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## **Time-to-Degree: Students' Abilities, University Characteristics or what else? Evidence from Italy.**

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We use a representative sample of Italian graduates drawn from the Consorzio AlmaLaurea to assess the impact of individuals and family characteristics, university inputs and the labour market on the time taken to attain a degree. Our estimates highlight that all these dimensions drive the outcome analysed. Especially a weakening labour market causes such worsening academic performance. Our results suggest the need for a comprehensive policy intervention to increase the number of students graduating within the minimum period.

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## **1 Introduction**

This paper assesses the determinants of the time taken to attain a degree in Italian universities using micro-data at national level and a two-stage estimation procedure. This topic is of paramount importance since the Italian tertiary education system is characterized by an average time to complete an undergraduate degree that is longer than the minimum period required as there is no official limit to the number of years a student can be enrolled in a specific programme of study. A delayed bachelor's degree is still common in Italy, despite the major changes that

occurred in the tertiary education system after the 2001 reform<sup>1</sup>. In fact, thanks to the reduction of the course programmes from four/six years to three years, a substantial rise in the number of students graduating within the legal time span was expected. Nevertheless, according to the national statistics, slightly fewer than 30% of students graduate within the minimum period (ISTAT 2008).

This issue is not a peculiarity of the Italian context only, but also of other countries where students have the possibility of freely determining the length of their studies (Brunello and Winter-Ebmer 2003; Garibaldi and al. 2007; Bound, Lovenheim and Turner 2010). The growing concerns expressed in the academic literature and political circles are basically due, on the one hand, to the fact that tertiary education, especially in most EU countries, is publicly provided, and governments regularly make decisions about the support of universities. In that, they are commonly motivated by goals of student performance and by the system's efficiency (Hanushek 2006; Agasisti and Salerno 2007). On the other hand, the interest in this issue is related to the impact that a completion beyond the minimum period has on individuals, namely in terms of starting salary. For instance, Monks (1997) finds a negative correlation between age of graduation and entry-level wage, and Brodaty, Gary Bobo and Prieto (2008) show that, during the early working career, each additional academic year spent obtaining a degree entails a reduction in earnings of about 9%.

A number of studies have examined the extent of undergraduates' and graduates' performance and, principally, the probability of getting a degree, drop-out behaviour, etc. (Arulampalam et al. 2005; Herzog 2006). Much less, however, is known about the factors that lie behind the delay in graduation. Most of the empirical US research on the time taken to attain a degree has focused on graduate students, above all Ph.D. programmes. The central conclusion of these studies is that individual ability, effort and getting a scholarship matter with regard to the time spent to complete any course programmes (Ehremberg and Mavros 1995; Siegfried and Stock 2001; Stock and Siegfried 2006). While focusing on the EU countries, early studies suggest that the time taken is affected not only by students' abilities, but both by external economic conditions and university inputs, such as level of tuition fees, facilities, scholarships, and faculty-students ratio. Brunello and Winter-Ebmer (2003), using data at the European level, show that excess time to graduation is increasingly frequent in countries where the share of public expenditure devoted to tertiary education is large, the unemployment rates are high, and employment protection is stricter. Messer and Wolter (2010) confirm the role played by economic conditions too. Basically, they stress how graduation on time is noticeable when students face a low unemployment rate and a high real interest rate. The link between college quality and students' ability on university completion is then analysed by Light and Strayer (2000). Apart from confirming that ability is an

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<sup>1</sup> A comprehensive description of the University education system in Italy and of the recent reforms is beyond the scope of this paper. For overviews, see Perotti (2002), Bratti, Checchi and De Blasio (2008) and Cappellari and Lucifora (2009).

important and positive determinant of academic success, they find that in colleges at the lowest quality level - where the relatively low academic standards should facilitate progression toward a degree - graduation is mainly hampered by the paucity of high-ability students and financial aids. According to Bound et al. (2010), however, the growing stratification of the higher education system, the reduction in the public resources that colleges have at their disposal, and the ongoing increase in tuition fees are responsible of the lengthening of the duration of degrees programmes. Häkkinen and Uusitalo (2003) and Glocker (2009), then, provide evidence that students financed by public resources are faster than those who receive financial support by their family or by private institutions, for Sweden and Germany, respectively. They also argue that lowering tuition fees may have a positive effect on graduation time, as students are less likely to work to support their studies. In sharp contrast to these results, Garibaldi et al. (2007), using administrative data of a leading Italian private university, show that a policy change aimed at increasing the level of tuition fees during the expected final academic year, encourages the probability of graduating within the minimum period. Additional studies of the Italian case are available, but all of them exploit data at university level. The main results are that progression towards a degree is positively related to individual characteristics, parental background and family income (see Checchi et al. 2000; Boero, Laureti and Naylor 2005).

