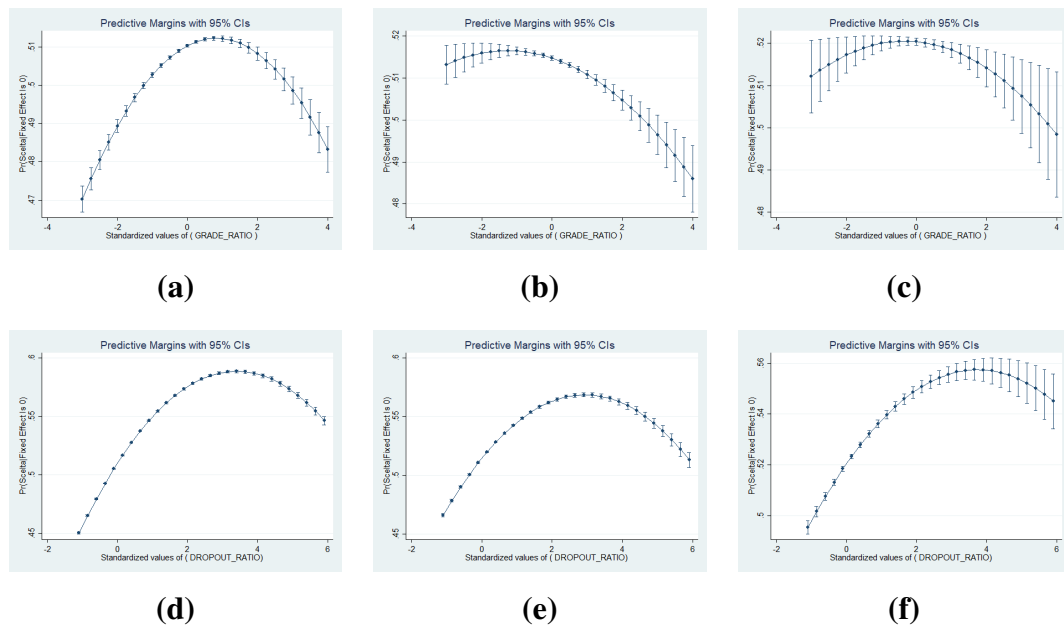
Fig. 2.4 Marginal effects for the quadratic estimates **(a)** GR - Lyceum **(b)** GR - Technical **(c)** GR - Professional **(d)** DR - Lyceum **(e)** DR - Technical **(f)** DR - Professional

2.5 Conclusions

At the very end, the main aim of this work was just to try to restore the reputation of young Italian students. In spite of those who want to depict this particular class of population as composed mainly by people who are in search for the easiest road, the estimation tells a different story. If really departments' directorates want to soften their grading policies in order to attract students, they are choosing a weak strategy.

Anyway, this analysis is not able to infer about a conscious recourse to this tool, even if it is a good point to be investigated. At the moment, it seems only possible to say that, if grading has any effect in attracting students, this is generally negative. Indeed, the results describe a very different picture than the one expected. Italian students are willing to make very difficult choices. Besides individual enterprise and craving

for adventures, it is never easy to leave their homes, starting over with new friends, new relationships and new habits. In most cases, students move from very little and peripheral towns towards the biggest cities in the country, so perceiving the transfer as even more upsetting. Nevertheless, they leave for a very long distance mainly because they feel to have to do it. In a country such as Italy, which sometimes appears to be divided in two parts with a huge social and economic gap, emigration becomes the best option in order to improve their life condition, and to find a job in line with the acquired skills. Moreover, a prior which states that a university can attract more students by means of grades it is not harmless. Indeed, it damages at the same time the reputation of students and of the Higher Education System as a whole, which is maybe worse. It is very sad and dangerous to think that our universities could be institutions ready for anything in order to increase their revenue, even if this turns out to impoverish the competencies provided and their reputation itself.

| | Conditional Multinomial Logit | | |
| | IX | | |
	[60,80]	(80,90]	(90,Honor]
Grade Ratio	0.9951^-	1.0289	1.0872
	(0.0031)	(0.0048)	(0.0053)
Dropout Ratio	1.2753	1.3290	1.3990
	(0.0030)	(0.0044)	(0.0047)
Unemployment Rate	0.3274	0.3424	0.3411
	(0.0030)	(0.0037)	(0.0037)
Grade#Unemp.	0.9777	0.9733	0.9506
	(0.0032)	(0.0047)	(0.0049)
Dropout#Unemp.	0.9766	0.9755	0.9877
	(0.0021)	(0.0030)	(0.0030)
Distance	0.0204	0.0248	0.0389
	(0.0002)	(0.0003)	(0.0004)
Controls	Yes	Yes	Yes
Observations	6,175,403	2,682,634	2,359,224
Log-Likelihood	-359250.98	-159116.76	-149975.52
LR(chi2)	687195.35	280480.80	217867.05
Prob > chi2	0.0000	0.0000	0.0000
Pseudo R^2	0.4889	0.4685	0.4207

N.B. Unless otherwise specified, each Odd Ratio is statistically significant at 1% level.
$^-$ = Odd Ratio statistically not significant.
Standard Deviations between brackets. All variables are standardized.

Table 2.6 Multinomial Conditional Logit Model: Range of High School final marks ([60,80], (80,90], and (90,Honor]).

Nevertheless, it is also undeniable that increasing grades appear in the Italian Higher Education System such as all over the world, as showed by a rich stream of literature. But the main finding of this paper is that it is a situation that does not pay at any level. Indeed, if always more scholars are devoting their studies to the phenomenons of overeducation and job mismatching, it can be also attribute to the perverse effects of grade inflation. A defective competition among students push them in trying to get always higher marks, which should have the role to improve the individual signal on the job market. But, greater the resulting grade compression, weaker the signaling effect provided by each degree, higher the possibility of mismatching between the job position obtained and the skills acquired during studies. And to make matters worse, the issue can be addressed also with regard to Social Inequalities. Indeed, it is reasonable to expect that this competition among students would advantage the richest, as their higher income permits them to spend more time in the university system, paying a higher amount of fees, in order to force grade compression. Some hints about this hypothesis are obtainable by the presented results. It is remarkable how students from Professional and Technical High School, and those with low final marks, are the more deterred by soft grading policies, as they should improve the poor signal that their credentials have acquired until that moment. As it was showed, in general Dropout Ratio presented a much bigger attractive power than the Grade Ratio, highlighting anyway a general will of obtaining the best education as possible without shortcuts.

Finally, from this work is also possible to derive suggestions for the policy makers. In the situation which has been described, the system of funding allocation which rewards
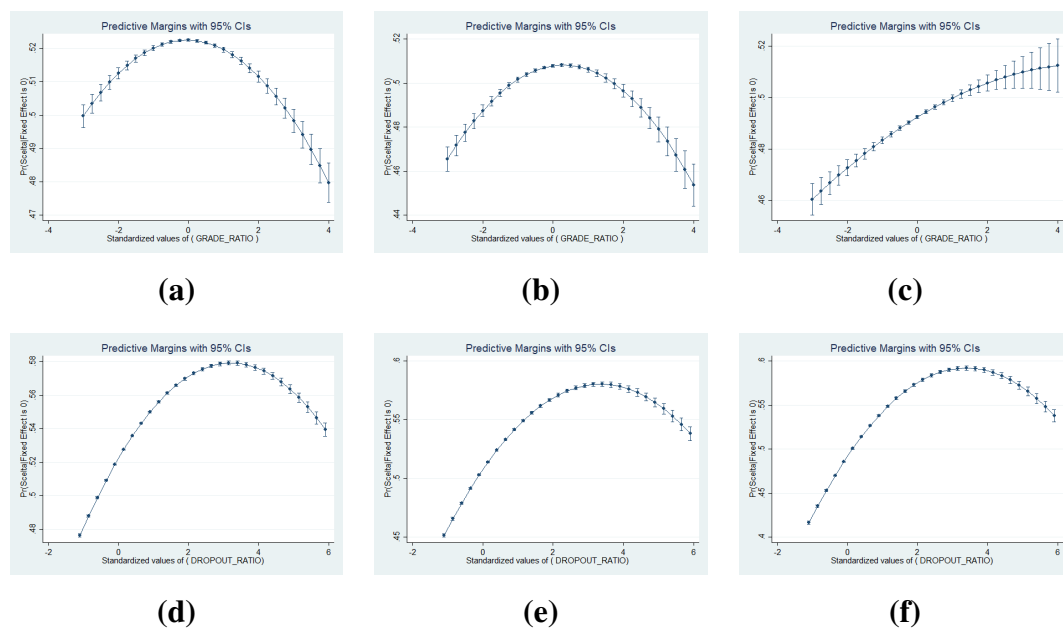
Fig. 2.5 Marginal effects for the quadratic estimates **(a)** GR - [60,80] **(b)** GR - (80,90] **(c)** GR - (90,Honor] **(d)** DR - [60,80] **(e)** DR - (80,90] **(f)** DR - (90,Honor]

universities with higher ranking positions, and penalizes those with lower ones, results in an engine to increase the North-South gap in Italy. What is more, this study shows how, in order to reduce this gap, it would be necessary a much more wide perspective, which has to be able to address the fact that reforming universities is not enough. It is necessary to work on the territory, improving the interconnections between the Higher Education System and its business fabric. If a region is not appealing in its employment sector, neither its universities are.

CHAPTER 3

Movers and Stayers in STEM enrolment: who performs better?

Recently, mobility behavior of Italian university student has feed an increasing interest both on the part of scientists and politicians. Actually, the very particular geographical characteristics of the country, jointly with the recognized persistence of a huge economic gap between the Southern and Northern regions, push a large amount of students in moving from the first macro-region toward the latter. As this phenomenon generates several economic and social implications for the policy-makers – at both the central and local levels – so it originates theories but also prejudices, at the edge of the myth. The present article will focus on the differences in the performance of those students who decide to move from the South to the North, against those who decide to stay close to their hometowns. From this perspective, it is possible to argue that "movers" should perform better than "stayers" because they represent the people with the greatest spirit of initiative and enterprise. On the other side, "stayers" should perform better because they have less "settling costs" to bear, and less pressure for reaching the degree quickly as possible, so minimizing the investment in Higher Education. In order to analyze this issue, we conduct multilevel modeling techniques, using administrative microdata from the Italian Ministry of Education, University and Research (MIUR) referring to 8 cohorts, from a.y. 2008/2009 to a.y. 2015/16, of enrolled students in STEM fields after earning their High School Diploma in the south of Italy.

keywords: inter-regional student mobility, STEM, performance, multilevel modelling.

3.1   Introduction

The issue of internal mobility within countries is acquiring a growing interest among scholars. The main reason lies in the worsened conditions of European young adults after the financial crisis (and the consequent Austerity measures), which decreased their chances of finding a suitable job without any improvement in the welfare assistance, forcing them in reliying mainly on their own families' support (Berrington et al. 2017). In this context, the transition to adulthood is widely explored in order to measure

which (and how many) events can affect the young adults life path (Billari et al. 2019, Kulu et al. 2018). Thus, one of the main events that are considered for investigating this transition is the internal mobility of young people. From this point of view, internal mobility is commonly analyzed looking at several factors, such as cultural and socio-economic background (Schwanitz et al. 2017), familiar ties (Ermisch and Mulder 2019), and the actual economic context (Lundholm et al. 2004, Lundholm 2007). Less importance is given at the direction of the migration flows, unless they are observed at international level (Bailey and Mulder 2017) or exploring the relationship between rural and industrialized areas, in those countries where this kind of difference is particularly strong (Todaro 1980).

Nonetheless, the present article will focus on a different kind of internal mobility, less explored in international literature because strongly related with Italian peculiarities. Actually, some evidences from other countries are available, pointing out the importance of the differences in geographical characteristics within a certain country in pushing students toward a particular region. Mobility emerges as strongly related with a lower inequality, a tool in order to anticipate the presence of a student in a better job market in the attempt of improving her social position in the long run (Wells et al. 2018, Mazawi 1995). Regarding Italy, this paper explores the choice of those students newly-graduated at the high school, who have to decide if apply for a northerner or southerner university. The issue is relevant especially regarding the migration of Southerners. Indeed, after the Second World War, the population in the South of Italy increased more the 15%, but the lacking in the growth of the economic system in that area prevented the workforce to be absorbed, fostering the emigration through the North. Nowadays , the decision to move is anticipated at the moment of applying for the Higher Education studies by students (Cersosimo et al. 2016*b*). Since the importance of highly-qualified human capital pushes students in moving towards those economies which are richer and at a higher innovation rate, the probability that a top-performing student from the South would move in a Northern region increases constantly year-by-year, impoverishing even more the southern Italy (D'Agostino et al. 2019).

From this point of view, this article will try to investigate if there is any difference among the performance of those Italian students who decide to move from their hometown for their higher studies and those who decide to remain. Some evidences about this issue are already provided by Boscaino et al. (2018) and Ordine and Rose (2007). In both cases it is supported the idea that the movers should be those who experiment the better performance during their Higher Education studies, due to the fact that they should represent the part of the population with the greatest spirit of

initiative and enterprise, highly-motivated in moving toward the richest and most advanced areas of the country where they can fulfil their potential. This prior is also perfectly coherent with Ordine and Rose (2008), who claim: *"in the presence of asymmetric information on workers' ability and asymmetric costs of moving, the only perfect Bayesian equilibrium (PBE) consistent with forward induction involves that only high ability workers acquire education and the quality of education is lower in macroareas where the mobility costs are higher. [...] education works both as a signalling device for individuals' ability and as an instrument that raises individuals' human capital."*

On the other side, a completely different story could be argued. Indeed, it is also possible to think the stayers as those students who can experiment less pressure during their studies. Namely, they have less "settling costs" to be born from an economic (e.g. no expenses for board and lodging), psychological (e.g. no need to familiarize with the new place and a completely different lifestyle), and social (e.g. less necessity of finding new friends) point of view. Some support to such a prior is provided from a quite different stream of literature about the so-called *transfer shock*. In his seminal paper, Hills (1965) highlights how the transition between two different institution at the Higher Education level can cause a significant difference in the performance of native and non-native students. In particular, movers seem to suffer a decrease in their own performance immediately after the transition, then gradually recovering the original achievement.

