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Di Cintio, Marco and Grassi, Emanuele

Department of Economics, Mathematics and Statistics, University of
Salento

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Internal Migration and Wages of Italian University Graduates*

Marco Di Cintio[†]

Emanuele Grassi[‡]

Department of Economics, Mathematics and Statistics - University of Salento

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Abstract

In this paper, we estimate wage gains due to sequential geographic mobility of Italian University Graduates three years after graduation. By means of a matching procedure we quantify wage *premia* associated with the choice of studying far from home, moving after graduation and moving back home after graduation. We find evidence of large heterogeneity in the returns to different migration patterns. We estimate large gains for those who move after graduation and little benefits for those who choose to go back home after having studied in regions different from that of origin. Finally, we also discuss a “transitivity” result for the estimated treatment effects.

Keywords: Internal migration; wage premia; kernel matching.

JEL Classification: I23, J24, J31, J61.

1 Introduction

It is a matter of fact that higher education is on average associated with higher wages to the extent that it increases the level of skills and, thus, of productivity. However it remains

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[†]Department of Economics, Mathematics and Statistics - University of Salento. e-mail: marco.dicintio@unisalento.it

[‡]Address for correspondance: Dipartimento di Scienze Economiche e Matematico-Statistiche - University of Salento. Centro ECOTEKNE Via per Monteroni 73100 LECCE (Italy). Tel: (+39) 0832-298788 – Fax: (+39) 0832-298788. e-mail: emanuele.grassi@unisalento.it

an open question whether, among university graduates, there are other factors able to make students more successful in their early labour market outcomes. In this paper, we address this issue by analyzing the impact of sequential geographic mobility on wages for a sample of Italian university graduates three years after graduation. In particular, we determine to what extent internal migration from domicile to higher education and, subsequently, to first employment affects the wages of young graduates.

Since the earlier literature, migration has been soon recognized as a human capital investment carried out by income-maximizers individuals (Sjaastad, 1962; Bowles, 1970; Greenwood, 1975). As such, one would expect migration to be accordingly rewarded through higher earnings for those who choose to migrate compared to those who did not. Then, what triggers the migration decision and what consequences do we observe on individuals and the labour market as a whole? Mainstream research has devoted a great deal of attention to answer these questions, and a large consensus has been reached on the causes of the migration decision. In particular, Bowles' pioneering contribution identifies the present value of expected income as one of the key variables affecting the choice of moving¹. In addition, regional differences in the returns to skills may drive the size and skill composition of migration flows (Borjas et al., 1992). Other factors include career progressions (Schlottmann and Herzog, 1984), industry composition, amenity differentials, relative employment opportunities and relative real wages (Treyz et al., 1993). Gottlieb and Joseph (2006) narrow the analysis to the college-to-work migration decision and show that science and technology graduates migrate to better educated places, that PhD graduates value amenity characteristics more than other groups and that foreign students from some immigrant groups migrate to places where those groups are already concentrated.

Conversely to the large body of the literature focused on the determinants of geographic mobility, only few studies attempted so far to deal with the effects of migration on labour market outcomes. Moreover, it is not clear whether the migration decision has a direct impact on wages and, if so, whether it is negative or positive. Indeed, Nakosteen and Westerlund (2004) and Lehmer and Ludsteck (2010) find a positive and significant effect of migration on gross income, Détang-Dessendre et al. (2004) emphasize the absence of any impact of internal migration on wages, and Tunali (2000) shows that a large fraction of migrants experience a negative return to migration.

From a spatial point of view, migration flows take place across or within national borders, so that migrants can be consequently classified as international or internal migrants. We specifically look at the second type of migration and, moreover, we restrict our analysis to a sample of graduates labour market entrants. We believe that the patterns of students' internal migration cannot be underestimated in terms of policy implications both by universities and central/regional governments. Italian universities compete on students enrollment to increase the level of attractiveness both to raise the quality level of their pupils and because they are awarded greater funds from the government. Policy makers can be interested in retaining hu-

¹As a consequence, age has a negative impact on the propensity to migrate, while schooling acts positively.

man capital to stem the brain drain from poorer areas as well as to increase overall economic efficiency.

From an economic perspective, geographic mobility is closely related to differences in local labour markets and is able to broaden individuals' opportunities over jobs and locations (Malamud and Wozniak, 2006). This may result in a selectivity problem because individuals with greater incentives are also those who choose to migrate. We use a non-parametrized matching procedure to control for the selection process by exploiting all the information contained in the data. We also perform a subsample analysis to check the reliability and stability of the results.