As mentioned above, all the existing research has long established that several aspects affect completion within the minimum period, strengthening the view that no sole factor tends to be relevant in this process. In fact, there are common agreements in the education quality literature about the central role of families in shaping their children's abilities through genetics and parental investments, besides how ability gaps can be reduced at an early age (Hanushek 1992; Cunha and Heckman 2010). On the contrary, with respect to the other quality inputs, there is a remarkable lack of consensus over whether teachers and their characteristics, administrative support, facilities, etc. are important (Iacovou 2002; Hanushek 2003; Todd and Wolpin 2003).

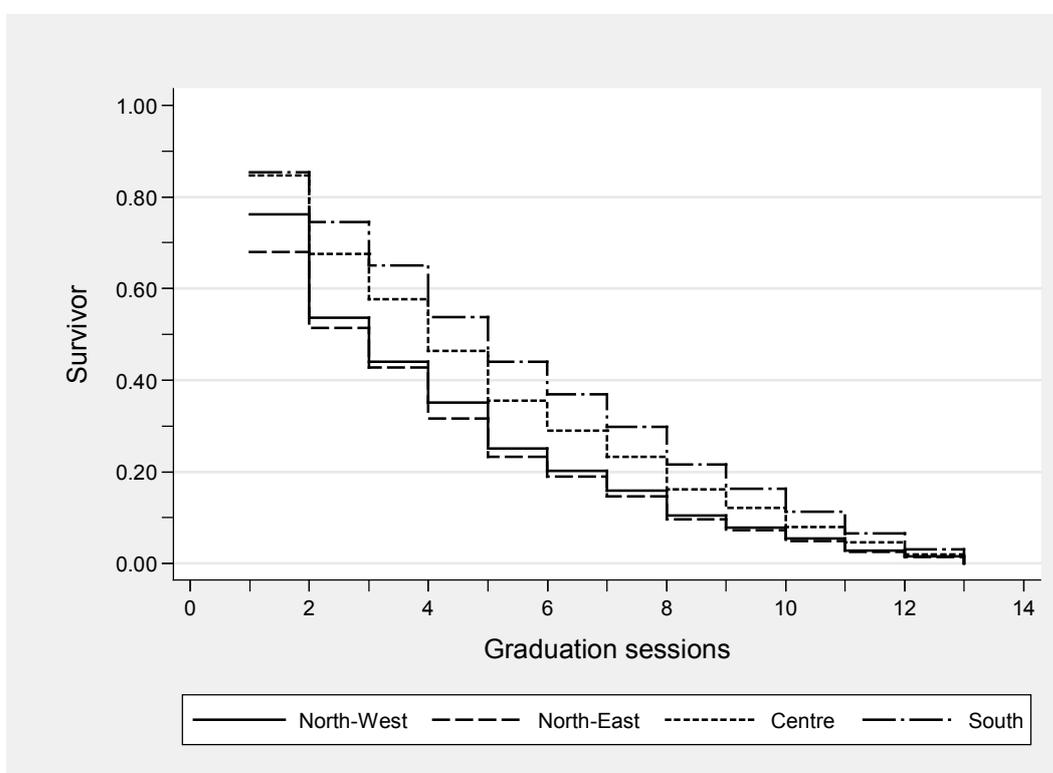
To sum up, following the aforementioned results, to analyse the issue of the time taken to attain a degree it would then be desirable to have a dataset that provides an unusually large set of background variables that help to avoid the usual problems of omitted variable bias. To be more precise, being able to handle school inputs such as human factors, physical capital, study material and other related variables, as well as non-school inputs, namely genetic capabilities and family factors (Tajnikar and Debevec 2005); otherwise shortcomings of data sources may lead to misleading and incomplete findings.