The article is structured according to the following outline. In the second section, the Italian framework will be depicted on the basis of both the Higher Education system and "moving and staying" students perspective. In the third section, literature about academic performance of university students will be explored in order to get hints about the determinants which can foster or depress it, with a focus on the "transfer shock" evidences. In the fourth section, data and methodology will be presented. As it will be shown, thanks to the the Italian University Student Register (ANS) students enrolled at the first year of their university career will be analyzed. The analysis is restricted to the STEM area - considered particularly important for development, productivity and growth - making possible to argue that losing workforce in those fields would turn out to be a double-penalty for a region (De Philippis 2017, Rothwell 2013). Consequently, a multilevel analysis will be presented, taking into account the effect of both courses and cohorts at the enrollment. Finally, in the fifth section results will be observed, showing how during the first year of enrollment movers seem to suffer a drop in their performance, comparing with their stayers colleagues.

3.2 The Italian Framework

According to Graziosi (2010), during the last decades, Italy suffered for the transition from a small and élitarian group of universities to a big and universal Higher Education system. It is sufficient to consider that in 1870 Italy hosted only 23 universities, while nowadays they are 91 among public, private and telematic institutions. Nonetheless, a poor positive effect emerged to the increase in the number of courses, teachers and students for the system as a whole. The attractiveness of universities became much more related with the economic conditions of the territories in which they were settled, and the newly-graduates decision making process was strongly reshaped consequently. In addition, the allocation funding process of the Italian Higher Education system was strongly heightened by the financial crisis and the consequent *austerity* measures. This section will try to link the crisis of the university system in Italy with the major issues related with the internal mobility of students within the country.

3.2.1 The crisis of the Italian Higher Education System

During the twentieth century the number of student enrolled in an Italian university increased from 27,000 to 1,800,000 units. Then, accomplice the confluence of the financial crisis, the number dramatically dropped up to 1,600,000 units up to 2015-2016. This situation is driven from the poor expenditures of the Italian governments for Higher Education, sensibly below the OCSE average, and from the loss of trust about the fact that education is still able to foster social mobility by the students and their families. As inequality of opportunity in attending university increases, then the Italian Higher Education system once again becomes slowly more classist (Capano et al. 2017). In this framework, a new commonly-shared storytelling about the Italian system arises, which highlights how Italian universities are poorly-rewarded by international rankings, their teachers are lazy and outdated and on top of that, their students are too many, listless and without any motivations in moving toward better places than their own hometowns (Viesti 2018). This commonplaces still influence the numerous reform policies trying to channel for funds only toward the institutions with the higher reputation, but at the same time they are based on a myopic view, which results to be poorly-matched with the available data. Thus, from 2004 and 2015 the number of students enrolled is reduced up to the 20%, the number of professors up to the 17%, the number of other employees and the one of degree courses up to the 18%, and the funds allocated from the government up to the 22,5%. Nowadays, Italy is at the bottom of the list of European countries for number of graduates, and to make matters worse its Higher Education system reflects the picture of a socio-economic framework split in two parts: Centre-South and Islands lose their high school graduates - namely, their future specialized workforce - who move toward the North, which absorbs human

capital and financial resources, not anymore devoted to a very specific macroarea of the country (Viesti 2016).

But, how can this picture be realistic, if students are considered lazy and unavailable for leaving their hometowns? According to D'Antone and Miotti (2016), after the Second World War, the South of Italy experiments a constant increase in its population, which is not combined with an economic growth sufficient to absorb the new workforces. This situation drove a strong increase in migration flows through the North of the country, that nowadays regards especially graduates who often anticipate the decision of reaching the most flourishing areas at the moment of enrolling the university. Thus, the Italian peculiarity emerges as the unidirectional migration flow of student from the South to the North, that fostered the impoverishment of the South also from the point of view of highly-specialized human capital. In this framework, the fall in the number of students enrolled affects mainly the southern universities and the humanistic courses in general, with a strong switch of applicants' decisions toward the STEM area. Moreover, the share of students from *Lyceums* enrolled grows against the one of those from technical and vocational schools: a tendency strongly correlated with the decrease in the number of low-income freshmen, those mostly afflicted by the economic crisis in Europe, consequently in the greatest difficulties in affording the costs related to the migration (Cersosimo et al. 2016*a*). Last but not least, the educational offer in the South results to be the most contracted, in a landscape where universities base a great part of their attractiveness on the relationships that they are able to establish with their own territories and with the external demand they are able to front, two factors alredy very impoverished in the southern area of the country (Petrosino and Schingaro 2016).

3.2.2 The internal mobility of Italian students

As already stated, it is not possible to highlight the characteristics of the Italian students' mobility without relying to the fact that the migration flows are shaped by a unique direction (from the South to the North), with very little chances of coming back, enriching the specialized workforces of the areas of origin. Regardless of the (almost univoque) direction of the flow, the distance of the movement can be shorter or longer depending on the economic characteristics of the territories, and from the offer of the universities in terms both of education, services, and facilities. As pointed out by Cersosimo et al. (2016*b*), the decision of being a stayer is surely related with the individual convenience in remaining in a certain *comfort zone*, but it is stimulated by the possibility of finding an educational offer which suits the proper needs. Apparently, only a small part of the stayers take this decision because they feel they do not have any other choice. Nonetheless, the survey conducted by Fondazione RUI (2015) on the Italian students between 2012 and 2015 seems to point in a slightly different direction.

Movers are mainly from South and Islands and the share of those who apply for STEM courses is generally higher than the one of the stayers for the same educational area. Movers' revenues amounts in average to 631€per month, of which the 73% is provided by their own families, the 22% by the choice of working during the studies, and only the 5% from the public welfare. At the same time, they spend in average each month 740€, and their average revenues cannot even cover the (average) costs of board and lodging, fees, transports and educational material. The 33% of movers in Italy seems to be in economic difficulties, especially those who come from families with low socio-economic backgrounds, spending less in absolute terms but relatively much more of their incomes for the basic expenditures such as board and lodging.

Despite these indisputable challenges in undertaking the decision of moving for the Higher Education studies, the hypothesis still exists that the choice of the university can be driven by the will of obtaining the degree in the easiest way as possible. Bagues et al. (2008) and De Paola (2008) investigate the (useless) attempt of attracting students softening the grading policies by those university which are settled in the poorest region and are consequently suffering for a low demand of enrolling students. Lombardi and Ghellini (2019) find very little evidences about the fact that students could really base their choice on such factors, attributing much more importance to the territorial conditions of the territories of destination. This idea is also supported by international studies on internal mobility of students (Prakhov and Bocharova 2016, Lörz et al. 2016). Actually, internal student mobility in Italy seems to reflect a well-recognized global tendency. According to Kim (2017), the academic capitalism intersects the old hierarchies among local areas (in terms of economic growth or labor market conditions) with the new academic stratification (i.e. the reputation of universities).

Indeed, what several studies show is that the Italian student population is highly selective regarding the educational offer of the university where to apply (Cattaneo et al. 2018), and to the conditions of the job market they are trying to anticipate. The combination of the presence of high-quality universities and healthy job markets - jointly able to guarantee the best chances of social mobility to the future graduates - are the very trump card for the North of Italy (Enea 2018, Bratti and Verzillo 2019, D'Agostino et al. 2019, Ciriaci 2014). At the same time it is important to notice once again how the presence of "better" universities in the northern regions is driven by a system of funding allocations which exacerbates the division among the two main macroareas of the country and the consequent unidirectional migration flows (Viesti 2018, Cattaneo, Malighetti, Meoli and Paleari 2017). Finally, to make things worse, the transition through the financial crisis not only caused a general reduction in funding allocation, but also conditioned the students' decision making process, reshaping the social norms

according to which they used to identify the institution where to apply (Cattaneo, Horta, Malighetti, Meoli and Paleari 2017).

3.3 Academic Performance of freshmen students: characteristics and shortcomings

The present section will provide some evidences on what it is known about those factors affecting academic performance of students, trying as much as possible to rely on the differences between stayers and movers. The objective is twofold: on the one side it is necessary to understand what are the characteristics of those who decide to move in terms of performance; on the other side, it is necessary to investigate if the decision of moving is able to affect the individual performance itself.

3.3.1 The determinants of academic performance

Several studies are available in order to highlight the driving factors of the student performance in Higher Education. These are often conducted through multilevel analysis, generally considering at least the individual level, incorporating the subjective characteristics such as ability and motivation and usually explaining the greatest part of the variance, and the course level, considering the peculiarities of groups of individual enrolled in the same field at the same institution and typically able to explain much less variations (Van den Berg and Hofman 2005, Tesfaw and Derebew 2014). Nonetheless, Beekhoven et al. (2003) highlight some courses' characteristics that can increase performance. In particular, the most effective courses are those with a high percentage of women - well recognized as better performing at university - and which require a greater number of work hours per week. A link similar to the latter is also addressed for the Italian case by Bratti and Staffolani (2013). Beyond individual attitudes, other factors generally found important are the socio-economic and familiar background, the secondary education institution attended, notwithstanding that these effects cause differences much more evident in low-performing students (Hijaz and Naqvi 2006, Mwandigha et al. 2018, Birch and Miller 2006). This last *caveat* is better clarified by Win and Miller (2005), pointing out is undeniable the role of schools in stimulating the academic performance well beyond individual characteristics. At the same time, a good university can generate the "immersion effect" and the "reinforcement effect", so that students in high achieving school environments perform better.

Some contributions about academic performance are also available specifically about the science, technology, engineering and mathematics (STEM) area. As an example, Crisp et al. (2009) evidence how, despite to the fact that these fields are acquiring constantly a greater importance in those public programs stimulating higher education attendance, it seems still to be present a difficulty in pursuing successfully a STEM de-

gree by some categories of people, such as women or ethnic minorities. Public support seems to not play any role in mitigating this evidence, while the presence of a strong cultural capital (e.g. parental education) seems to be much more effective. Despite to the fact that the scientific literature reviewed above expects in general better performances for women, also Soler et al. (2019) finds lower performance for this category in STEM area, even worsened at the Higher Education level with regard to the high school.

Before to explore some findings about the performance of freshmen at university, it seems important to clarify some concepts about the measurement of performance, according with Adelfio et al. (2014). Indeed, the performance is measured through synthetic quantitative indicators of a qualitative characteristic. This is a latent variable, which could be called "academic achievement", unobservable and not measurable. Through the construction of quantitative indicators - as it will be shown in the following sections - it is possible to make performance attended in different courses and/or institutions comparable among themselves.

3.3.2 Some evidences about the performance of moving freshmen

The examination of the academic performance of freshmen is a phenomenon widely studied during the last decades. As an example, Touron (1987) analyzes the first year of medical school students in Spain, taking into account the fact that admission criteria are not able to capture the effective achievement of an adequate academic maturity. Nonetheless, he finds a positive significant effect for both the high school final mark and the admission test's grade, confirming the idea that the individual background of a student surely matters for her academic performance. On the other side, Van Overwalle (1989) addresses the link among individual and social factors. In particular, an institutional context able to cooperate with freshmen students positively contributes in mitigating the shock which comes with a transition in a completely different system such as the Higher Education one. But also the subjective ability in managing the studying activities helps in succeeding during the first year at university, especially nowadays that students can rely on an enormous number of different tools, such as textbooks, Web-based lecture notes, and online quizzes (Huon et al. 2007). Finally, the joint effect of individual attributes and contextual factors is discussed by Schaeper (2019), who finds in the lacking of self-esteem one of the main factor damaging freshmen academic performance (especially concerning women), jointly with a learning environment more oriented on the provision of concepts and instructions, rather than on the activation of stimulating ways of thinking.

Different studies are also available specifically referring to the performance of freshmen in the STEM area. The growing interest in these fields is globally causing an increasing

adoption of strategies in order to stimulate enrollments, which has to come with a bigger attention to the speed of students in adapting themselves to the new context. According to Lopez and Jones (2017), there is an evident stratification in the kind of people who decide to enrol a STEM course, since they find that the best explanatory variable for students' performance in this area is the level of education of the father.

Packard and Jeffers (2013) find a significant necessity of accompanying new STEM students in the transition in the Higher Education system in order to preserve their performance and motivations. On the other side, a strong effect of social context in STEM area regardless of institution's facilities is strongly addressed by Jackson (2010) and Jackson and Laanan (2015). In particular, the difficulty in adjusting the performance of women in this fields is generally recognized and attributed to the a low socialization environment, the lacking of mentors, and the internalization of stereotyped social norms. In the transition to a completely new institutions all these factors can cause - for both men and women - the so-called *transfer shock* (Hills 1965).

Keeley III and House (1993) analyze several factors that can foster a transfer shock. In particular, it seems all transfer students generally present some degree of transfer shock, especially men, who are in average outperformed by women. The youngest freshmen are usually the most affected by transfer shock, as the lowest performers in previous institutions. More specifically, Glass and Harrington (2002) find that *movers* in the long run seem to perform better than stayers, but they experience a drop in their performance during the first semester, due to the transfer shock. Regarding specifically to STEM students, Cejda (1997) finds that freshmen in this area experience a stronger transfer shock with respect to their collegues in business, education, fine arts and humanities, and social sciences.