The rest of the paper proceeds as follows. Section 2 provides the basic economic intuitions and motivations of internal geographic mobility. Section 3 focusses on the data. In section 4 we briefly describe the econometric model, while in section 5 we present the empirical results. Section 6 concludes.

2 Internal migration of graduates and early earnings

Economists have long recognized that individuals are pushed to migrate because they wish to accrue their future income streams by exploiting greater opportunities in the destination area. Indeed, Borjas et al. (1992) provide theoretical intuitions and empirical evidence of the role played by differences in the returns to skills to predict movements across different geographic areas within a country. This reasoning can be accommodated to the migration decisions of university students. In particular, the migration pattern can be thought of as the result of a two-stage process through which students first choose the university they want to attend, and then they move to the place where they wish to find a job. The economic rewards to this process are at the core of our analysis.

Relative to our observational window, the possible taxonomy of mobility patterns includes three alternative categories. Indeed, from the moment an individual migrates to study, he or she has to face the decision of where to look for a job, thus whether to remain in the destination area, move to another host region, or return to his/her area of origin. This categorization is in line with the Dustmann and Weiss's (2007) idea that migrants' lifetime utility could be maximized either by spending some time in the host area, for example to acquire a better education, and then returning home², or by a subsequent mobility optimal choice. In this respect, our contribution is also linked to the literature concerned with permanent and temporary migration³.

Similarly to Lansing and Morgan (1967), we believe that comparing the labour market outcomes between those who have shown some mobility pattern and individuals belonging to the destination area might be misleading. Thus, we wish to uncover the economic effect

²If human capital acquired in the host region is better rewarded at home, then lifetime income could be maximized through temporary migration.

³The migration literature considers temporary migration as a wider category, which may include seasonal migration, migration for temporary job or migration to acquire education.

of geographic mobility on wages by comparing the income of those who have been mobile - according to our definitions of mobility - with the income of those otherwise similar students who have not shown the same mobility patterns. A practical advantage is that we do not have to predict wages for all the possible destinations that have not been chosen by individuals, but only wages for a well-defined control group. In order to do so, we first split Italy into four macro-areas, namely North-East, North-West, Center and South, then we define five mobility variables⁴ able to track the migration patterns. We define *stayers* those who never leave the area of origin - neither to study nor to work; *early movers* are those who migrate to study and remain in the same area to work; *late movers* study in their area of origin and move to a different area for employment; *back-movers* are those who choose to go back to their area of origin after having studied far from home⁵. According to these definitions, we implement five evaluation studies aimed at detecting possible wage gains due to different inter-regional mobility patterns. Specifically, the evaluation studies are the followings:

1. Early Mover vs. Stayer⁶;
2. Late Mover vs. Stayer;
3. Early Mover vs. Late Mover;
4. Back Mover vs. Stayer;
5. Back Mover vs. Early Mover.

In the first two cases, the effect of mobility is examined by comparing the income of mobile individuals with the income of similar individuals who have been mobile. In the third case, both early movers and late movers work in a geographic area different from that of origin, but they differ in the timing of migration. Thus, the effect of early mobility is evaluated by comparing the income of early movers with the income of late movers. The fourth case is aimed at detecting the wage gain associated with early mobility, but only for those individuals who find a job in the area of origin. The last case wants to isolate the wage gain/loss of those individuals who find a job in the area of origin had they not chosen to move from the place where they studied.

⁴For a similar approach see Faggian et al. (2006).

⁵Note that the groups are mutually exclusive, so it is not possible that an individual belongs to more than one group. There is also the category of *movers* whose individuals choose to migrate both to study and to work. Therefore, they leave both the area of origin and the area of university.

⁶For each item in the list, the first term qualifies the treatment status, while the second term qualifies the non-treatment status.

3 Data

To carry out the empirical analysis, we use data from the 2004 and 2007⁷ waves of the Graduates' Employment Survey⁸ (GES). The survey is conducted by the ISTAT (National Institute of Statistics) every three years since 1995 and covers a sample of individuals who graduated three years earlier⁹. The GES has proven to be an effective source of information for several reasons. First, the available information on wages is for a relatively recent cohort of college graduates. Second, it provides valuable information on academic curriculum, labour market experiences, individual characteristics, and family background which are essentials to control for selectivity (see Black and Smith, 2004). Moreover, the data offer detailed information on the region of residence before going to university, on the region where the university is located and on the region of work¹⁰. The questionnaire also asks whether the student actually moved to the University location or was only a pendular, and this allows us to construct individuals' mobility patterns with greater reliability.