This piece of work stands as an improvement to existing studies based on this topic in that: (a) it is unique in its use of a wide variety of data sources as we have information on a representative sample of Italian graduates at micro-level, including both students initial conditions, their academic performance and family background – non-school variables -, along with school

inputs at university/faculty level (indicators of facilities, endowment and human resources as well as labour market conditions); (b) it provides evidence, according to the time spent to get a degree, on the differences observed amongst students and the link with all the factors considered; (c) it allows a better understanding of the mechanisms that drive Italian academic students to graduate beyond the minimum period, as we know fairly little about it; (d) it gives some insights to policy-makers who seek to bring about improvement in the tertiary education system on the whole.

Our findings are robust and help to explain why regional differences in terms of the probability of graduating within the minimum period, as shown in figure 1, prevail over the entire period considered<sup>2</sup>.

**Figure 1 Survivor functions by university location**



Some results of our analysis in particular stand out. From the first step of the analysis, we shed light on the correlation between mobility, class attendance and probability of graduating within the minimum period. The lesson that we learned from such links is that the recent expansion of the tertiary education system, mainly aimed at facilitating access to university, was not the ideal solution if an efficiency goal was also expected. With regard to class attendance,

<sup>2</sup> Students attending a college based in the south experience lower chances of graduating in each session compared to those who are enrolled in a northern university. Such worst behaviour, once controlled for the individual characteristics, may be related to both university quality inputs and labour market. In fact, the colleges in southern regions are lacking in resources compared to the others. For instance the number of regular students per teacher is on average equal to 18.7 in northern universities and to 29 in the south.

however, the positive correlation may suggest that enforcing it may reduce time taken to attain a degree, as in Italy class attendance is not compulsory. Finally, with respect to the second stage, the main result is that the regional rate of unemployment impacts positively on the time spent graduating, disregarding human and physical resources available at each university-faculty level.

The rest of the paper proceeds as follows. Section II describes the data and presents the empirical strategy. Section III illustrates the empirical results. Section IV discusses the main results and concludes.

## **2 Empirical analysis**

### **2.1 Data and descriptive statistics**

We use data provided by the Consorzio AlmaLaurea on Italian graduates from 46 universities, namely about 65% of yearly graduates as a whole (see Consorzio Universitario AlmaLaurea 2009). This survey collects individual student data on variables such as pre-enrolment characteristics (gender, age, type of high school, final grade, parental background, late enrolment, region of residence), and information while enrolled at university (name of university, faculty, enrolment year, day of graduation, final grade, level of class attendance, type of accommodation, and occasional jobs).

Our sample is composed solely by individuals who graduated in 2008 and enrolled in departments offering three-year programmes. We thereby eliminate students who enrolled before the 2001 reform to avoid complications that might arise from comparing students who enrolled under diverse higher education schemes, mainly in terms of duration and workload. Graduates in medical sciences are omitted too, as access to this faculty is on the basis of entry tests, contrary to other departments where admission is open and virtually free to all high school leavers. Again for the sake of improving comparability between the observations, our analysis excludes students enrolled in a private universities and full-time workers. In order to assure heterogeneity within universities and faculties we consider neither graduates from colleges with less than three faculties nor those from departments that do exist in less than three universities. Finally, all students under consideration were then in their freshman year over the span 2001-2005. According to our selection criteria, the final sample contains 52,950 students graduating from 33 universities.

With respect to the dependent variable used in the first stage, i.e. time required to get a degree, this is defined at individual level. For each student we have computed the number of graduation sessions spent to get a degree beyond the minimum period. Unlike other university frameworks, for example the UK system where graduation is performed once per year, in Italy undergraduate students who have passed all the exams have at their disposal three opportunities of graduating per academic year. If she/he has completed her/his curriculum by that time, the first chance is hence during the summer term, otherwise during the subsequent ones (winter or spring

term) and so on. This variable ranges in our sample between zero and thirteen. For instance, those who obtained a degree within the minimum period take value zero, while those who enrolled in 2001 and graduated during the last session available (winter term in 2008) take the maximum value<sup>3</sup>.