Evidences are also available for what concerns Italy. Apparently, the performance of students does not seem to depend from socio-demographic features, but just on motivations and inclinations. Nonetheless, Nonresident students perform worst than residents and male perform worst than females. High school final grade exhibits a positive effect on the performance both for good and very bad students, but Lyceum Southern students migrating in the North perform on average slightly better than Lyceum stayers (both southerners and northerners) (Boscaino et al. 2018, Adelfio and Boscaino 2016, Adelfio et al. 2014).

3.4   Data and Methodology

3.4.1   Data

The analysis that will be proposed is based on micro-data provided by the Italian Ministry of Education, University and Research (MIUR) and collected into the Italian University Student Register (ANS)[1]. In particular, the database is restricted to 406,587 students across eight cohorts, between the academic years 2008 and 2015. Students included are enrolled at the first year of an Italian degree course belonging to the Science, Technology, Engeneering and Mathematics (STEM) area, with available and valid information about their own first-year performance. In order to classify degree courses into the STEM area, the main reference provided is Andersson and Olsson (1999), who formalize in a manual the CEDEFOP and EUROSTAT's classification for vocational education and training, then adopted by the European Commission in 2015. Accordingly, STEM fields of studies can be classified in the following three categories (Code[2] for each degree class included between brackets):

1. Natural sciences, mathematics and statistics (L-13,L-2,L-27,L-29,L-30,L-32,L-34,L-35,L-41);

2. Information and Communication Technologies (L-8,L-31,L-43);

3. Engineering, manufacturing and construction (LM-4 C.U., L-7, L-9, L-17)

It is important to notice that, differently from the European Commission's guidelines, this study includes Architecture, mainly due to the presence of some courses such as the so-called "Architecture and Engineering" which make it difficult to operate a selection into the database. On the other side, accordingly with the guidelines, all the courses afferent to the area of Health Studies are excluded from the sample.

Several information are available for each student, starting for their gender. Then, a dummy variable is calculated in order to identify if the final high school grade obtained was above the 75th percentile. Also the type of High School attended is considered, keeping as a baseline the scientific *Lyceum*, and observing coefficients for students who attended a so-called *Classic Lyceum* or another diploma in Secondary Education. Then, another binary indicator informs if a student obtained her Secondary Education degree in late with the "normal" road map, namely she enrolled university later than the year after the end of the high school. Moreover, it is possible also to control for the possibility that a certain freshmen change her degree course during her first year of attendance.

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[1] Database MOBYSU.IT [Mobilità degli Studi Universitari in Italia], research protocol MIUR - Universities of Cagliari, Palermo, Siena, Torino, Sassari, Firenze and Napoli Federico II, scientific reference Prof. Massimo Attanasio (UNIPA), Data Source ANS-MIUR/CINECA.

[2] Full list available at: `http://www.miur.it/UserFiles/2600.pdf`

Finally, the main covariates of interest are those which identify the origin-destination movement of students, and are classified as follows:

1. *Stayers of North/Centre* as the baseline;

2. *Stayers of South*;

3. *Movers from South*;

4. *Movers from North/Centre*.

The choice and construction of the dependent variable deserves a particular focus. In the attempt to obtain a measure of academic performance of each student, attention is paid to the credits earned during the first year of enrolment. Indeed, as regulated by the Ministerial Decree 509/1999 by the MIUR[3], academic credits are a measure used by Italian Universities to estimate the workload required in order to graduate. As it was easy to figure out, this is a very discrete variable. Consequently, a transformation is required in order to normalize it, as suggested by Leckie (2013). Thus, firstly the N students are ranked basing on their original scores. Then, the standard normal score for the ith ranked student in the data is calculated as:

$$\Phi^{-1}[(i - 0.5)/N],$$

where Φ^{-1} denotes the inverse of the standard normal cumulative distribution function. The advantage behind this simple transformation is that it is order preserving and students with the same number of credits will also receive the same standard normal score. Moreover, with this transformation the effects of covariates can be interpreted in terms of standard deviation units of the response.
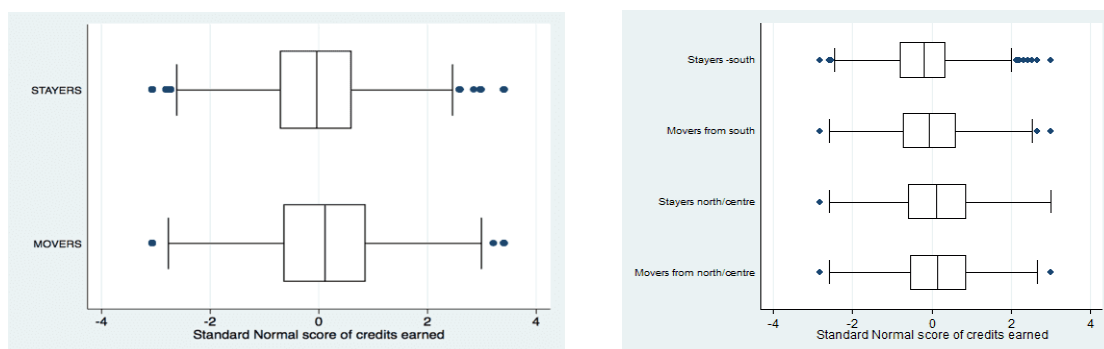
Fig. 3.1 Distributions of Standard Normal Scores of credits earned among Stayers and Movers and Stayers and Movers per macroarea of origin.

Looking at the picture showed in Figure 3.1 it is possible to argue that movers perform slightly better than stayers, and the (few) movers and the stayers from North and Centre perform evidently better than their southerners colleagues. Nonetheless, this result

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[3]Available at `http://www.miur.it/0006Menu_C/0012Docume/0098Normat/2088Regola.htm`.

could be strongly questioned, since it not takes into account any possible difference among degree courses, in terms of both fields and departments. Thus, Figure 3.2 adjusts the dependent variable for the average number of credits that, within each cohort, a certain degree course provides to its students. The idea is that if a degree course in general uses to provide a larger number of credits during the first year - without speculating about the causes of this evidence -, then the evaluation of a highly-performing students has to be allowed to shift accordingly. Indeed, after this adjustment Stayers seem to perform slightly better than movers, and movers from the South to the North seem to exhibit the lowest performance, probably because they are the most exposed to the risk of a transfer shock. On the other hand, the groups with the highest performance are those of Stayers of the South and Movers from the North/Centre. Some hypothesis can fit with this result. On the one side, Stayers of the South are less threatened by the risk of a transfer shock and, as highlighted in paragraph 3.2.2, it can be that departments settled in the less attractive regions would try to soften their grading policies in order to increase the number of enrolling students. On the other side, students that move from the North and the Centre of Italy use to leave for much shorter average distance with regard to their southerners colleagues. This is due to the fact that they are already settled in a macroarea where the largest part of the regions are attractive, and consequently they can choose the university based on a wider range of characteristics beyond the territorial ones, while remaining sufficiently near to their hometowns to mitigate the risk of a transfer shock.
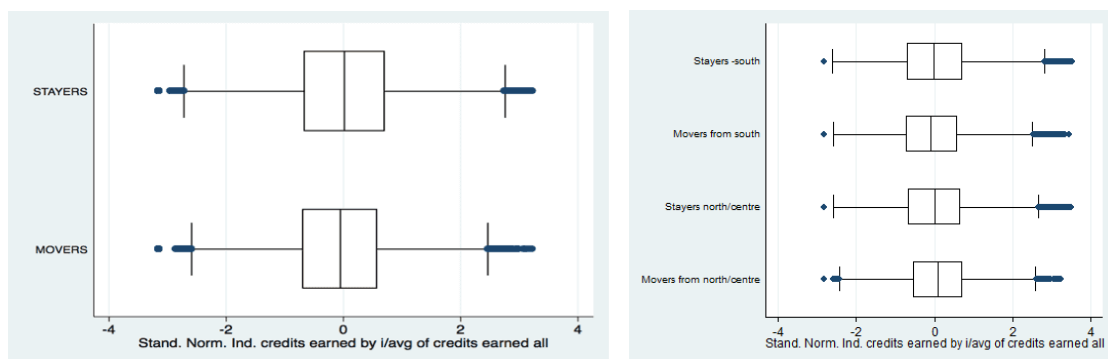
Fig. 3.2 Distributions of Standard Normal Scores of credits earned on the average grade earned in the same degree course, among Stayers and Movers and Stayers and Movers per macroarea of origin.

3.4.2 Methodology

In a nutshell, Multilevel Analysis is a typology of hierarchical linear model, which allows to compute regression analysis for data with several nested levels. The underlying idea is that each level should be a potential source of unexplained variability (Snijders 2011).

The importance of relying in such a technique in educational studies is widely addressed by Grilli and Rampichini (2009). Indeed, it is important in order to disentangle the effect of individual characteristics - generally attributed to prior achievements and socio-economic backgrounds - and (for a minor part) the institutional factors related to the department where students are enrolled on. Consequently, this kind of methodology allows to consider the hierarchical structure of data, namely the fact that students are nested into the universities and the cohorts. The resulting variance-covariance structure helps in achieving a better quantification of the uncertainty.

Coherently, several studies resort to multilevel analysis in approaching educational issues. Crawford and Benton (2017) highlight the relevance of isolating volatility at the cohort-level, as information should be provided about changing in performance from year to year within the same institutions. On the other side, Martini (2018) emphasizes the importance of considering the school level, so that the value added provided by each institution could be estimated. In particular, the concept of value-added is crucial for the nesting at the institutional level. Liu (2011) clarifies as the traditional concept of value-added is related with the evaluation of the performance between the beginning and the end of the studies for a specific student in a specific institution. Nonetheless, in the following analysis this level will be evaluated in a much more local perspective, evaluating the effect of the degree courses on the difference in the performance during the very first year of Higher Education studies.

According with Leckie (2013), a three-levels Multilevel Model will be implemented. Data contains eight cohorts of students from 2008 to 2015, nested both across cohorts and degree courses. Hence, the regression can be summarized as follows:

$$y_{ijk} = \beta_0 + v_k + u_{jk} + \sum_{t=2009}^{2015} \beta_t \text{year}_t + \sum_{h=1}^{H} \beta_h x_{ijkh\cdot} + \beta_p d_p + e_{ijk},$$

where $i = 1, ..., n_{jk}$ denotes those students enrolled in the j-th course-cohort within course k; $j = 1, ..., J_k$ denotes those course-cohort combination for each course k; $k = 1, ..., K$ indicates the number of degree courses in the sample. As β_t, β_h, and β_p are the unkown parameters to be estimated, then y_{ijk} also depends on v_k and u_{jk}, namely the variance components which allows to control for supercluster and cluster random effects. In other words, β_0 measures the mean effects across all the universities in the sample, v_k is the effect of each degree course k, and u_{jk} is the effects of each course-cohort j within a specific degree course k. v_k and u_{jk} are assumed to be indipendent and identically distributed normally with mean 0 and variance σ_v^2 and σ_u^2, respectively.

According to this specification, the final analysis will be based on 405,587 students, nested within 5,571 course-cohort clusters, they in turn clusterd within 1,166 degree courses available in the sample.

3.5   Results

The present sections shows the results for the Three-Level analysis estimated. Three models will be showed. The *Null Model*, where no covariates are included, so that it only decomposes the total response variable variation into separate level-specific variance components. Then, the *Full Model* will exhibit coefficients for all the independent variables included. In the last column of each table, the OLS regression allows to check the robustness of the Full Model. Each table shows the same regressions, which are divided in three charts just to make regressors at different levels simpler to be read.

Looking at the Null Model (fully showed in each table), the intercept - which measures the overall mean of the average number of credits (adjusted for the average provided in each degree course) earned by students - is statistically significant at the 1% level and negative. Then, each degree course provides its own value-added to be added to the intercept in order to measure the exact effect of a specific degree course. Much interesting information can be obtained looking at Variance Partition Coefficients (VPC). Remaining on the Null Model, it is possible to observe that the 15% of the variation lies between courses, the 4% lies within-courses between course-cohorts, and as many as 81% lies within-course-cohorts between students. As fully-showed in the disclosed literature, the majority of the variation in students' academic performance lies at student level, and this result is clearly confirmed also in the present analysis. It is clear that, net to the presence of an undeniable role of courses in conditioning students' performance, this still relies much on the individual characteristics of students, as it will be examined in depth in the Full Model.

Hence, looking at the Full Model in table 3.1, it is possible in the first instance to compare its VPCs with those in the Null Model, noticing how adjusting for covariates is helpful in order to explain about the 15% of the variation in students' performance. From this point of view, the Full Model represents an improvement with regard to the null one, and the independent variables will help in shading light on the determinants of freshmen students' performance.

Focusing on the effect of the cohort-level, Table 3.1 includes dummy variables for each available year from 2009 to 2015, keeping the 2008 as a baseline variable. In general, the analysis presents a correlation around 79% between couples of subsequent course-cohort within the same degree course, with the course performance which seems to be

very stable over time. Nonetheless, looking at the coefficients it is possible to notice that they are all positively significant at the 1% level, and their size is always increasing year by year. Moreover, between 2011 and 2012 the magnitude of the coefficients has a particularly large increase, with respect to the other variables. This result should not surprise, taking into account that it coincides with those Italian reforms which tied the provision of funding for universities with the number of students that they put in condition of graduating on time. Consequently, evidence appears that all the departments start relaxing their grading policies, facilitating the overall performance of the Italian students progressively during time.

Comparing the Full Model with the OLS regression, it is clear that the obtained results are pretty much consistent each others. The main difference lies in the fact the OLS' intercept are slightly larger with regard to the Full Model's ones (with the only exception of Year 2013). Probably, OLS' coefficients are inflated by the fact that are not corrected clustering for each degree course, as in the first level of the Full Model.