Past education is summarized by high school type (Scientific, Humanities, Technical, Other Professional high schools) and high school final grade. Fields of study have been classified into five main categories: Scientific (Chemistry, Physics, Geology, Biology, Pharmacy, IT and Mathematics), Engineering (including Architecture), Economics (Statistics and Business), Social Sciences (Sociology, Political Sciences, and Law), and Humanities (Philosophy, Literature, Languages, Education, Psychology). Other academic characteristics are university final grade, honor, courses attendance, repeating students and the working student status. Family background variables include both parents' education (no education, primary school, secondary school, high school, university diploma and university or PhD) and fathers' occupation (managerial, white collar, blue collar). Individual characteristics include gender, age, area of origin (North-west, North-east, Centre, South) and university location (North-west, North-east, Centre, South).

Graduates from scientific and engineering represent 22.7 per cent and 23.7 per cent of the sample, respectively, whereas graduates from humanities and social sciences are 16.6 per cent and 19.3 per cent respectively, while students in the economic field represent 17.5 per cent. The university final grade average is around 103/110 and 20 per cent obtained the honor. Most of the graduates in our sample (75.7%) attended the courses regularly, but the average completion of a program of study is two years more than the established ministerial period. As far as past educational choices are concerned, the mean of the High school final grade is around 49/60. Scientific general high school represent 44.2 per cent of the sample, while Humanities

⁷We decide to pool the two waves to increase the sample size.

⁸Indagine sull'Inserimento Professionale dei Laureati - ISTAT.

⁹Since we observe wages three years after graduation, we cover the hypothesis that it takes time for an individual to receive returns to migration. Yankow (2003) illustrates this point and finds that highly educated workers receive returns to mobility with a lag of nearly two years.

¹⁰Since the publicly available micro-data do not include complete geographic information, we carried out the matching procedure at the ADELE ISTAT laboratory in Rome.

Figure 1: Early mover vs. Stayer

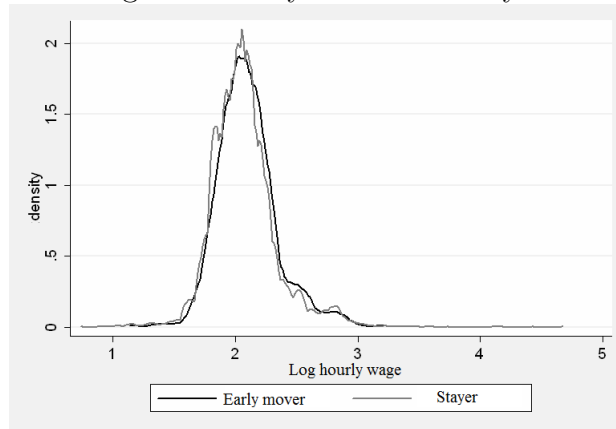
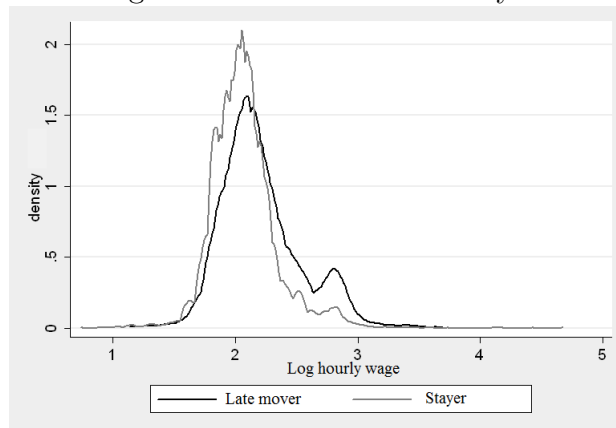


Figure 2: Late mover vs. Stayer



general high school and Professional high school are 16.3 and 29.8 per cent respectively. In our sample, uneducated parents are a very small fraction; fathers with a primary school degree are 14% while mothers are 17.5%; secondary school degree for fathers and mothers are 25.9 per cent and 27.7 per cent respectively; nearly 37 per cent of parents hold a high school degree; 21.3 per cent of fathers and 15.4 per cent of mothers hold a university degree or a PhD. Individual characteristics also show an age on average of 27 years and that 52.2 per cent of graduates are female. Finally, the outcome variable we consider is the net-of-taxes log hourly wage obtained by those individuals who are stably employed at the date of the survey. Kernel density distributions of the outcome variable are presented in Figures 1 to 5.