**Table 1 Sessions taken to attain a degree for 2008 graduates**

	Mean sessions	Standard Deviation	Number of observations
Entire sample	4.481	3.382	52,950
Female	4.344	3.332	32,035
Male	4.692	3.447	20,915
<i>High school track</i>			
General	4.269	3.359	31,399
Technical	4.738	3.395	14,932
Professional	4.980	3.335	1,112
Teaching	4.800	3.430	3,865
Other	5.368	3.236	900
<i>High school leaving grade</i>			
60-70	5.939	3.532	8,578
70-80	5.209	3.451	11,543
80-90	4.559	3.342	11,649
90-100	3.399	2.921	20,439
<i>Father's education</i>			
Primary school	5.081	3.515	4,395
Lower secondary	4.543	3.392	15,408
Upper secondary	4.428	3.350	21,974
University degree	4.141	3.305	10,008
<i>Mother's education</i>			
Primary school	5.251	3.529	4,342
Lower secondary	4.581	3.375	15,038
Upper secondary	4.357	3.324	23,775
University degree	4.153	3.367	8,737
<i>Other characteristics</i>			
Delayed enrolment	5.286	3.478	8,207
Previous university experiences	5.841	3.540	3,495
Study in the same province	4.712	3.412	27,640
Study in a different province	4.230	3.331	25,310
Occasional jobs	4.737	3.433	38,230
Rented accommodation	4.481	3.409	18,585
Class attendance (<25%)	6.211	3.470	1,641
Class attendance (25-50%)	6.232	3.436	3,283
Class attendance (50-75%)	5.515	3.413	10,908
Class attendance (> 75%)	3.947	3.212	37,118

<sup>3</sup> For brevity further details about the methodology applied to define the dependent variable and the potential problems arising from the use of an outflow sample are not reported, but can be provided upon request.

Table 1 reports the set of covariates used in the first stage estimation. We notice that students successfully obtained their undergraduate degree after an average of 4.5 sessions, which is about one year and a half extra time<sup>4</sup>. This simple descriptive statistic denotes that for a standard programme of three years, Italian students lengthen the time spent at university by 50%, thus nullifying the attempt of the 2001 reform to encourage rapid transition from university to work.

Women, who represent the majority of the graduate population, are overall more likely to earn a degree in fewer sessions beyond the legal length than males. While looking at initial conditions, students with a general high school diploma (*licei*) and higher final grade are faster. The link between parental education and graduation time, as expected, is negative. The mobility variable, which indirectly captures motivation and ambition together with the family's capability to provide financial support, shows that students who attend a university outside their home province are in fact quicker. However, occasionally taking a job during university as well as renting a flat reduce the chances of graduating within the minimum period. Finally, the number of sessions needed to graduate are inversely proportional to class attendance.

In the second stage estimation, we use data on several measures of college quality, mainly in terms of teaching activity, drawn up by the Italian Ministry of Education, University and Research (MIUR) in order to control also for the effect of institutional characteristics. These indicators are defined at college-faculty level, the same grouping level of the dependent variable obtained from the first-step estimate. Following the literature on school quality (Card and Krueger 1992; Hanushek 2003) the first indicator is represented by the (log) of the pupil per teacher ratio, which gives information on the human capital resources available on average to students. The second measure is about the physical assets usable by students, namely the (log) of the pupil per class seat ratio. However, considering that the number of non-regular students in Italian universities is sizeable and evidently positively correlated with the outcome analysed, both the aforementioned indicators are calculated taking into account only regular students. The quality of teaching can be related also to the experience. In particular, in Italy, full and associate professors are the categories that are supposed to be chiefly devoted to this activity and to the supervision of students' final dissertations. Hence, to capture the teaching quality aspect, the last indicator is represented by the proportion of professors to the total number of permanent academic staff (in log).

In order to test the validity of the previous indicators, we make use of two additional measures. The first is a more inclusive indicator that comes from the *Grande Guida dell'Università* published by Censis/LaRepubblica in 2006. It takes into account colleges' endowment in terms of

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<sup>4</sup> It has to be noted that in Italy students are considered "regular" if they graduate by the last graduation session of their 3<sup>rd</sup> academic year. According to our organization of graduation sessions, this means that those who graduate by the end of the 2<sup>nd</sup> session have to be considered as regular students, even if they were entitled to graduate since the summer session of the year before (session 0). In our sample on average students graduate 2.5 sessions (10 months) after the end of the regular period, namely 52 months after their matriculation.

structures devoted to students' activities, such as the number of seats in classrooms, teacher/pupil ratio, together with the size of tenure-track faculty and the implementation of procedures for evaluating teaching activity. This indicator (in log) represents a proxy of the overall resources provided by each college-faculty cluster. The last is meant to capture any difference in reputation and it is defined as the (log) fraction of graduates enrolled in a specific university that come from a region other than the one where the institution is located.