	Multi-Level Regression		
	Null Model	Full Model	OLS
Constant	-0.0694***	-0.1744***	-0.0990***
	(0.122)	(0.0275)	(0.0053)
Year 2009		0.0396***	0.04132***
		(0.0131)	(0.0058)
Year 2010		0.04966***	0.0594***
		(0.0136)	(0.0057)
Year 2011		0.0672***	0.08927***
		(0.0137)	(0.0057)
Year 2012		0.1011***	0.1219***
		(0.0139)	(0.0058)
Year 2013		0.1248***	0.0968***
		(0.0138)	(0.0060)
Year 2014		0.1709***	0.1805***
		(0.0138)	(0.0058)
Year 2015		0.2097***	0.2209***
		(0.0138)	(0.0057)
var(Courses)	0.150	0.111	-
	(0.0075)	(0.0058)	-
var(Courses_Cohorts)	0.039	0.036	-
	(0.0012)	(0.0011)	-
var(Residual)	0.803	0.695	-
	(0.018)	(0.0015)	-
N	406,587	406,587	406,587

* = p-value< 10%; ** = p-value< 5%; *** = p-value< 1%.   Standard Deviations between brackets.

Table 3.1 Multi-Level Regression: Covariates based on cohorts.

In Table 3.2 coefficients are showed for the individual characteristics of students. Most of the results are coherent with both priors and the main findings in literature. In particular, there is a significantly positive effect of being a woman on the adjusted number of credits earned, in line with the main findings. Indeed, if several studies show that men perform better than women in STEM fields, then it was also highlighted that studies on freshmen point out that women are less sensitive to the transition toward a new institution. The role of the high school background also matters. Better performing students during the Secondary Education studies also maintain higher scores during universities, as expected. Nonetheless, the interaction with the gender variable shows a negative coefficient. Thus, the model seems somehow to capture the higher difficulties that women generally exhibit across several studies on STEM area.

Another reliable result regards the effect of the type of high school attended. The baseline is the *Lyceum*, specialising in scientific field, as it emerges as the one which provides the best education background in order to enrol a STEM faculty. Coherently, both the *Lyceum*, specialising in Humanities, and other types of high schools (i.e. other *Lyceums*, Technical and Vocational schools) have a negatively significant coefficient. If it is not surprising that the scientific *Lyceum* is the one that provides the best upbringing in order to achieve a good performance in a STEM degree course, then it is relevant that the coefficient for the Classic *Lyceum* is almost half than the one for other high schools. This result recalls well-known facts. The first is that *Lyceums* still emerges as the schools which provides that better training in order to deal with Higher Education studies. On the other side, this result provide the only indirect hint about the possible effect of socio-economic background. Indeed, high school emerges as a strong source of stratification in the Italian Secondary Education system, where the socio-economic background of students from *Lyceums* is generally higher that the one of those coming from Technical and Vocational Schools.

Before to observe those variables regarding students' movements, a last result is showed for those covariates indicating if a student has achieved her Secondary Education degree in late, and if she has changed degree course during her first year of university studies. In particular, freshmen who enrol Higher Education on late exhibit a significant more negative performance during the first year. This result is reliable since probably this variable mainly incorporates those students who failed one or more years during the high school, net to the possibility that some of them were enrolled later for different (unobservable) events such as a sabbatical year, or the impossibility to attend immediately university for force majeure (e.g. medical or economic reasons).

Moreover, students who change their degree course during their first year of studies present a highly negative significant effect on their own performance. Also this result should not surprise. The fact of changing a course during the very first year of Higher Education studies imply to experiment two very strong transitions in a very short time.

The first is the one from the Secondary to the Tertiary Education system. The second is the one between two degree courses, and it can regard: *i)* a change of field of study in the same institution (and/or city); *ii)* a change of institution (and/or city) in the same field of study; *iii)* a change of institution (and/or city) and field of study. Consequently, experimenting a drop in the academic achievements after such a tangled route should be read as a physiological issue.

Finally, it is possible to examine the effect of internal students' mobility on academic performance during the first year of Higher Education Studies. Keeping stayers students

	Multi-Level Regression		
	Null Model	Full Model	OLS
Constant	-0.0694***	-0.1744***	-0.0990***
	(0.0122)	(0.0275)	(0.0053)
Female		0.0580***	0.0538***
		(0.0036)	(0.0038)
HS Grade		0.7440***	0.7379***
		(0.0040)	(0.0043)
Female#HSGrade		-0.1923***	-0.1837***
		(0.0060)	(0.0065)
Classic *Lyceum*		-0.1972***	-0.2283***
		(0.0046)	(0.0049)
Other HS		-0.3780***	-0.3792***
		(0.0032)	(0.0034)
Late		-0.1541***	-0.1383***
		(0.0063)	(0.0067)
Course Change		-0.2945***	-0.1803***
		(0.0096)	(0.0081)
Stayers of South		-0.1842***	-0.3182***
		(0.0160)	(0.0033)
Movers from South		-0.1924***	-0.2534***
		(0.0052)	(0.0054)
Movers from N/C		0.0121	-0.0006
		(0.0094)	(0.0092)
var(Courses)	0.150	0.111	-
	(0.0075)	(0.0058)	-
var(Courses_Cohorts)	0.039	0.036	-
	(0.0012)	(0.0011)	-
var(Residual)	0.803	0.695	-
	(0.018)	(0.0015)	-
N	406,587	406,587	406,587

* = p-value< 10%; ** = p-value< 5%; *** = p-value< 1%.   Standard Deviations between brackets.

Table 3.2 Multi-Level Regression: Individual-level covariates.

from the Northern and Central regions of Italy as the baseline, the first evidence to be pointed out is that they do not present any significant statistical difference between the movers from the same region. This result is coherent with those evidences obtained from the literature, since the great part of Northerners do not move for very long distance, remaining in a cultural and socio-economic environment much more comfortable in comparison with the migration flow of their southerners colleagues. Indeed, movers from the South of Italy are predicted to make 0.192 standard deviations less progress than stayers of North/Centre. This outcome is surprising in light to the prior stating that are the best students those who exhibit such a great entrepreneurship to move as soon as possible toward better environments. Thus, it is possible to argue that the obtained coefficient captures at least partially the presence of the transfer shock affecting those freshmen who experiment the harshest transitions. Consequently, the first year of southerner moving students seem to be characterized in general by the lowest performance in terms of credit earned within the entire sample. It is important to recap that the dependent variable, measuring the number of credits obtained by each students, cannot be considered a good proxy for the evaluation of each student, but it is a much better approximation for the number of exams successfully passed during the academic year. In other words, nothing can be said about who are the best students in terms of score in this analysis, but only in terms of progress of their academic curricula.

Concerning the comparison between stayers from South and those from North and Centre of Italy, the first are predicted to make 0.184 standard deviations less progress than the latter. From the one side, this result can foster the prejudice about remaining students, considering them as the less capable and resourceful, unavailable in leaving their comfort zone and with less social and economic pressure in rapidly obtaining the degree. On the other side, this evidence make difficult going on with the idea that southern universities offer facilitated study paths, maybe in the desperate attempt of obtaining a greater number of applications.

Finally, some brief considerations about Table 3.3, summarizing covariates at faculty level, with Industrial Engineering as the baseline. As it can be read, all the significant coefficients are associated to degree classes which appear to be providing a higher number of credits with regard to the reference one. Those faculties not always emerge in accordance with the commonplaces about field of studies. As an example, if Physics shows a positive and significant coefficient, a faculty such as Pharmacy exhibit a negative and not significant one. Nonetheless, these covariates are mainly included in order to control for degree classes fixed effect, and evaluating them one by one could emerge as a fruitless task.

| | Multi-Level Regression | | |
	Null Model	Full Model	OLS
Constant	-0.0694***	-0.1744***	-0.0990***
	(0.0122)	(0.0275)	(0.0053)
Biology		-0.755	-0.1012***
		(0.0504)	(0.0056)
Architecture		0.5408***	0.7324***
		(0.0576)	(0.0071)
Biotechnology		0.1197**	0.0239***
		(0.0511)	(0.0070)
Chemistry		0.0432	-0.0397***
		(0.0506)	(0.0076)
Pharmacy		-0.0582	-0.0347***
		(0.0545)	(0.0098)
Physics		0.0859*	0.0219***
		(0.0522)	(0.0078)
Informatics		0.1446***	0.1075***
		(0.0504)	(0.0067)
Environmental and Natural Sciences		0.0304	-0.0031
		(0.0541)	(0.0091)
Geology		0.2787***	0.1827***
		(0.0620)	(0.0112)
Mathematics		0.0174	-0.0443***
		(0.0547)	(0.0085)
Statistics		0.4412***	0.3781***
		(0.0771)	(0.0132)
Technology for Cultural Heritage		0.3199***	0.1929***
		(0.0813)	(0.0225)
Civil Engineering		-0.0580	-0.0241***
		(0.0450)	(0.0057)
Information Engineering		-0.0540	-0.0548***
		(0.0382)	(0.0047)
Construction Engineering		0.3150***	0.4085***
		(0.0538)	(0.0069)
var(Courses)	0.150	0.111	-
	(0.0075)	(0.0058)	-
var(Courses_Cohorts)	0.039	0.036	-
	(0.0012)	(0.0011)	-
var(Residual)	0.803	0.695	-
	(0.018)	(0.0015)	-
N	406,587	406,587	406,587

* = p-value$< 10\%$; ** = p-value$< 5\%$; *** = p-value$< 1\%$.   Standard Deviations between brackets.

Table 3.3 Multi-Level Regression: Covariates based on degree classes.

3.6 Conclusions

The present article addressed the issue of Italian students' internal mobility, in the attempt of understanding who seem to perform better among stayers' and movers' freshmen. As widely emerged from the literature examined, such a problem cannot be simply explored looking at the individual characteristics of students, especially in a country as Italy, with such peculiar characteristics. Indeed, the geographical and socio-economic framework - which result in almost unidirectional migration flows -, and the crisis of the Italian Higher Education - worsened by a long series of questionable policy reforms -, suggest how the internal mobility behavior of Italian young adults has to be read in light of much more systemic conditions rather than the simple degree course environment.

Hence, the analysis has showed how not only the fixed effects related to the degree classes chosen by each student within the STEM area, but also the time is a relevant exogenous source able to affect the academic performance of freshmen. Especially these factors are the most related with the policy implications of those reforms experimented by the Italian university system, and which strongly conditioned the capability of departments in obtaining governmental funds. In this complicated framework, students try to reach those territories with the best territorial conditions, which in Italy are basically concentrated in the Central/Northern macro-regions.

The result is that students from the South who decide to emigrate toward the North suffer much more than their colleagues for a transition which does not regard only a new institution, but also a very different place. Indeed, movers from the North does not present significant differences with their stayers colleagues, probably for the well-recognized fact that they move for much shorter average distances, remaining closer to their comfort zone and in local job market healthy enough to allow them remaining more relaxed about the university reputation.

On the other side, stayers of the South appear to be the students with the worst performance in terms of credit earned during the first of studies, thereby raising suspicion both on the fact that those who remain in their hometowns are the less dynamic individuals in their population, but also to the commonplace that take as given southerners universities as the easiest ones to be attended.

These open questions could be explored more deeply further developing this analysis. Firstly, it would be interesting to include territorial covariates, such as local rates of unemployment and the movers' residence-destination distance. On the other side, re-analyzing the same students during the following years of studies could be useful for understanding if movers are actually experimenting a transfer shock, and if they are able to recover it getting used to their new environment.

CHAPTER 4

Investigating the relationship between Secondary and Tertiary Education and Labor Market Outcomes: Evidences from the University of Florence

What is the effect of holding a university degree on different possible labor market outcomes? And what is the one of secondary education? Does the fact of having been a working student during the higher education studies matter? This article addresses these questions by looking at credentialism and overeducation phenomena which have been extensively explored by the sociological, marxian, and human capital approaches. To do so, a novel dataset is constructed by means of disaggregated administrative data. The dataset matches individual-level data on the career of students at the University of Florence, Italy, with records on employment contracts for the same students from the Italian Ministry of Labor. Hence, a survival analysis for ordered events is employed in order to estimate the probability of stipulating hierarchical-ranked types of employment contracts. Unsurprisingly, it turns out that being graduated make students more likely to obtain a higher-skilled contract. Nonetheless, grades and other usual degree-related information do not seem to play a substantial and significant role for explaining individuals' labor market outcomes as secondary education degrees do. On the other side, working student shows a positive effect for employing graduates in suitable jobs, but not for fostering their upward social mobility.

keywords: Higher Education, Secondary Education, Job Market Outcomes, Credentials, Working students.

4.1 Introduction

The present article tries to observe how the characteristics of different degrees both at the high school and at the university level influence the Labor Market outcomes for graduates from the University of Florence. The background for this study is framed into the streams of literature of overeducation and credentialism. The interest toward this kind of phenomenons arises from the "bureaucratization of economic life", namely - in the context of education - the emerging of Universal Education as the cause of over-

production of job-seekers and the consequent increasing over time of the requirements for any job. In this framework, the enormous amount of schooling required by our society is not useful neither for acquiring work competences nor for personal development and self-fulfillment. Dore (1980) names this situation "reluctant schooling", which he defines as a ritual that is not played for self-satisfaction, not for doing jobs, but only to *get* jobs.