From the original sample, we keep individuals holding only one degree and with a paid job, while we drop the observations whose individuals were already working during their studies. Moreover we exclude from the analysis individuals graduated in medicine, physical education

Figure 3: Early mover vs. Late mover

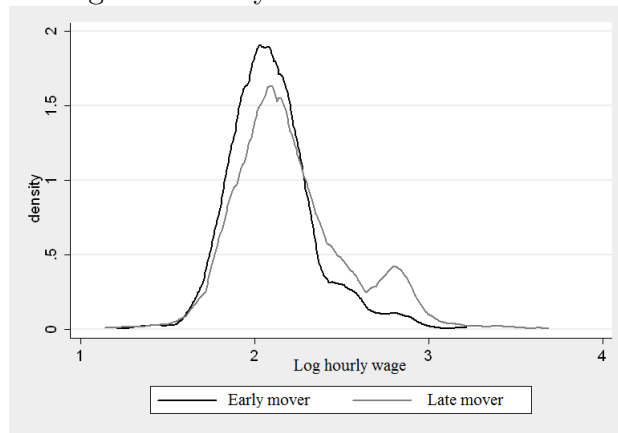


Figure 4: Back mover vs. Stayer

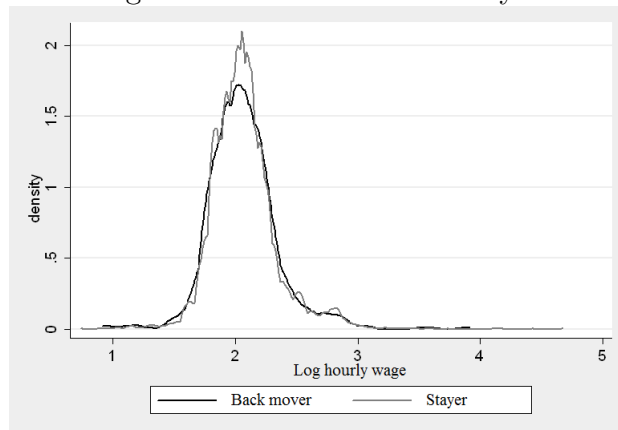
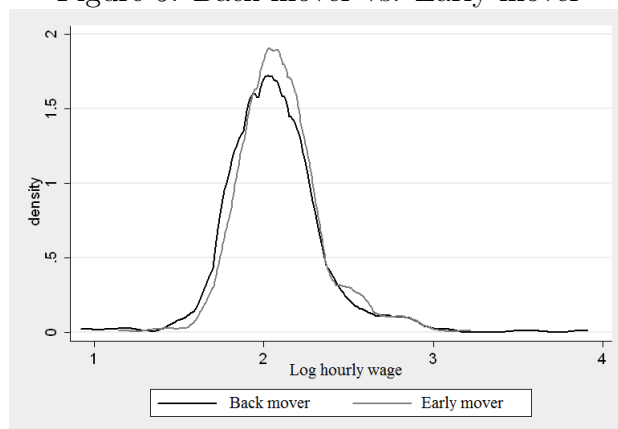


Figure 5: Back mover vs. Early mover



(gym) and defense¹¹. The individual wage is available for 22689 graduates but observations on self-employed individuals have been dropped to keep the sample as homogeneous as possible. The final sample is made up of 15886 individuals with complete information on mobility patterns, the outcome variable and the covariates needed to compute the propensity score. In particular, stayers represent 75.71% of individuals in our sample. Migration takes place at an early stage both for early movers (3.78%), back movers (3.41%) and movers (1.59%), while late mobility happens in 15.5% of the cases. It is worth noticing that, by focussing on the subsample of individuals belonging to the South, the percentage of stayers drops substantially (53.89%) in favor to early movers (9.18%), late movers (28.12%), movers (3.97%) and back movers (4.85%). However, by looking at the distribution of graduates by area of origin and university location, an important point arises. On the one hand, most of study migrants from the South attend universities in the North. On the other hand, movers coming from the North West attend universities in the North East and vice versa. This means that the process of regional “brain circulation” concerns Northern region while the process of “brain drain” is relegated to the South, despite the mobility of Southern students is significantly constrained by lower family income.