Finally, to investigate the role played by the labour market conditions in shaping the academic behaviour of each student we use the regional rate of unemployment.

## 2.2 Empirical framework

We take advantage of the two-stage estimation procedure adopted by Card and Krueger (1992) and Brunello and Cappellari (2008). In the first stage we estimate the effect on students' time-to-degree of the attended college-faculty cluster together with a vector of observable attributes. Concerning pre-enrolment characteristics we take into account gender, type of high school attended, final grade, parental education, late enrolment and previous incomplete academic experiences. Both parental background and high school achievements contribute to capturing unobserved factors, like motivation, ambition and individual abilities. As regards the post-enrolment information we then include dummies about students' mobility, type of accommodation, together with their interaction, occasional jobs, and class attendance.

Given the discrete nature of the time variable (sessions spent to get a degree) and of the corresponding outcome of interest (graduation may occur in any term of each academic year), we use a survival analysis technique with a discrete hazard setting based on a complementary logistic model (*cloglog*). At any graduation session, the dependent variable takes the value 0 when a student is still enrolled at university and 1 if he/she makes the transition (Jenkins 2004). As our sample is composed of graduates only, for each individual we observe a complete duration period.

Thanks to the proportional hazard function shape, we can transform the coefficients of this analysis into hazard ratios to make the interpretations of results<sup>5</sup> easier. For any given covariate, the hazard ratio is:

$$HR = \frac{\lambda(x = a)}{\lambda(x = a - 1)} = \exp(\beta_x)$$

where  $\lambda$  is the continuous time hazard rate. This is the relative risk associated with a one unit change in the value of the corresponding explanatory variable, holding everything else constant.

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<sup>5</sup>Indeed, under the "proportional hazard" assumption, the duration profile of the hazard is the only function of the time variable and, therefore, it is the same for all the individuals, where this profile is shifted upwards or downwards by the explanatory variables.

Following Brunello and Cappellari (2008), the first step regression allows us to predict the time taken to degree probability for 225 college-faculty clusters and in the second step we analyze the determinants of college-faculty time-to-degree. Hence, in the second step the dependent variable is represented by the estimated coefficients of the 225 clusters. This technique has a double advantage. Firstly, because of the large number of controls considered, the first stage allows individual-level unobserved heterogeneity within clusters to be averaged out, as clusters coefficients are estimated. Secondly, the indicators of college quality are calculated at the college-faculty-cluster level, so in the second stage both dependent variable and covariates are specified at the same grouping level, thus reducing potential measurement errors.

Estimates of the second stage are hence based on Weighted Least Squares, and the weights are proportional to the inverse of the variance of clusters coefficients to account for the fact that the dependent variable is generated by the first stage estimate (Card and Krueger 1992; Brunello and Cappellari 2008).

In order to analyse the time taken to get a degree within each cluster, in the second stage we include as independent variables a vector of indicators of teaching quality measured at college-faculty level, already described in the data section. University inputs are useful to disentangle the heterogeneous performances achieved by each student in terms of time spent at university before graduation. Once the outcome at individual level is controlled, differences amongst individuals sharing average characteristics are associated to the specific facilities that each university and faculty offer. Finally, labour market conditions are captured by including the average rate of unemployment measured at regional level. It has been documented that a weakening labour market keeps students in school (Clark 2009) or disincentives graduation within the minimum period (Brunello and Winter-Ebmer 2003; Messer and Wolter 2010). It is questionable whether students might be affected by the labour market conditions of the region where their university is placed, and not by those in any other regions, since after graduation they may decide to move to another area. However, since the narrow mobility noticed in the Italian context is from the southern to the centre-northern regions, it is plausible to assume that the propensity to move is also correlated to the more favourable labour market conditions they can find in the region of study. As a consequence, the region of study also represents their reference labour market. Moreover, the low mobility rate of Italian students both at enrolment and after graduation<sup>6</sup> leads in most cases to an overlap of the labour market of the region of residence and of study. In this manner the choice of the reference labour market is neutral. Finally, the inclusion in the second stage estimates of a set of covariates measured at the college-faculty level allows the exclusion of the fact that the unemployment rate coefficient picks up the university fixed effects. In fact, in our sample there is not enough college variation within each region, namely in some regions there is just one college.