Also Collins (2002) highlights the link between Credential Inflation and the expansion of the University System. Indeed, as the academic degree is not anymore an indicator of middle class respectability - and a great part of the population is nowadays holding a degree - then the competition for delivering a stronger signal to the job market has shifted: on the one side from the mere degree-holding to the competition for higher degree value (e.g. in terms of grading); on the other side, from the objective of obtaining a degree to the collection of credentials in order to enrich the resume as a whole (e.g. post-graduate degrees, language or informatic certifications). So, a self-feeding mechanism arises, looking at which it is enough easy to understand why we talk about *inflation*. In fact, the expansion of the University System increases the supply of academic credentials, the meritocratic philosophy justifies the job assignment process as an efficient mechanism (Bowles and Gintis 1976), the job market is fragmented by the High-Tech Era which requires always more specialized skills by workers. In this framework, students aim to increase the signalling effect through the obtainment of higher grades and higher credentials, reducing the value of a University Degree among others.

The general conclusion from previous studies is that first-destination outcome (i.e. the first job or internship obtained) of graduates is likely to be influenced by a number of individual characteristics, included degree classification (e.g. final mark), subject studied, age at graduation and socio-economic background. Degree classification is consistently found to be positively correlated with the status of new graduates in the period following graduation. Productivity-enhancing effects and signalling effects may account for the positive association between degree classification and graduate first-destination outcomes (Chevalier et al. 2004). In fact, degree classification may have an important signalling value: with the unprecedented number of people graduating from university than ever, employers may distinguish among new graduates on the basis of their degree classification regardless of their underlying ability. This is because they might assume that students with a higher degree classification have higher skills than those with a lower degree classification. Freier et al. (2015) find that in Germany graduating with a honours degree positively affects future labour market outcomes.

In this article, the theoretical background will be firstly examined in order to explore the roots of common priors about credentialism and overeducation. In particular, three different views will be exploited: the sociological approach of the "Social Closure Theory"; the Marxian analysis of credentials; the "Human Capital Theory" from Eco-

nomics.

Then, an empirical background will be drawn starting from studies across Europe, and then focusing on some studies specific on the Italian case. As it will be described, there is a general agreement about the actual presence of overeducation both across Europe and in Italy, but not so much accordance about its magnitude and its effective harmfulness for the system.

Moreover, the idea will be explored that social stratification in Italy can arise already at the secondary education level, then fostered during higher studies by the decision of being a working student, so conditioning at a very early stage the future chances of stuents' social mobility.

Subsequently, data and model will be presented. In particular, data will be drawn from a novel database created by the merging of administrative information on the academic path of students from the University of Florence with information from the Italian Ministry of Labor about the job contracts stipulated till the 30th of September, 2015. The model will be computed through the approach of Survival Analysis for ordered events (Andersen and Gill 1982). As in this framework is substantially impossible that a subject (the student) would be at risk of a second event (obtaining a second job) until the first event (job) has occurred (and so on), the Conditional Risk Set Model proposed by Prentice et al. (1981) will be preferred, so that the analysis would be stratified by failure order.

Finally, estimation and results will be showed and commented, concluding that the problem of overeducation in this framework, if any, seems to be more related with the specific intrinsic details of the high school degree, with higher education just emerging as a mandatory step for reaching high positions. At the same time, the fact of having been a working student emerges as an accelerator for the chances of finding a job, while reducing the possibilities of reaching the top of the skilled-job pyramid.

4.2 Three different theoretical approaches linking education and job market

This article examines the issue of *credentialing theory*, which has so many different theories trying to address it properly. Brown (2001) divides those approaches in three streams: Social Closure Theory (Weber 1922, Collins 2002); Marxian Analysis of Schooling, Work, and Credentials (Gramsci 1996, Bowles and Gintis 1976); Human Capital Theory (Becker 1964, Spence 1974, Arrow et al. 1973, Thurow 1975).

Regarding *Social Closure Theory*, the underlying assumption relies on the weberian stratification analysis, framing the segmentation of the Education System into a context of status-group domination. From this perspective, holding a certain type of credential has just a weak relationship with actual knowledge acquired, rather than with the status

of self-interested occupational groups, which aim to limit and monopolize the supply of candidates for their own positions. Accordingly, students aim to increase the chances to be admitted in these "recruitment queues" through the obtainment of higher grades and higher credentials, reducing the value of a specific University Degree among others. At the same time, the job market pushes Higher Education to be *mcdonaldized*, which , in the words of Garland (2008), means that *"university* [is restructured] *toward market-defined goals of 'value'* [...] *and of course in terms of the efficient 'production line' of graduates to meet the ever changing needs of capital, or the 'challenges' of globalization."* And again, *"The 'predictability' of the 'McDonaldization' process at work* [...] *can be seen in the bureaucratic rationalization of teaching and research to serve straightforwardly economic ends"*. As highlighted by Collins (2002), the stratification generated by credentialism stimulates a self-driven mechanism, in which the *per se* social distinctiveness of the degree and also its value decreases, resulting in a very fragmented indicator of social status, not only from a socio-economic point of view, but also according to other characteristics such as gender (e.g. female discrimination on the job market except for teaching). Hence, inflation of credential emerges as a supply-driven process, fostered by the expansion of schooling, rather than the necessity of more educated labor force. In this context, the relationship between education and productivity is irrelevant, since wages are negotiated between social partners, and then qualification levels are matched with pay levels.

Moving toward a more radical standpoint, according to the Marxian analysis of credentials, capitalists would take advantage of the educational system in order to steer it toward their ideological and economic interests. Thus, schools can be seen as centers for the production of cultural hegemony, namely "factories" of docile labor forces (Brown 2001). In this context, capitalism utilizes meritocracy as a tool in order to foster economic inequality, while reproducing economic relationships independently from technical requirements and efficiency standards. Furthermore, this system pacifies masses through different channels. On the one hand, meritocracy helps to make people accept alienated works and social stratification, by convincing them that the job assignment is objective, efficient, just and egalitarian. Consequently, individuals react by competing among each other to acquire the best position offered along the various recruitment queues, rather than by collectively coordinating to improve their bargaining power and, eventually, overcome such an intra-group competition which fosters the elitarian stratification. On the other hand, inflating the credential requirements, the ruling class is able to manipulate easily those educated workers who are at the bottom of the skilled-job pyramid. Basically, this mechanism generating a new class of proletarianized white collars can be described as follows. Initially, The Universal access to Education increases the will and the value of obtaining a degree. As a matter of fact, credentials are perceived as means to strive for better jobs and living standards.

Nonetheless, changes intervened in the Capitalist System induce a shift in the motivations of acquiring high education. Indeed, acquiring further education is now motivated by being more marketable on the job market. Such changes can be of social or technical nature, as the fall of unionization rates and the rise of automation and deskilling. In this context, the introduction of meritocratic mechanisms in both Universities and workplaces has a twofold effect. On the one hand, it spurs competition in a feedback fashion. On the other hand, meritocracy coupled with competition contributes to make education a mean for being even more marketable. Accordingly, capitalists will have a greater bargaining power over workers as the latter are engaged in competing among themselves for best jobs and opportunities (*divide et impera*).

Finally, Economics attempted through Human Capital Theory to harmonize the interdipendence between Education and Labor. Accordingly, Education provides skills with the aim of satisfying the needs of the job market, while people invest in education in order to maximize their own possibilities of being selected by employers. The design of this mechanism highly reflect market necessities, since in this case employers compete each other in order to hire the best applicants at the lower wage, while employees are iper-individualistic, only looking at their own utility function. The other fundamental assumption of this approach is that education is productivity-enhancing in any case. This kind of theory was then improved through the development of "signalling", "filtering" and "screening" theories. According to the first, students uses degrees in order to overcome the uncertainties in the recruitment processes, signalling to the employers the acquired abilities. Through this kind of specification it is possible to overcome the crucial assumption of Human Capital Theory, since it makes no longer necessary to assume the productivity-enhancing effect of education. Filtering and screening theories relax even more the original paradigm, considering credentials as a way to enter the training slots of the skilled-job market. From this perspective, recruiters base their hiring decisions on observable characteristics, i.e. grades, degrees, or school prestige. Then, new hires are allocated in training positions, allowing employers to discover their real abilities, according to which they will be assigned to their corresponding job positions. However, on the supply-side job seekers have an incentive in acquiring higher and higher credentials in order to move ahead to the job queue.

The above defensive strategy played by individuals can be a good explanation for the wide-spread evidence across the OECD countries on the negative relationship between investment in education and returns to investment in human capital which results in the phenomenon of overeducation (Muysken and Ter Weel 1999). As highlited by Bills (2016), in this context individuals do not acquire more education in order to improve their own living standards, but merely to protect their present positions.

4.3 Empirical evidences on the contemporary relationship between credentials and employment: from Europe to Italy

The phenomenon of overeducation was widely studied across countries, and many empirical insights about causes and consequences of this mechanism are available both for Europe and specifically for Italy. Starting with a picture of the general framework, Gebel and Giesecke (2011) analyze 15 Western European Countries from 1992 to 2007. Linking Employment protection reforms both for permanent and temporary contracts across Europe with inequalities in the education-based skill levels for each country, these scholars are able to reach a twofold conclusion. On the one hand, if the regulator increases protection for permanent contracts against easier dismissals, temporary contracts increase. Consequently, trying to limit temporary jobs increases the skill divide. On the other hand, deregulating temporary contracts always decreases the chances of employment for low-skilled. Nontheless, as a general conclusion, during the examined period very little evidence emerges about an increase in the risks of the skill-related unemployment, while clearly a detriment in the chances of obtaining a temporary contract for low-educated workers shows up.

A more recent attempt to analyze overeducation from a cross-sectional perspective is proposed by Di Stasio et al. (2016), relying on the 2010 wave of the European Social Survey. In their hypothesis institutions of the education system foster over-investment in education, while institution in wage-setting coordination limit the capacity of employers of rewarding workers' skill. Accordingly, they expect more overeducation in those countries with weaker vocational education systems, emerging as a defensive strategy to move ahead to the recruitment queue. Furthermore, they expect that wage coordination will limit the expected returns on education. In line, they find negative relationships both between vocational orientation and overeducation, and between corporatism in the economic system and overeducation.

Moving more specifically on evidences from Italy, Triventi et al. (2016) highlights how the liberalization of access in the Italian Higher Education system was aimed at de-stratifying the existing elitist system. Thus, the belief was that expanding participation would have decreased inequality. What they find is that since the end of 1980s degrees lose a substantial part of their own value, resulting in a "race to the bottom" by students, which affected both upper and lower classes. Nowadays, what seems to matter really is the amount of education that each individual receives, but the positive relationship between years of education and returns does not hold anymore.

Going forward in time, Cattani et al. (2018) are able to build an indicator that attempts to overcome the usual bias exhibited by those studies which relies on self-reported measures of dissatisfaction by workers. In this regard, Italian workers seems to overestimate their own level of overeducation, since the wage premium for graduation appears to be

still low. Nevertheless, this perception shows up even when the job content coherently matches with the level of education reached. In other words, there is the possibility that overeducation in Italy could be overestimated by what is just "perceived" overeducation. This hypothesis is coherent with Quintano et al. (2008), who attribute to the longer average time of study attendance the increase in workers' expectations, which not always correspond with the real opportunities offered by the job market. Indeed, looking at graduates in Economics from the University of Naples, they find that this kind of degree seems to be generally good in limiting overeducation. Nonetheless, this results is stronger if associated with other characteristics, as achieving a higher final grade or being willing to move away toward richer territories.

On the contrary, Montanari et al. (2015) notice some evidences of skill mismatch among Italian graduates, resulting in a lacking of graduates with the most requested profiles, namely inadequate skills and work experience. Coherently with the literature presented above, the authors highlight the necessity of stronger career counseling service in Italy, jointly with a reinforcement of the vocationally-oriented tertiary education.

4.4 Social stratification in Italy: Secondary Education and working students during higher studies

The analysis of the transition from tertiary education toward the job market must not disregard the role that secondary education plays on individual social mobility during the life course. Several transnational studies are available to broadly explore the condition of the Italian secondary education system, starting from Afonso and Aubyn (2006). Accordingly, Italy is at the 19th place for the efficiency of its secondary education system, over the 25 countries examined, and it is comparable with countries such as Czech and Slovak Republics, Hungary and Korea, which are much poorer, but they exhibit higher levels of education attainment.

Moreover, the rise of universal education during decades has reduced the inequality of opportunity between those students who were tracked into more academic secondary education paths, and those who attended technical or vocational schools. Nonetheless, Cobalti (1990) already observed a standstill of compulsory education in reducing inequalities, and more recently Blossfeld et al. (2016) include Italy among the countries that were able to reduce inequalities for the transition to the upper secondary education, but which remained behind concerning the stratification at the tertiary education level. Even though universal education should have helped in overcoming the classism in educational attainment, and in fostering social mobility, Italy still presents upper classes students to enrol in academic tracks. On the other side, students from the working class are more likely to choose technical and vocational schools, their families' investment on education turns out to be burdensome, and they need strongly to "bet" on their

childrens' ability in order to allow them enrolling an academic track (Panichella and Triventi 2014, Checchi 2000). Brunello and Checchi (2005) even find that in Italy school quality and parental education are technical substitutes, highlighting how in this framework greater investment in education would guarantee a reduction in inequality and social stratification. In a nutshell, Italy exhibits social origins as the main driver for educational choices after compulsory schooling, fostering a school tracking implicitly based on classes, and generating during the Higher Education studies (and beyond) more chances of downward mobility, while upward moves are unlikely (Contini and Triventi 2016).

In this framework, focusing also on the decision of working during the tertiary education path could be a useful aspect for exploiting the issue of social stratification between education and labor. Indeed, arguing that this choice is taken by those students in the greater economic difficulties emerges as realistic, and also for this possibility some evidences are provided by the existing literature.