4 Econometric model

In order to assess the effect of early and late mobility on wages, we adopt a non-parametrized matching protocol. The framework is the standard *potential outcome approach* as defined in Rubin (1974) and Holland (1986), in which, for each individual and for a given intervention (treatment), we can only observe either the outcome conditional on receiving the treatment (Y_1) or the outcome conditional on non-receiving the treatment (Y_0). The evaluation problem simply arises because, for each person, we can only observe one of the two potential outcomes and the effect of the treatment on a single unit ($\Delta Y = Y_1 - Y_0$) can never be assessed. However, we can still focus on different informative measures to quantify average impacts. In the present study we are concerned with the mean impact of the treatment on the treated¹², i.e. the *average treatment effect on the treated* (ATT). Formally, let D the indicator of the treatment status, X a non-empty vector of observed characteristics, $p(X)$ the propensity score and τ the estimand. The ATT can be written as:

$$\tau^{ATT} = E(Y_1 - Y_0 | p(X), D = 1) = E(Y_1 | p(X), D = 1) - E(Y_0 | p(X), D = 1) \quad (1)$$

While the mean outcome in the treatment regime is identified from the data, the missing counterfactual must be appropriately estimated. Several approaches are available to the econo-

¹¹These categories have been excluded because they differ both in terms of course duration and post-graduation paths.

¹²For an extensive survey on other parameters of interest, the reader may refer, among others, to Imbens (2004).

metrician¹³. According to Frolich (2004), kernel matching seems to perform better in propensity score matching procedures. Thus, we decide to use this methodology to achieve greater reliability. Moreover, matching estimators have proven to be more effective in the presence of a large reservoir of control units (Imbens, 2004), as in our case.

Technically, we implement a kernel matching protocol based on the propensity score, in which the counterfactual outcome is build as a weighted average of the control units and the weights are inversely proportional to the propensity score distance between a treatment case and all the control cases. In other words, the closest control cases are given the greatest weight and contribute more to the construction of the counterfactual outcome. In this way, the matched sample becomes more reliable because of the higher comparability of treated and control units.

As in Heckman et al. (1998), the estimator can be written as:

$$\tau_K^{ATT} = \frac{1}{NT} \sum_{i \in T} \left\{ Y_{1i} - \frac{\sum_{j \in C} Y_{0j} G\left(\frac{p_j - p_i}{h_n}\right)}{\sum_{k \in C} G\left(\frac{p_k - p_i}{h_n}\right)} \right\}$$

There are several advantages in using this estimator. First, through matching it is possible to relax the assumption of linear functional forms which are implicit in regression based estimates of counterfactual outcomes. Second, matching helps avoiding the common support problem through propensity score overlap. Third, by choosing a non-parametrized matching protocol, estimates do not suffer from the choice of specific distributional functional forms whose parameters are often difficult to interpret.

5 The Effect of Geographic Mobility on Wages

In this section, we first give detail about the propensity score estimation and the balancing properties of our matched sample. Then, we focus on the wage returns to mobility choices. We also provide the empirical evidence on the subsample of individuals whose area of origin is the South of Italy.

5.1 Kernel Matching on the Propensity Score

The propensity score is the conditional probability of receiving a treatment given pretreatment characteristics, i.e. $p(X) \equiv Pr(D = 1|X) = Pr(D|X)$. Rosenbaum and Rubin (1983) show that adjusting for differences in the propensity score between treated and control units is equivalent to remove the bias related to differences in the covariate distributions. We estimate the propensity score by logistic regression separately for each treatment considered in the analysis, and we use the estimated score to match individuals in the selected samples. In particular, we include only pre-treatment variables to reduce potential selection problems and to

¹³For a comprehensive survey of different estimators see Imbens and Wooldridge (2009).