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<sup>6</sup> According to the Italian Ministry of Education, 80.4% of the students enrolled in a university located in their home region in the academic year 2007/2008.

In this case the inclusion of the regional rate of unemployment in the first step could have captured also other university characteristics not considered.

### **3 Results**

Table 2 presents the first stage estimation of the probability of time taken to get a degree at an individual level. We use the full sample and all the set of covariates selected from the survey as well as 225 college-faculty dummies, reporting then both coefficients and hazard ratios, where the latter represent the complement to one of the probability of graduating in any graduation session.

Mostly estimates are not informative as they confirm the existing results well established in the literature. Pre-enrolment conditions, such as family information, high school performance and individual characteristics, are always statistically significant and their signs are as expected. For instance, a greater likelihood of reducing time taken to get a degree is related to individuals who have both better schooling and parental backgrounds. While three key control variables – students' mobility across provinces, type of accommodation and class attendance – contribute to the enlargement of the knowledge of how they are linked to student performance. It is noticeable that students who rent a flat, instead of living in university accommodation or in their parental home, reduce the probability of graduating in each session by about 13%. Although moving to attend university increases the likelihood of graduation (7%), this positive relationship is nullified if movers rent a flat. We may speculate that this specific condition raises living costs so, because of the rent, students might be forced to work taking time from study, or alternatively loneliness may simply lead to bad habits, i.e. staying up late, missing class and tiredness, hence academic performance might be impaired. This link underlines that, to promote university accessibility and contemporary academic performance, policies that aim to increase accommodation availability may be helpful, especially for those with disadvantaged background and/or financial constraints. Class attendance, however, is positively correlated to graduation. A student who during his/her academic career attends more than 75% of the classes is more likely to get a degree in any session by about 69% versus only 15% of those who attend between 50 to 75%. This result is in line with previous studies which claim the importance of introducing mandatory attendance (Romer 1993; Manburger 2006; Credé, Roch and Kieszczynka 2010). Although we are aware that this positive relationship does not allow any causal interpretation to be drawn, as attendance levels are not exogenous (Stanca 2006), we argue that analysis of student performance that excludes such information may lead to estimation bias.

**Table 2 First stage estimation results**

	Coeff.	SE		Hazard ratio
Movers	0.072	0.013	***	1.075
Rented accommodation	-0.132	0.020	***	0.876
Movers*Rented accommodation	0.048	0.024	**	1.049
Class attendance 25-50 %	0.003	0.030		1.003
Class attendance 50-75 %	0.126	0.027	***	1.134
Class attendance >75 %	0.506	0.026	***	1.658
Number of observations	59,250			

\*\*\* and \*\* significant at 1 percent and 5 percent, respectively. Other variables are: gender, high school track and leaving grade, parents' education, occasional jobs, delayed enrolment, previous academic experiences and university-faculty clusters.

We performed several checks to assess the robustness of our results and identify the presence of heterogeneous aspects. In particular, we changed the current specification by including a large set of interactions term in covariates and we re-estimated our analysis by separating the sample according to the dimension and the geographical area of university to control for potential heterogeneous effects in different sub-samples. All such tests invariably confirmed the estimations shown in table 2. As a consequence, we are fairly confident that individual ability has been adequately captured by all the set of controls considered.

**Table 3 Second stage estimation results**

	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE
	(I)		(II)		(III)		(IV)		(V)		(VI)	
Pupil-class seat ratio	-0.003	0.045	-0.015	0.033								
Pupil-teacher ratio	-0.219	0.059 ***	-0.136	0.046								
Full professor-teacher ratio	0.750	0.205 ***	-0.004	0.160								
Overall college quality indicator					1.245	0.171 ***	0.446	0.143 ***				
Fraction of graduates from other regions							-0.357	0.028 ***	0.221	0.042 ***	-0.02	0.036
Regio unemployment rate			-0.395	0.029 ***							-0.4	0.030 ***
Observations	225		225		223 <sup>a</sup>		223		225		225	
<i>R-squared</i>	0.315		0.626		0.381		0.648		0.313		0.230	

\*\*\* significant at 1 percent. All variables are expressed in (natural) logarithm. Faculty dummies are included in each specification.

a For two university-faculty clusters the indicator provided by Censis/LaRepubblica is missing.