In the following quotation by Ciucci and Potesta (1984) it is contained all the process of transformation of the universal education framework, comprehensive of its shortcoming on Italian students' employment perspectives: *"There is no doubt that by expanding in education, the State is engaged in transforming the unemployed into students: this new social configuration has the effects of minimising the drama of job-hunting on the one hand, while at the same time not discouraging, indeed promoting, the tendency to complement a declining activity (study) with a job, almost invariably casual, temporary or seasonal, which, in the absence of gratifications, offers at least some remuneration."*
Then, the changing in the students' perspectives has to be analyzed in light of the implementation of those reforms consequent to the "Bologna Process", which split the degree courses in bachelors (three years long) and masters (two years long), making enrolment easier for students who need to work to sustain themselves during studies (Bratti et al. 2006, Vaira 2003). Finocchietti (2004) points out how working students (both temporary and permanent) are the great majority in the Italian higher education system. Nonetheless, this article evidences how economic needs are not the only reason for getting a job in the meanwhile of a degree course, but also the will of anticipating the entry in the labor market, signaling a greater experience gathered in advance with regard to not working colleagues. Anyway, this second strategy can turn out to be risky in terms of probability of success: as an example, Meggiolaro et al. (2017) estimate a significantly lower probability of graduation for working students, especially in those environments where they are a smaller share of the entire number of enrolled in a certain degree course.

Consequently, as several evidences are available about the fact that social stratification

in Italy is so strong at the secondary education level to be potentially determining for the future employees' outcomes, so the decision of having been a working student can be likely another indicator for this issue. In particular, it is still uncertain if working during studies reflects more the presence of economic difficulties, the will of signal resourcefulness to the future recruiters, or just that tertiary education is seen as an accessory activity, as in the "parking lot" hypothesis (Bratti et al. 2008).

4.5 Data

The following analysis is based on data obtained thanks to an agreement between the Italian Ministry of Labor and the University of Florence.

To this extent, as the following analysis emerges as a Case Study, then the University of Florence appears to be as an excellent study subject. Indeed, in the last examination (2019/2020), it resulted to be at the 3rd place among the Italian public Mega-Universities according to the CENSIS socio-economic research institute. Nowadays, this university includes 136 degree courses among bachelors, masters, and single cycle degrees, ten of them taught in English. About 51000 students are there enrolled, 25% of them are transfer students. Moreover, teaching activities are located among three different cities, and research activities among four of them. In a nutshell, it is a large and dynamic environment with a high degree of internationalization and attractive for students from several parts of the country.

Regarding the available data, administrative information about the students' population of the University of Florence are merged with the information obligations (*"Comunicazioni Obbligatorie"*) required by the Ministry to every employer (public or private) who needs to stipulate, extend, transform or terminate any employment relationship[1]. In particular, these data refer to the first communication of the above project, considering graduates between 2008 and 2015. For each graduate his career was built starting from his first information obligation available, independently if it was stipulated before or after his graduation. In this regard, it is important to notice the absence of an information about the exact graduation day, only the year being available. To this extent, evaluating if certain jobs were obtained before or after the achievement of graduation is impossible: in those cases, an approximation is built considering a job obtained with graduation if it is stipulated at least in the same calendar year of student's graduation. Moreover, it was possible to compute time spells also for the period in which each person is *unemployed*. An important clarification is needed also about the usage of the word *unemployment* in this framework. Indeed, no one of the individuals analyzed is strictly unemployed if not graduated, yet. This is due to the fact that each person considered is actually a student in a certain university degree course. From this perspective,

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[1] Decreto Interministeriale 30 ottobre 2007 - Decreto interministeriale per le comunicazioni obbligatorie on line. *Trad: Inter-ministerial decree for online information obligations.*

the employment before graduation is just used as a control for the computation of the chances of ending up in a certain professional category without a degree or in the case of being a working student. This kind of a control is also motivated by the idea that recruiters could have some priors for evaluating positively or negatively this particular category of students. On the other side, it is effectively possible to talk about unemployment only for those time spells which appears after graduation not presenting any activated job contract[2].

Regarding the university careers, other information are available. In particular, it is possible to identify approximately the age at graduation, as the difference between the year of birth and the year of graduation. Of course, there is the unobservable possibility that a student had her graduation day before her birthday. With the same degree of approximation, it is also possible to speculate on the possibility that the student gained her degree outside prescribed time. In order to control for this with the limited information available, a variable was built following a technique mutuated by Mian et al. (2017):

$$\text{OOT}_i = max\{\text{AaG}_i - \text{mAAG}_{i,r}, 0\},$$

where i identifies each student, AaG identifies the age at which degree was holded, mAAG is the prescribed age at which graduation is commonly considered to be reached, which varies according to the regulatory system r to which each degree course belongs to. In particular, it is possible to distinguish between eight types of regulations r: *Single Cycle Degrees* for the regulation systems 509/1999 and 270/2004, which last five years; *V.O.*[3] *degrees* which last four years; *Bachelor Degrees*, for the regulation systems 509/1999 and 270/2004, which last 3 years; *Master's Degree*, for the regulation systems 509/1999 and 270/2004, which last 2 years. In addition to this regulatory systems, it is also possible to identify the faculty attended by each student among: Mathematical, Physical and Natural Sciences, Medicine; Architecture; Education Sciences; Law; Psychology; Political Sciences; Economics; Literature and Philosophy; Engineering; Agriculture; Pharmacy; Inter-Departmental Courses. Unfortunately, it is not possible to observe the exact final grade obtained, so it will be used the best available proxy, which is the average mark obtained as a whole result of the exams undergone at the end of the course.

Also information about the high school attended is available. Similarly to what already described, the year of (and consequently the age at) diploma is at hand. In this case, also the exact final mark obtained is at our disposal. The several different typologies of high schools are coded according to four categories: *Lyceum*; Technical Schools; Vocational Schools; other schools. A proxy for the possibility that some students had

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[2]Actually, also in this case some caution is needed, since no one can guarantee that an individual has applied to another course in a different university (or she is working into illegal/undeclared work).

[3]"Old" Regulation System (A/N).

to repeat one or more years of school is simply obtained through a dummy that is 1 if the student graduates at more than 19 years old, which is the prescribed age at which a high school degree in Italy is supposed to be obtained.

Finally, some explanations are due to the way in which data were structured, with a particular focus for the dependent variable. So, as in the data all the information obligations were available up to the 30th of September, 2015, for each individual, then the information had to be conformed to survival structure. Consequently, focusing on those contracts which last at least 30 days, time spells were created for the periods in which each worker had not any contract in effect. Those spells start from the end date of their own previous spell, and they finish on the start date of the following one. If the last contract available for a certain person results closing before 30th of September, 2015, then a spell is created up to that date[4]. A final focus is reserved for the exit outcomes in the sample. Indeed, the analysis will not be concentrated simply on the stipulation of a contract, but competing risks will be computed based on the level of professional qualification of the contract itself. Specifically, the Italian National Institute of Statistics (ISTAT) provides a framework where contracts are sorted on a scale 1-8 according to a hierarchical principle, which considers

> "[...] the nature of the work which marks out the job, the level of formal education and experiences required in order to carry out adequately the prescribed tasks."[5]

Consequently, the outcomes were classified into three categories: *Low Job* includes classes from 4 to 8, which contain elementary workers, craftsmen, specialized workers, farmers, specialized workers in tertiary sector, executive jobs in tertiary sector; *Medium Jobs* includes class 3, which contain technical professions; *High-Jobs* includes classes 2 and 1, which contain intellectual and scientific high-skill professions, and legislators, businessmen, managers and entrepreneurs.

Moreover, thanks to the database of the ISTAT, rates of unemployment at the regional level are obtained for all the cities where each graduate obtains a certain contract.

In the next section, the Conditional Risk Set Model will be briefly described, as the methodology used in order to analyze data above.

4.6   Model

As explained in the above section, the present article deals with survival data for students from the University of Florence who enter in the job market, before or after their

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[4]Unfortunately, after this reconstruction several contracts appeared overlapping their time spells for the same individual. Maybe arbitrarily, a choice was taken of maintaining case by case only the contract with the longest time lenght.

[5]ISTAT, La Classificazione delle Professioni, Edited by: STEALTH, 2013, p.15, available at: https://www.istat.it/it/files//2013/07/la_classificazione_delle_professioni.pdf (Trans.).

own graduation. Furthermore, these students can stipulate a contract which can be classified in three different categories, i.e. low, medium, and high jobs. Accordingly, a model for competitive risks is required to deal with those different outcomes. As the main aim of this article is to investigate the effect of the education credentials on the job market outcomes, then the professional level that each individual is able to reach through her own degree becomes very important. Indeed, the focus is to understand if university degrees are still able to improve the chances of finding a good job, more than just anyone. From this perspective, it makes sense to argue that the effect of each covariate with regard to the cause-specific Hazard function could diverge from the one on the cumulative incidence function. In this case, it is necessary to deal with the *proportional hazard models for subdistribution* as proposed by Prentice et al. (1981). Following the notation by Cleves et al. (2008), given $i = 1, ..., k$, the cause-specific hazard ratio is:

$$h_i(t) = \lim_{\Delta \to 0} \frac{P(t \leqslant T < t + \Delta t, \text{failure from cause } i | T \geqslant t)}{\Delta t}$$

where, t is a certain point in time, T is the time to first failure, and the overall hazard rate, which is the probability that the failure occurs into the prescribed time interval, is $h(t) = \sum_i h_i(t)$, and the probability a failure occurs because of i is $h_i(t)/h(t)$.

In presence of such a *complete data*, i.e. failures and causes are observable on all individuals, the partial likelihood function has to be modified in order to obtain consistent and asymptotically normal regression parameters. Moreover, due to the presence of competing risks, it is also necessary control for the possibility of tied events, i.e. events with the exactly same survival time. In order to deal with this problem, the method proposed by Efron (1977) is preferred since, even if fit statistics are worse than those of other methods, efficiency and parameters estimates are basically equal with others and the bias is even lower in presence of a large number of ties (Borucka 2014).

The other peculiarities of the available data are that events can be recurrent, and that the order in which events show up for each individual matters. Accordingly, starting from the partial likelihood function by Cox (1975), the estimation is corrected for multiple failure events, according with Andersen and Gill (1982), and stratified according with the order of events, as in Prentice et al. (1981). For the ith failure type ($i = 1,2,3$) the *hazard function* will assume the form:

$$h_i(t; \beta_i, X(t)) = h_{i0}(t)exp[X(t)^T \beta_i],$$

where h_{i0} is the latent baseline hazard function, $X(t)$ is the matrix of the covariates until time t, and β_i is the vector of the coefficients.

As risk conditional set model model belongs to the class of semiparametric analysis, also nonparametric analyisis will be conducted for this study. In particular, in order to control for the effect of holding a degree when a contract is stipulated, the cause-specific

hazard for each class of jobs will be plotted and tested. In particular, the log-rank test for the null hypothesis

$$H_0 : h_i^{No}(t) = h_i^{Yes}(t)$$

will investigate the equality of hazards over each job class if an individual is already graduated or not. Moreover, cumulative incidence function will be plotted in order to control the probability of stipulating a certain type of contract before a given time, with or without a degree. Furthermore, the null hypothesis that a cumulative incidence function does not differ across two different statuses will be tested through the Pepe and Mori (1993) test, in the case the degree has been already achieved.

As the above model will exhibit problems in meeting the proportional hazard assumption, and in order to try avoiding endogeneity issues, a second model will be specified focusing on high school diplomas and job career. In this case, as the test based on the generalization by Grambsch and Therneau (1994) of Schoenfeld (1982) residuals rejects the hazards proportionality, allowing to explore the specific covariates who originates this issue, the same analysis will be performed through time-varying covariates in order to identify the accelerating and decelerating factors for failures.

4.7   Estimation and Results

In this section, estimations and results will be presented. As it will be shown, the diagnostic of the model presented exhibits several problems. Nonetheless, tests will be performed in order to highlight useful hints about the examined relationships, beyond the simple checks for the robustness of the study.

4.7.1   Nonparametric Analysis

In Figure 4.1 it is possible to observe graphically the estimates of the cause-specific hazard for the three possible outcomes, as described above. At a first glance, it is

Outcome: Low job   Outcome: Medium job   Outcome: High job
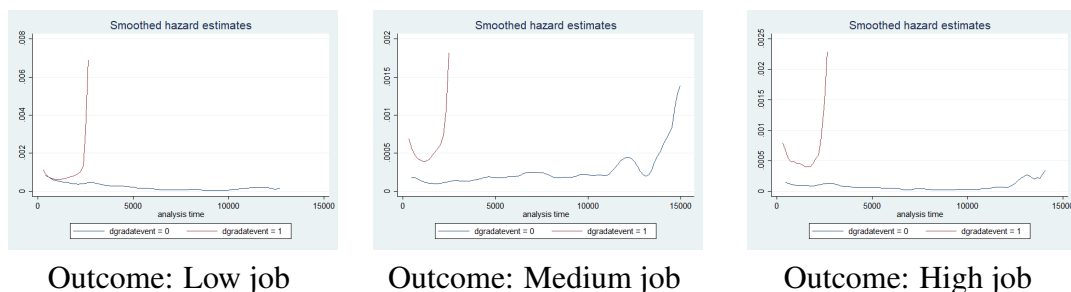
Fig. 4.1 Comparative cause-specific hazards for having a degree: ((a)) Low Job; ((b)) Medium Job; ((c)) High Job.

already possible to argue that the fundamental assumption of proportional hazard is not met in this data between the treatment and the control. Of course, in this context the fact of having already obtained the degree is considered the treatment, while being still in a university course is considered as a control. Nonetheless, some interesting insights about the information provided by those data is obtainable. Specifically, it is conforting to observe that in general the red line is above the blue one. This result suggest that the fact of holding a degree seems to increase the probability of stipulating any kind of contract in a short time. Simply, looking at this figure one could be tempted to conclude that being graduated it is still a more profitable strategy. On the other hand, looking at the subfigure 4.1.((a)), it is possible to observe how the two curves kind of overlap at the very left of the graphs. This fact suggests that not having a degree increases the probability of ending in a Low contract in a very short time. This outcome could be due to the fact that graduated people would wait more time before to search for a low job. Even if this conclusion looks in some sense trivial, it is still possible to conduct some test on it.