Table 1: Balancing properties of the matched sample

Treatment	Control	Bias Before	Bias After	% Reduction
Early Mover	Stayer	18.001	2.581	85.66
Early Mover	Late Mover	11.291	0.807	92.85
Late Mover	Stayer	10.434	0.881	91.56
Back Mover	Stayer	10.578	4.795	54.67
Back Mover	Early Mover	14.801	4.248	71.30

Notes: The reduction of bias is computed as $BR = 100 \cdot \left(1 - \frac{B_{after}}{B_{before}}\right)$

obtain meaningful estimates. We stress the fact that our sample includes graduates only, so the population under scrutiny is less heterogeneous compared with other samples used in similar studies at least along two dimensions. First, all the sample includes labour market entrants, so we do not have to be concerned with job-to-job transitions and their incentive effects on the propensity to migrate. Second, we reduce the dimensions along which self-selection might act by excluding from the original sample individuals belonging to particular categories (see section 3). This makes it easier to control for selectivity. Moreover, Ballarino and Bratti (2009) and Checchi and Flabbi (2007) document that the assumption of selection on observables is quite realistic for the Italian context, where the determinants of post-secondary education decisions are primarily driven by parents' educational levels and secondary school curriculum. We thus estimate the propensity to migrate on the area of origin, university locations, personal characteristics, high school grades and typologies, family background and fields of study. Compared to other studies, our set of covariates is richer and makes us confident that the selection on observables problem is minimized¹⁴.

Following Rosenbaum and Rubin (1985) and Lechner (2001), the match quality has been assessed through the analysis of the reduction in the mean absolute standardized bias. Since most of our covariates are dichotomous, the standardized bias has been computed according to the following formula:

$$B_{before}(X) = 100 \cdot \frac{p_T - p_C}{\sqrt{\frac{p_T(1-p_T) + p_C(1-p_C)}{2}}} \quad B_{after}(X) = 100 \cdot \frac{p_T^M - p_C^M}{\sqrt{\frac{p_T(1-p_T) + p_C(1-p_C)}{2}}}$$

where p_T and p_C are the proportions of the covariates, respectively, in the treatment and the control group, while the M suffix refers to the matched sample.

As shown in table 1, most of the observable bias in the original sample has been effectively removed.

¹⁴Among many others, Falaris (1988) applies a nested logit model and uses information on education, age, race and distance to control for selectivity. Yankow (2003) specifies a Probit model to predict selectivity corrections and uses information on race, education, experience, job tenure and few personal characteristics.

5.2 Average Treatment Effects on the Treated

This section explores whether different mobility patterns involve wage gains. Our main results are shown in table 2. The first two columns describe the treatment and control status; columns (3) to (6) report the number of observations by treatment status that satisfy the common support criteria; the average treatment effects, standard errors and T-statistics are, respectively, in columns (7), (8) and (9). The estimated ATT is the difference of hourly log-wages, thus the log of the ratios between hourly wages for treated and control units. By taking the exponential of the ATT, we recover the coefficients of proportionality between wages for treated individuals and controls. Column (10) shows these coefficients.

By keeping in mind that the control groups have been specifically constructed to simulate missing potential outcomes, our estimates pertain only to the gains/losses experienced by treated individuals. Consequently, the estimates can not be interpreted as wage differentials between groups of workers, but they must rather be read either as the wage gain (or loss) received because of the undertaken mobility pattern or as the amount of money that treated units would have lost (or gained) had they not chosen that specific mobility pattern.

The first line in table 2 suggests that early movers earn only 2.8% more than they would have earned if they had not chosen to migrate. Thus, the effect is small in magnitude and, if one takes also into account migration costs, the net benefit of migration could be null or even negative. Of course, labour market entrants can also be interested in other dimensions that we do not take into account in the present study. For instance, individuals may also be interested in the probability of finding a job, the expectations on career progressions, local amenities as well as other factors. As in Jovanovic (1979), it is plausible to assume that individuals are able to learn about job match quality only by first experiencing the job. Since graduates have already devoted financial resources to undertake their studies (and non-financial resources to build social relationships), it is reasonable to infer that at the beginning of young adults' labour market experience, another change of location to sample new jobs could be unaffordable. Another explanation of the low reward to early mobility could be related to the human capital theory. Indeed, according to this paradigm, migration can be seen as an investment in future productivity. Thus, early migrants may tend to accept initial lower paying jobs just because they expect a future wage growth (Yankow, 2003).

The second evaluation study is concerned with the effect of late mobility. As shown in table 2, late movers earn 15.3% more than they would otherwise earn. One explanation of this finding is that graduates are more aware of their level of skills and have acquired pieces of information about regional differences in the return to skills. By combining this result with the previous one, we can infer that it is better to postpone the migration decision to a stage in which education has been completed. This is supported from the third evaluation study, namely early movers *versus* late movers. Moreover, a corollary result emerges from a closer inspection of the table. Consider the ATT computed as the difference of wages between early movers (EM) and late movers (LM), $EM - LM = -0.114$. Now consider the stayer category (ST); by adding and subtracting ST to the previous line, it follows that $(EM - ST) - (LM - ST) = -0.114$.