Second stage results, shown in table 3, investigate the impacts of university quality inputs and rate of unemployment on the time taken to get a degree estimated at college-faculty level. Several specifications are provided on the basis of the set of indicators included each time. Column (I) considers physical capital and human factors, then in column (II) the rate of unemployment is added to capture regional labour and product market effects. The pupil-class seat ratio does not contribute to easing the problem of irregular students in any specification considered. While coefficients of the number of students per teacher and of the proportion of professors out of the total number of academic staff have a positive and sizeable impact on the process of getting a degree, but only when labour conditions are not controlled for. In fact, once the latter factor is included in our second step regression, none of the previous human resources inputs are relevant to the outcome analysed, meaning that facilities and human resources have negligible effects on the time taken to graduate. In addition, the higher R-squared associated with the specification (II) suggests that the introduction of measures capturing not only university inputs, but other factors as well, namely regional rates of unemployment, significantly increases the portion of explained variance of the dependent variable.

Columns (III) and (IV) report diverse specifications with respect to the university inputs. Instead of considering information about human and physical capital separately, a comprehensive indicator is used. The bunch of university inputs summarised by the indicator drawn from the Censis/LaRepubblica survey has a positive impact, even once labour market conditions are analysed. But higher unemployment rates keep students at university, as already shown in column (II). Finally, the last two columns show the attempt to capture some university-faculty measure of reputation and attractiveness considering the mobility flows, namely the fraction of graduates coming from a different region from that where the university is located. This indicator is positively associated with an improvement in obtaining a degree on time, although again this relationship is not statistically significant in the last column. In every specification including regional rate of unemployment the coefficient is always associated with a worsening performance. However, this link is in line with the real business cycle explanation introduced in previous studies (Brunello and Winter-Ebmer 2003; Di Pietro 2006; Messer and Wolter 2010; Clark 2009), that is degree completion is conditional on the level of unemployment.

#### **4 Concluding remarks**

The expansion of higher education that took place in the early 1990s was the easy answer to the problem of overcrowding in Italian universities. Mainly due to both the more positive attitudes to tertiary education and the internal inefficiency of each institution, namely the growing proportion of students graduating beyond the minimum period required. However, the central government has not yet achieved suitable results, as large colleges are still congested and only a tiny fraction of students get a degree on time. Not even the 2001 reform, which led to a reduction

of degree course programmes, brought the expected benefits in terms of the time taken to get a degree. This paper has therefore attempted to disentangle the determinants of delayed graduation, looking at several dimensions, like non-university inputs (students' characteristics and parental background), university factors (facilities, equipment and academic staff information) and regional labour markets. The emerging question is aimed at detecting what dimensions drive final outcome, i.e. graduation within the minimum period.

The main findings obtained from a two-stage estimation approach indicate that the time taken to get a degree is a cumulative process. After accounting for students' characteristics, family factors, the university and department where students are enrolled, graduation in any session, during the sample period, is positively associated with the human and physical resources available to every university-faculty cluster considered. Nevertheless, the impact changes according to the indicators included in the specification. The effect is negligible for the variables that look at only one measure of quality university, for instance pupil-teacher ratio, once we controlled for the labour market conditions too. On the contrary, the impact of university inputs are positively associated with the dependent variable, also when economic conditions are included, if a unique indicator of all these aspects is used. To some extent, the latter result suggests that a more inclusive indicator of college quality can capture heterogeneous distribution of endowment over university-faculty.

Finally, a weakening labour market causes a worsening of academic performance in terms of the time spent to get a degree.

There has been much debate about the extent to which determinants influence students' behaviour towards graduation, so establishing the true causal pathway is important for policy. However, if not only individual and university quality characteristics are the driving force behind poor academic outcome in terms of the time taken to get a degree, then policies to increase intergenerational mobility or to overcome financial constraints will have little effect on such an outcome. Policy-makers who seek to bring about an improvement in student academic achievement within the minimum period should be aware that interventions on the labour market side are also necessary.

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