In particular, as it is shown by table 4.1, controlling the presence of a significant difference between the hazard functions of different statuses it is possible through a log-rank test. As observable, the hazard functions differ always, except for the Low Job case. This conclusion is comforting, since it is easy to expect there should be no difference in the probability of stipulating a contract for an unqualified job. On the other hand, a difference - with a significant positive effect in the treated group - could have been interpreted as a possible symptom of a generalized presence of overeducation.

Figure 4.2 allows to compare the cumulative incidence of stipulating a certain macro-category of contract for those who hold a degree versus who do not. Coherently with the expectations, we can observe how the probability of ending in a Low Job is higher for those who are not holding a degree, while the opposite happens for those who already hold it.

Also this results can be tested through the Pepe and Mori test summarized in Table 4.2. In particular, the main aim for this test is to control that the cumulative incidence of a certain outcome with respect to each other one differs over treatment groups. Again, in

Log-rank test for equality of survivor functions								
Low Job			**Medium Job**			**High Job**		
Graduated at event	Events observed	Events expected	Graduated at event	Events observed	Events expected	Graduated at event	Events observed	Events expected
No	1520	1486.47	No	5225	4687.27	No	5225	4687.27
Yes	1288	1321.53	Yes	3466	4003.73	Yes	3466	4003.73
Total	2808	2808	Total	8691	8691	Total	8691	8691
	chi2(1) =	1.72		chi2(1) =	144.89		chi2(1) =	144.89
	Pr>Chi2 =	0.1891		Pr>Chi2 =	0.0000		Pr>Chi2 =	0.0000

Table 4.1 Log-rank test for equality of survivor functions.

this framework the treatment group is identified by those who hold a degree. As shown in the table, the null hypothesis of equal cumulative incidences of distant relapses is always rejected at 1% level, except in the case of High versus Low jobs.

As a conclusion for this nonparametric analysis, it seems that generally the degree matters in order to obtain a job. In the next subsection, the semiparametric analysis will help to investigate more deeply those characteristics of the achieved educational level which emerge as useful for obtaining a better qualified job.

4.7.2 Semiparametric Analysis

As already described, in this subsection the Cox model in the specification of Andersen and Gill will be computed in order to estimate the cause-specific hazard for low, medium and high jobs. Results are summarized in Table 4.3, showing coefficients rather then hazard ratios. The table is divided in three parts. In the first part covariates are included regarding the secondary education career for each individual. In the second part there are the covariates for the tertiary education. Then, after showing the "treatment" variable, which identifies whether a worker is already graduated at the event, the set of tertiary education variables is presented interacted with this first dummy. Before to look at these estimation, it is important to highlight the results of the test for the proportional hazard assumption reported in the last line of the table. Indeed, the null hypothesis of proportional hazards has to be rejected in each specification, meaning that the model presented will need further investigation in order to deal with this issue.

Starting from the effect of secondary education, results show that the final grade is negatively significant for what regards Low and Medium jobs, and positively significant for High jobs. On the other side, the variable who identifies if at least one year was failed during the High School, it presents a strongly significant (and positive) effect only for ending up in the lowest category, while it exhibits a significant effect only at 10% level, for Medium and High jobs. This is not surprising. Realistically, better performing students graduated on time are those who try to achieve the most straightforward career

Outcome: Low job   Outcome: Medium job   Outcome: High job
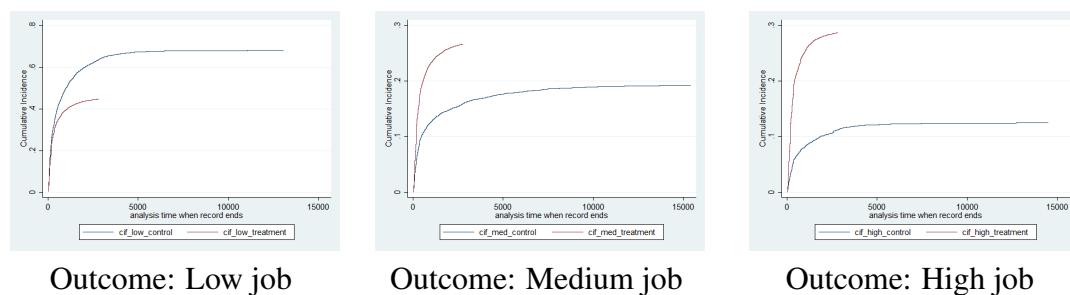
Fig. 4.2 Comparative Cumulative Incidence of holding a degree: ((a)) Low Job; ((b)) Medium Job; ((c)) High Job.

at the university, aiming to reach the more suitable jobs for a university graduate. At the same time, here there could be a confounding factor missing. It is possible that those students with lower incomes are the more likely to graduate with lower marks at the high school, and the more likely to need a job during the university in order to sustain themselves. Finally, with respect to those who are holding a Lyceum diploma, students from technical school are less likely to obtain any kind of job. At the same time, students from vocational schools are less likely to obtain Medium and High jobs but they show higher chances to obtain a low job, and those from other schools are less likely to obtain medium jobs, while no difference emerges with regard to other two job classes. All these conclusions are coherent enough with priors.

For what regards the set of variables for tertiary education, let see what happens looking jointly at the effect of each variable alone and interacted with the dummy that identifies for each time spell if an individual is already graduated. This, considering that apparently the chances of obtaining every kind of job significantly benefit from the university degree. Nonetheless, the weakest effect is of course showed for low jobs, and the strongest for the medium ones. This result could appear struggling, but at the very end it seems plausible that the estimated effect should be more powerful for a category such as that of medium jobs, which includes those contracts that much more requires credentials for moving up the queue, rather than experience as in high jobs. Consequently, it is possible to observe how a high final grade decreases the probability of ending up in a Low or Medium job and increases the probability of stipulating (in the long run) a High contract. The surprising fact is that the final mark has a null if not negative effect regarding medium jobs, for which it should be expected to have the highest impact, since they are the prescribed jobs obtainable through a university degree. Something similar happens for what regards the variable which tries to indicate if a student gained her degree within the prescribed time. In this case, combining the coefficients for the stand-alone covariate and the interacted one, it seems that achieving the graduation on late only increases the chances of obtain a medium job. Also here, the intrinsic characteristics of the degree have a very weak effect on what should be the

Pepe and Mori Test								
Low Job			**Medium Job**			**High Job**		
Event	Chi2(1)	p	Event	Chi2(1)	p	Event	Chi2(1)	p
Low	24.488	0.00	Medium	1116.3	0.00	High	1033.6	0.00
Medium	371.26	0.00	Low	170.1	0.00	Low	2.5082	0.11
Low	170.1	0.00	Medium	423.48	0.00	High	1137.9	0.00
High	1116.3	0.00	High	1137.9	0.00	Medium	423.48	0.00

Table 4.2 Pepe and Mori Test comparing the cumulative incidence two groups of holding a degree.

most suitable outcome. Apparently, the picture drawn by these estimates is that the better graduates are pushed out from low jobs toward the highest ones, probably in the long run, while the mediocre former students, who graduated with a middling evaluation and/or in a longer time, remain stocked in medium jobs.

Now it is time to compare the effect of different regulatory systems, having as a reference the bachelor degree in the newest framework, i.e. 270/2004. Apparently, Masters for the law 270/2004 decreases the probability for each outcome but High jobs, for which the combined effect of the significant coefficients with and without the interaction term results to be positive. In comparison with Bachelors 270/2004, both Bachelors

| | Conditional Risk Set Model | | | | | |
| | Low | | Medium | | High | |
	$\hat{\beta}$	s.d.	$\hat{\beta}$	s.d.	$\hat{\beta}$	s.d.
Secondary Ed.						
Final Grade	-0.0020***	(0.0062)	-0.0002	(0.0009)	0.0062***	(0.0010)
Fail	0.1456***	(0.0242)	-0.0603*	(0.0343)	-0.0690*	(0.0404)
Technical	-0.0730**	(0.01944)	-0.0457*	(0.0277)	-0.2615***	(0.0323)
Vocational	0.0790	(0.0537)	-0.1902**	(0.0755)	-0.3396***	(0.0908)
Other	0.271	(0.0307)	-0.2444***	(0.0496)	0.0447	(0.0416)
Tertiary Ed.						
Average Mark	0.0023	(0.0053)	-0.0134***	(0.00476)	0.0200*	(0.0114)
Out-of-Time	-0.1312***	(0.0035)	-0.0630***	(0.0046)	-0.0309***	(0.0045)
Master 270/2004	-0.0614	(0.0658)	0.5234***	(0.1093)	1.0279***	(0.1328)
S.C. 270/2004	-0.2098**	(0.0834)	-0.1075	(0.1675)	0.7655***	(0.2779)
Bachelor 509/1999	-0.3993***	(0.0306)	-0.1507**	(0.0676)	0.1313	(0.0973)
Master 509/1999	-0.6832***	(0.0496)	0.1592*	(0.0856)	0.7654***	(0.1122)
S.C. 509/1999	-0.2849***	(0.0772)	-0.3201*	(0.1780)	0.3488	(0.2632)
V.O.	-0.4258***	(0.0501)	-0.2330**	(0.0943)	0.6623	(0.0990)
$d\_$Grad.atEvent	0.3925*	(0.2302)	1.0933***	(0.2588)	0.8687**	(0.4367)
#Grad.atEvent						
Average Mark	-0.0320***	(0.0082)	-0.0039	(0.0084)	0.0455***	(0.0155)
Out-of-Time	0.1085***	(0.0053)	0.0662***	(0.0062)	0.0298***	(0.0062)
Master 270/2004	-0.2447***	(0.0939)	-0.7217***	(0.1538)	0.9093***	(0.1619)
S.C. 270/2004	-0.2728**	(0.1350)	-0.4660**	(0.2275)	-0.1311	(0.3287)
Bachelor 509/1999	-0.0652	(0.0445)	-0.0350	(0.0871)	-0.4574***	(0.1119)
Master 509/1999	-0.1594**	(0.0677)	-0.5663***	(0.1085)	-0.9160***	(0.1299)
S.C. 509/1999	-0.3774***	(0.1172)	-0.6034***	(0.2233)	0.3982	(0.2798)
V.O.	-0.4439***	(0.0753)	-0.5608***	(0.1271)	-0.4718***	(0.1176)
Control Variables						
Faculties	Yes		Yes		Yes	
No. of Subjects	31,826		31,826		31,826	
No. of Failures	17,203		7,562		7,015	
Time at Risk	21295566		21295566		21295566	
Log pseudolike.	-157011.06		-67685.447		-62559.512	
Prop.-Haz. Ass.	$p > \chi^2(48) : 0.00$		$p > \chi^2(47) : 0.00$		$p > \chi^2(51) : 0.00$	

Table 4.3 Conditional Risk Set Model for Ordered Failure Events, stratified by occurence, and with tied events controlled by Efron Method.

and Masters 509/1999 result to have a negative effect, while Single Cycle (S.C.) degree for the newest regulatory system has negative effect on both Low and Medium job outcomes, and strong positive effect on High jobs. This result can be interpreted as a good news for the quality of these kind of degrees, which mainly include faculties such as Medicine, Law, or Construction Engineering, i.e. among the faculties with the higher reputation. On the other side, the preceding regulation on S.C. courses exhibits no significant difference in comparison with the actual bachelors. Finally, having a V.O. degree, which belongs to a regulatory system antecedent of 1999, decreases the probability of stipulating any kind of contracts, but the High ones. This result is probably vitiated by the fact that who holds a V.O. degree is on the job market from a longer time. Finally, it is necessary to highlight that the examined results also include fixed effects for the faculties attended, both interacted with the graduation at the event and not.

In a nutshell, the estimations presented above show a strong consistence for those variables attaining the Secondary Education, while the Tertiary Education - much more difficult to be interpreted because of the numerous interactions required - causes doubts both on its robustness and on the possible presence of endogeneity problems due to the direct relationship between university degrees and job market outcomes. Consequently, further analysis will be devoted on the exploitation of the effect of Secondary Education on Higher Education graduates.

4.7.3 Secondary Education and Working Students

In order to exploit the effect of Secondary Education on Job Market Outcomes, the analysis is restricted on graduates at university, namely those who have already obtained the degree and observed only after the achieved it. Of course, the estimation has to be focused on a different treatment, and the choice fell on a dichotomic variable indicating if a student worked during the period she was enrolled at university. The idea behind focusing on Secondary Education lies in the fact that it emerges as one of the main source of social stratification, and the following estimations will aim in exploring the idea that, at the very end, the fate of a graduate could be decided much more before her graduation day. From this point of view the choice of focusing on working students is not random. Indeed, the fact to have worked during the period of studies at the university system could be a consequence of different situations, both at the individual and social level. One can decide to work because she needs money, while someone else just because she wants to be independent from her own family. At the same time, working can slow down the achievement of the university degree, but it can also be rewarded on the job queue position, as a signal of determination and resourcefulness. Indeed, observing again the Table 4.3 it is possible that graduating on late at the university negatively affect the chances of getting a low job because it

incorporates the choice of students that decide to employ more time in order to improve their academic curricula. On the other side, the fact the prescribed variable presents a slightly positive coefficient for medium jobs could be due to the fact that working students, mainly coming from economic difficulties, are rewarded on the job market with a suitable job for a graduate person, but at the same time they remain mainly stocked on average jobs.