Table 2: Kernel-Matching results

(1)	(2)	N. Treated Units		N. Control Units		(7)	(8)	(9)	(10)
		(3)	(4)	(5)	(6)				
Treatment	Control	Off support	On support	Off support	On support	ATT	S.E.	T-stat	Coeff.
Early Mover	Stayer	3	598	33	11995	0.028	0.011	2.55	1.028
Late Mover	Stayer	3	2459	2	12026	0.142	0.008	18.86	1.153
Early Mover	Late Mover	0	601	10	2462	-0.114	0.013	-9.05	0.893
Back Mover	Stayer	0	542	157	11871	-0.006	0.012	-0.51	0.994
Back Mover	Early Mover	16	526	17	584	-0.023	0.020	-1.12	0.977

Notes: The propensity score includes area of origin, university locations, individual characteristics, high school grades and typologies, family background and fields of study.

Having estimated the two terms in parentheses, we are able to perform this test. It is actually the case that $0.028 - (-0.142) = -0.114$. Intuitively, consider an individual facing the choice of moving to study and remain in that area to work or studying in the area of origin and move to a different area to work. Since the alternatives are mutually excludable, the gains are also independent from each other. Thus, it must be the case that the difference between them can be recovered from a third evaluation study in which one of the two treated category is still considered as a treatment group, while the other is considered as a control group.

Finally, the choice of moving back home after graduation does not pay off. Indeed, if we consider the relative gain with respect to the stayer category, even if the effect has a negative sign, its magnitude appears to be close to zero. In fact, the effect can be quantified as a loss of six euros out of a thousand. This result has a twofold interpretation. First, the human capital growth associated with the choice of studying in a different area might not differ substantially from the growth experienced in the area of origin. Thus, the choice of moving back home is not followed by higher wages. Second, even if graduates have acquired a higher level of skills, the area of origin does not reward, on average, those particular skills. Given that the effect is almost null, we can also perform a test similar to one presented above. Consider the ATT computed as the difference of wages between back-movers (BM) and stayers (ST); if it is close to zero, then it must be also true that $(BM - EM) \simeq (BM - ST) - (EM - ST)$, or $(BM - EM) \simeq -(EM - ST)$. The wage loss experienced by those individuals choosing to go back home to work instead of remaining in the area of study can be approximated by the opposite of the wage gain of those individuals choosing to be early mover over stayer. Intuitively, if early movers enjoy a rent because of their status, back movers choose to give up this rent when they return to the area of origin. We thus estimate the left hand side term and we obtain $-0.023 \simeq -(0.028)$. The difference is small in magnitude (0.005) and the signs

Table 3: Kernel-Matching results - Subsample

(1)	(2)	N. Treated Units		N. Control Units		(7)	(8)	(9)	(10)
		(3)	(4)	(5)	(6)				
Treatment	Control	Off support	On support	Off support	On support	ATT	S.E.	T-stat	Coeff.
Early Mover	Stayer	1	457	10	2679	0.031	0.013	2.29	1.031
Late Mover	Stayer	2	1401	2	2687	0.149	0.011	13.88	1.160
Early Mover	Late Mover	1	457	1	1402	-0.113	0.015	-7.59	0.893
Back Mover	Stayer	0	242	47	2642	0.011	0.021	0.52	1.011
Back Mover	Early Mover	1	241	27	431	-0.011	0.025	-0.44	0.989

Notes: The propensity score includes area of origin, university locations, individual characteristics, high school grades and typologies, family background and fields of study.

reflect our interpretation of the results in terms of gain and loss.

We also present the results on the subsample of individuals whose region of origin is the South of Italy. This choice reflects the mobility patterns of Italian young adults and is aimed at reducing the selectivity problem that might undermine the results presented in the previous section. Historically, Italian internal migration flows have shown a clearcut direction from South to North, and this pattern is also valid when we consider internal migration for study reasons. To some extent, these results are related to educational quality differentials between universities. In the presence of such differentials, we could reasonably expect significant disparities in the returns to education depending on the specific institution attended. However, it is not clear how these differences may arise in a context where universities effects and the return to education are contextually associated with better regional labor markets.