Looking at table 4.4, it is possible at a first glance to notice how almost all the information regarding Secondary Education are highly significant. In particular, a substantial final grade helps in reaching high job positions, at the same time avoiding low and medium ones. The opposite evidence arises looking at the variable indicating if a student graduated on late. This result is remarkable thinking that it refers to characteristics of high school diplomas on job market outcomes reached after university graduation. Also looking at the different type of high schools the usual hints of social stratification emerge. Always keeping lyceums as the baseline, Technical Schools exhibit higher probabilities of ending up in low and medium jobs, and lower for high jobs. Vocational schools strongly increases the chances of obtaining low jobs, it decreases those of

| | Conditional Risk Set Model | | | | | |
| | Low | | Medium | | High | |
	$\hat{\beta}$	s.d.	$\hat{\beta}$	s.d.	$\hat{\beta}$	s.d.
Secondary Ed.						
Final Grade	-0.0042***	(0.0006)	-0.0030***	(0.0008)	0.0104***	(0.0009)
Fail	0.1840***	(0.0252)	0.0536*	(0.0316)	-0.1786***	(0.0342)
Technical	0.0413**	(0.0198)	0.0753***	(0.0238)	-0.2947***	(0.0262)
Vocational	0.1778***	(0.0605)	0.0053	(0.0688)	-0.5490***	(0.0983)
Other	0.0818**	(0.0327)	-0.1500	(0.0455)	-0.1596***	(0.0394)
Job Career						
Working Student	0.3088***	(0.0369)	0.0579*	(0.0342)	-0.8297***	(0.0353)
Prev.Job Low	0.7905**	(0.3846)	-0.1895	(0.3323)	-0.2924	(0.3043)
Prev.Job Medium	0.3636	(0.3850)	0.2235	(0.3353)	-0.1779	(0.3049)
Prev.Job High	-0.0813	(0.3856)	-0.3478	(0.3333)	0.6020**	(0.3070)
ΔUnemployment	0.0218***	(0.0041)	0.0112*	(0.0057)	-0.0168***	(0.0061)
Time at Event						
Age	-0.0624***	(0.0027)	-0.0271***	(0.0028)	0.0227***	(0.0027)
Control Variables						
Faculties	Yes		Yes		Yes	
No. of Subjects	26,434		26,434		26,434	
No. of Failures	15,007		9,547		9,920	
Time at Risk	586519.5		647293.8333		875427.3667	
Log pseudolike.	-120445.45		-75791.28		-78781.275	
Prop.-Haz. Ass.	$p > \chi^2(30) : 0.00$		$p > \chi^2(30) : 0.00$		$p > \chi^2(30) : 0.00$	

Table 4.4 Secondary Ed. and Working Students: Conditional Risk Set Model for Ordered Failure Events, stratified by occurence, and with tied events controlled by Efron Method.

obtaining high ones, while the coefficient for medium jobs is not significant. With weaker statistical significances, the same result emerges for the other types of schools.

Moving on control variables attaining the job career of graduates in the sample, it is possible to observe how the fact of having been a working students do not seem to be positively rewarded by the Italian job market. Indeed, this characteristic is positively significant at the 1% level for low jobs, positively significant - only at the 10% level - for medium jobs, and it exhibits a strongly negative significance for high jobs.

Moreover, looking at the effect of the job immediately preceding the one on examination, it is possible to observe how it is almost always not significant. Apart from the evidence that having had a low (high) job helps in finding another low (high) job, it seems that the previous experience plays no role in providing job progress, net to the strong effect estimated for Secondary Education career.

In this case, it was also possible to control for difference among the unemployment rates of the regions in which the examined job and the previous one (or the university if it was the first) were obtained. As it could be expected, in order to obtain a high level job in Italy it is necessary to move toward the healthiest regions of the country.

Finally, also the age at the event is explored, observing how high jobs are obtainable only after time spent on the job market, while low and medium ones are negatively correlated with this covariate.

The last row of table 4.4 points out how also in this estimation the proportional hazard assumption is not met. Nonetheless, Figure 4.3, plotting the proportional hazards for having been or not a working student, do not seem to present a picture so much far from proportionality, with the only exception of subfigure 4.4.((c)) for high jobs. Keeping in mind that the presence of such a large number of observation can inflate the dataset, hardening the proportional hazard assumption to be met, a test for the interaction of covariates with analysis time can help in investigating those factors accelarating or decelerating significantly the probability of ending up in a certain outcome.

Outcome: Low job   Outcome: Medium job   Outcome: High job
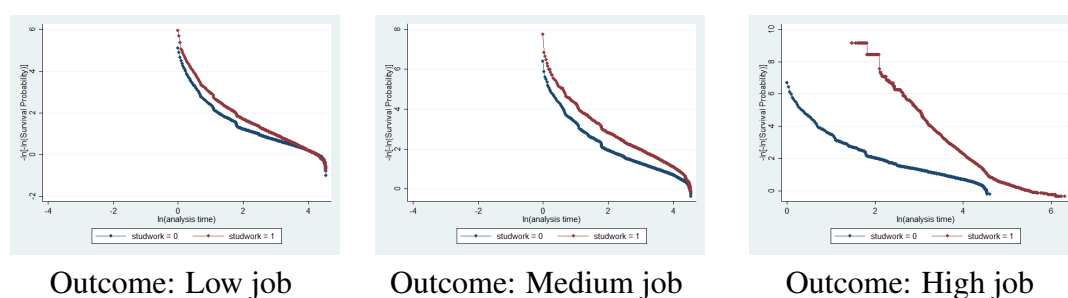
Fig. 4.3 Proportional Hazard Plot for being a Working Student: ((a)) Low Job; ((b)) Medium Job; ((c)) High Job.

Hence, looking at Table 4.5 some straightforward conclusions can be taken. First of all, regarding low jobs the differential in the rates of unemployment seems to accelerate the effect of the time. The idea is confirmed that moving toward the poorest region of the country condemns on having to be content of a low job, even if a degree is hold.

On the other side, the probability of obtaining a medium job is accelerated by having been a working student, or having already worked at a medium or high level. Unsurprisingly, in this case the differential in unemployment rates turns out to be a decelerator. Concerning high jobs it is possible to observe one accelerator, which is the fact of hav-

	Conditional Risk Set Model (Main)					
	Low		Medium		High	
	$\hat{\beta}$	s.d.	$\hat{\beta}$	s.d.	$\hat{\beta}$	s.d.
Secondary Ed.						
Final Grade	-0.0043***	(0.0009)	-0.0044***	(0.0011)	0.0126***	(0.0013)
Fail	0.1668***	(0.0353)	0.0653	(0.0476)	-0.2436***	(0.0522)
Technical	0.0575**	(0.0281)	0.0452	(0.0358)	-0.2410***	(0.0389)
Vocational	0.2568***	(0.0825)	-0.0714	(0.1080)	-0.4159***	(0.1359)
Other	0.0958**	(0.0472)	-0.1084	(0.0663)	-0.2397***	(0.0630)
Job Career						
Working Student	0.2828***	(0.0703)	-0.0202	(0.0655)	-1.7726***	(0.0883)
Prev.Job Low	0.1449	(0.4079)	-0.9173*	(0.5083)	1-6830	(1.2896)
Prev.Job Medium	-0.2618	(0.4098)	-0.6581	(0.5140)	1.7003	(1.2904)
Prev.Job High	-0.7025*	(0.4118)	-1.1245*	(0.5115)	2.7578**	(1.2938)
ΔUnemployment	0.0119*	(0.0062)	0.0274**	(0.0082)	-0.0119	(0.0091)
Age at Event	-0.0652***	(0.0040)	-0.0260***	(0.0046)	0.0383***	(0.0037)
	Conditional Risk Set Model (TVC)					
Secondary Ed.						
Final Grade	-0.00004	(0.0000)	0.0000	(0.0000)	-0.00006**	(0.0000)
Fail	0.0012	(0.0013)	-0.0000	(0.0000)	0.0019**	(0.0010)
Technical	-0.0009	(0.0010)	0.0012	(0.0011)	-0.0015*	(0.0008)
Vocational	-0.0036	(0.0033)	0.0044	(0.0031)	-0.0024	(0.0024)
Other	-0.0006	(0.0017)	-0.0018	(0.0020)	0.0015	(0.0011)
Job Career						
Working Student	0.0018	(0.0019)	0.0033*	(0.0017)	0.0187***	(0.0016)
Prev.Job Low	0.0170	(0.0120)	0.0168	(0.0107)	-0.0344**	(0.0168)
Prev.Job Medium	0.0155	(0.0119)	0.0258**	(0.0110)	-0.0326*	(0.0169)
Prev.Job High	0.0146	(0.0120)	0.0181*	(0.0107)	-0.0374**	(0.0169)
ΔUnemployment	0.0007***	(0.0002)	-0.0007**	(0.0003)	-0.0002	(0.0002)
Age at Event	-0.0001	(0.0002)	-0.0002	(0.0002)	-0.00041***	(0.0001)
Control Variables						
Faculties	Yes		Yes		Yes	
Year at Event	Yes		Yes		Yes	
No. of Subjects	26,434		26,434		26,434	
No. of Failures	15,007		9,547		9,920	
Time at Risk	586519.5		647293.8333		875427.3667	
Log pseudolike.	-119933.69		-75461.072		-78609.611	

Table 4.5 Time-Varying Covariates Test: Conditional Risk Set Model for Ordered Failure Events, stratified by occurence, and with tied events controlled by Efron Method.

ing been a working students, while all kind of previous job turns out to be a decelerator. This last result is contradictory, but it can be explained distinguishing two different situations. For low and medium jobs the difficulties in reaching the top of the job pyramid could have been captured. For high jobs the resistance in changing a job after having reached the top could have been estimated.

Also the evidence that having been a working student behaves as an accelerator is interesting. Indeed, if it is true that former working students are those who experimented the harsher economic difficulties, it seems that, as long as they are able to escape the social trap which stocks them in lower level jobs, they become so dynamic to reach the top faster. Undoubtedly, if a student worked because of her own economic conditions, she has much more need to accept any kind of job, but at the same time she could also improve faster her own curriculum vitae in a way that the society would possibly reward before or after.

4.8   Conclusions

This paper tried to verify how much degrees from graduates at the University of Florence are able to match the correspondent level of education with a certain type of job for which 8 type of contracts are categorized hierarchically according to three macro-classes. The analysis is divided into a nonparametrical and a semiparametrical analysis. The nonparametrical analysis offers only a broad picture about the effect of holding or not any kind of degree. On the other side, the semiparametrical analysis provides useful insights about the effect of a wide set of covariates. Then, a further development focuses on the effect of secondary education and on the possibility of having been a working student during the tertiary education.

Findings from nonparametric analysis show that holding a degree emerges in general as a good strategy for ending up in higher typologies of contracts. Nonetheless, there are higher chances to find a lower job in a shorter time for those who have still not achieved a degree. This fact is coherent with theory of positionality. In this respect, who has not a degree can easily move ahead in the recruitment queue for lower-skilled job, while those who holds a degree will probably choose firstly the high-skilled recruitment queues before to move on the lower ones.

On the other side, the cumulative incidence of stipulating Medium-High and High jobs is significantly higher for those who already have achieved a degree, as confirmed by the Pepe and Mori test.

Apart from this very general and - in some cases - trivial conclusions, much more interesting evidences emerge from the Cox Model with the Anderson and Gill's approach. In particular, as the prior was to find the best matching for the class of Medium contracts, then what actually shows up is that if obtaining any kind of university degree is particularly useful for this kind of contract, then good credential's characteristics poorly

match with this category. In particular, grades exhibit a negative correlation with regard to this specific type of contracts. On the other hand, good results have a weak effect in increasing the possibilities of obtaining a high contract, and no effect in getting a low one.

Nonetheless, the various type of high school degrees behaves generally as expected, with Lyceums more suitable for obtaining any kind of contract. According to expectation, also the regulatory systems of the Higher Education degrees are more or less coherent, with single cycle degrees which pushes out from lower contracts and Master's degrees which increase the probability of obtaining higher-skilled contracts.

In general, the problem of overeducation in this framework, if any, seems to be more related with the specifical intrinsic details of the degree (e.g. time-to-degree, grades) than with its general characteristics (e.g. type, regulation). From this perspective, any eventual strategy adopted by student in order to improve their position in the recruitment queue could be less useful than expected, with the exception of the career pathway in general, both at the high school and at the university.

As a consequence to these findings, a new analysis was conducted focusing on secondary education and job career, excluding tertiary education characteristics with the only exception of faculties attended as fixed effects. To this extent, all the priors about the secondary education as the main source of social stratification were generally confirmed. Indeed, it seems sufficient to be a well-performing student coming from a lyceum to strongly increase the chances of obtaining a high job contract. But, as shown in the related literature, these characteristics are still devoted to upper-classes graduates. Unsurprisingly, the odds of reaching the top of the skilled-job pyramid increase significantly for those individuals who are available to move toward regions with the lower unemployment rates, while very weak effects are found for the previous contracts stipulated.

Finally, the conditions of those who worked during their higher education studies reflect the idea that upward social mobility is precluded to students finding themselves to be in economic difficulties. Indeed, working students are more likely to end up in low jobs, and significantly less likely to end up in a high job, while no significant effect is shown for medium jobs. Nonetheless, the fact of having worked during higher education studies turns out to be an accelerator for the probability of finding a suitable job in a shorter time. This result suggests that maybe the signal provided by rolling up the sleeves, and the experience earned consequently, can still help in entering faster the job market.

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