Table 3 reports the number of treated and control units satisfying the common support criteria, the ATTs, standard errors, T-statistics and the coefficients of proportionality. Even though the number of observations drop substantially, the estimates of the first three evaluation studies are close in magnitude to the estimates reported in table 2. Moreover, the third ATT can be still approximated by the difference between the first and second ATT. As far as the fourth case is concerned, we notice that the sign of the ATT changes, but the gain is still quite small (+1.1%). Finally, the last ATT rise from -0.023 to -0.011 . Still different mobility patterns generate heterogeneous returns.

By comparing the second and the third evaluation studies, it is possible to detect the extent to which differences in local labour markets and university attributes may drive the results. By keeping a group of individuals belonging to the same area of origin (namely the South), since the second study compares individuals who differ in the area of employment but have studied in Southern universities, the estimated ATT should primarily highlight differences among regional

labour markets. Conversely, the third evaluation study - early movers *versus* late movers - computes the wage gain of those individuals who work far from home but attended different universities, so that the resulting wage gain is primarily due to different universities' attributes. Therefore, graduates in Southern universities who find a job in other areas of the country (late movers) gain 16 per cent more with respect to stayers. Thus, the wage gain reflects the effects of different regional labour markets. However, the third evaluation shows that those who migrate to study from the South and remain in the same area to work (early movers) lose 10.7 per cent with respect to the graduates who attended universities in the South and postpone the migration decision to a stage in which education has been completed (late movers). Therefore, we conclude that the quality of education of Southern universities may not be worse than that of other universities.

In terms of policy implications, the labour market performance and the local rate of unemployment in the South of Italy strongly influence the individuals' choice of moving increasing the brain drain problem. If the advantage of attending universities located in the North is partly due to discrepancies in educational quality levels and, assuming that they are correlated with the effects of different regional labour markets, then the reduction of both funds and infrastructures for Southern universities would imply a further increase in regional disparities.

Our results give also some hints to evaluate the outcome of the university reform process that Italy is recently experimenting. The reform is intended to modernize Italy's higher education system and to cut costs introducing a diversification between virtuous universities and universities with budget problems. The financial side of the plan would gradually decrease the ordinary financial fund for universities (FFO) further reducing the resources available for research and education. The worry appears to be a cut of university funding and the reduction in the number of unproductive degrees. While there may be good theoretical reasons for it, the mechanism is based on the ability of public universities to attract private funding, and it is well known that it is very difficult for Southern universities to have access to private funds. Therefore, if nothing changes, most Italian universities (especially in the South) will face budget deficits. Despite the struggling conditions, Southern universities are still efficient but, by encouraging study migration from South to North, the brain drain and regional disparities will increase.

6 Concluding remarks

In this paper we have measured the average wage gains induced by sequential geographic mobility. The analysis is based on the survey conducted by ISTAT on the Italian university graduates three years after graduation. In particular, a non-parametrized matching procedure has been applied to estimate wage *premia* associated with the choice of studying far from home, moving after graduation and moving back home after graduation. By splitting Italy into four macro-areas, we define five mobility variables (namely *stayers*, *early movers*, *late movers*, *movers* and *back-movers*) in order to detect possible gains due to different inter-regional

mobility patterns.

Both early and late movers earn more than they would have earned if they had not chosen to migrate, however it is better to postpone the migration decision to a stage in which education has been completed. One explanation of this finding is that graduates are more aware of their level of skills and have acquired pieces of information about regional differences in the return to skills. Also, since the two migration patterns are mutually excludable, both the gain of early movers and late movers with respect to the stayer category are independent from each other. Thus, the difference between them can be recovered by considering one of the two treated category as a treatment group and the other as a control group. Our results confirm this transitivity property. The choice of moving back home after graduation does not pay off. Indeed, the human capital growth associated with the choice of studying in a different area might not differ substantially from the growth experienced in the area of origin. Also, even if graduates have acquired a higher level of skills, the area of origin does not reward, on average, those particular skills. Moreover, if early movers enjoy a rent because of their status, back movers give up this rent when they return to the area of origin. The results are confirmed on the subsample of individuals whose region of origin is the South of Italy.

To some extent, since the wage premia may reflect both differences in the quality of education and regional disparities in labour markets, our estimates could detect which of the two effects drives the results. Since Southern late movers are better rewarded than early movers and the premium is primarily due to different universities' attributes, we argue that the quality of education of Southern universities may not be worse than that of others.

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