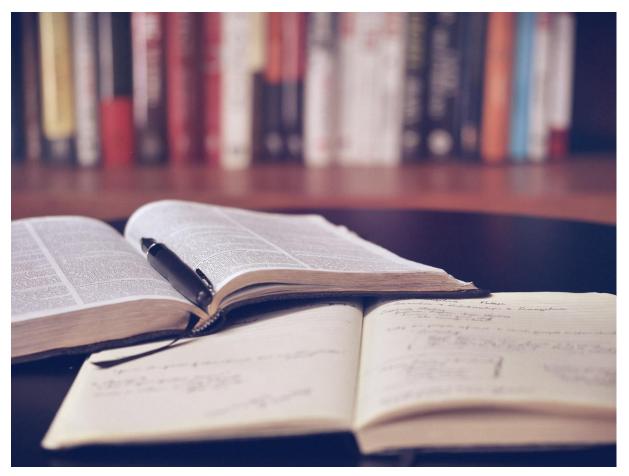# Working Paper TerRA n°07

Does slow and steady win the race? An Italian case

Anna Bussu, Claudio Detotto, Laura Serra

Does slow and steady win the race? An Italian case

Anna Bussu [a], Claudio Detotto [b,c] & Laura Serra [d,e,f]

[a] *Faculty of Health & Social Care, University of Edge Hill, Ormskirk, UK*

[b] *Corresponding author - email: detotto_c@universita.corsica*
Avenue Jean Nicoli BP 52, Corte (France - 20250)
Faculty of Law, Economics and Management (LISA - UMR 6240 CNRS), University of Corsica, Corte, France
[c] *CRENoS, Sassari, Italy*

[d] *Department of Experimental and Health Sciences, Pompeu Fabra University, Barcelona, Spain*
[e] *Research Group on Statistics, Econometrics and Health (GRECS), University of Girona, Girona, Spain*
[f] *CIBER of Epidemiology and Public Health (CIBERESP), Girona, Spain.*

Abstract

This paper presents an empirical study focusing on students' drop-out and irregular careers at the University of Sassari (Sardinia, Italy). The analysis is based on 1167 students registered in a full-time undergraduate program (three years according to the Italian system), which have both not changed and not abandoned the degree course. Using a Probit model, our findings document the individual, background and environmental factors that play the main role in explaining the likelihood of irregular careers' occurrence. We observe that residential students perform worse than the commuter students. Furthermore, other factors seem to explain the success in attending an academic institution, here measured as the probability to finish the undergraduate programme in the nominal duration, namely individual characteristics (like gender and age), students' background (family income, secondary schools and final marks obtained), institutions' environment (department's teaching and research quality) and students well-being (students' satisfaction). Finally, some policy implications are discussed.

Keywords: probit; regular careers; commuter students; residential students; undergraduate.

1. Introduction

The Lisbon Strategy (March 2000),the Bologna process (Eurydice 2010) and the training priorities provided by Europe 2020 (EU2020) are committed to set up a knowledge economy to promote employability and the development of human capital via lifelong learning and social equity (EC 2004, 2005, 2009; Dion 2005).

Among its priority objectives, EU2020 aims the expansion of education in Europe for all levels and degrees with the following two final goals: (1) to reduce school drop-out by 10% and (2) to increase college education in 30-34 aged people by 40%. Remarkably, this is not a trivial goal for Italy due to its constantly decreasing number of university students' enrolments and very long student careers. According to Eurostat (2009; 2014), Italy ranks at the bottom end of the spectrum for the number of graduates, followed only by the Czech Republic, Romania and Slovakia. Among people aged in the range of 25 and 34 years, only 19% of Italian population have obtained a bachelor's degree, while the European average is around 30%. For all of that, it is relevant focusing on the Italian case in order to understand which factors affect students' behaviours and careers.

As largely explored by educators, academics, and policy makers, students' performance has been linked to economic, sociological and psychological factors, along with the quality of the university and of the matching between students and institutions (for a recent detailed literature review see Zotti, 2015). Based on this last strand of research, this paper aims to analyse students' performance in terms of *career regularity*[1] (Costantini & Vitale, 2010; Grilli, Rampichini & Varriale, 2015) taking into account individual, background and students' environmental factors. Our goal is to shed the light on two issues that, as far as authors know, have not been fully explored yet. On the one hand, we focus on the impact of departments' features on students' performance. Although it has been demonstrated that the teaching quality performance reduces students' propensity to drop-out (Johnes and Mcnabb 2004; Hanushek and Rivkin 2006), the understanding of the effects of research quality and productivity on students' performance seems to be still incomplete. This analysis aims to fit into the current debate, testing the impact of research quality, measured by national indicators and provided by Italian Ministry of Education, University and Research (MIUR), and teaching quality, proxied by students' satisfaction, on students' career. On the other hand, we compare the performance of two groups of students: commuter and residential students. This research question is not trivial since the two groups have very different needs and behaviours. For instance, one can think how their status affects the demand of services both in terms of quantity and typology (student accommodation, transports, public areas, etc.). In this sense, it is important to allocate the resources and calibrate the supply in order to increase students' performance and well-being (Jacoby 2000).

To this end, we scrutinise information about the cohort of students enrolled in Fall 2008, from the Student Administration Bureau (Ufficio Segreteria Studenti) and the Bureau of Research, Evaluation and Program Support (Ufficio di Supporto al Nucleo di Valutazione) of the University of Sassari, the second as dimension in Sardinia (Italy). The implementation of a longitudinal analysis solves any problems of data comparability over time. In fact, all students face the same environment at the same time that helps us to model and interpret the variables under study. In our opinion the University of Sassari is a good case study for a number of reasons. Firstly, Sassari well represents the Italian situation since the number of irregular careers is about 62.8%. It is worth to notice that such a value is not far from the average level at national level, 59% (Almalaurea, 2014). Second, in the Italian context the University of Sassari is a

---

[1] According to Costantini et al. (2011), irregular careers represent an outcome indicator of student career performance. Precisely, it indicates the duration of student careers to complete an education programme: a career is called "irregular" when its duration is greater than the 3 years provided by law.

medium-sized institution (it accounts for about 12,000 students in 2014/2015[2]) and a medium-ranked university in the last Italian Research Assessment Exercise (ANVUR, 2013). So, our results can be easily generalizable to the whole Italian system. Third, the isolated condition of Sardinia dramatically reduces students' outflows/inflows. This aspect leads to a high homogeneity among student population. Although at first glance this seems to be an issue, it is quite an advantage here. The limited presence of ethnic and racial components makes our pattern clearer. So, there are not any problems of interaction between our variables of interest and belonging to minority groups, avoiding possible sample and estimator biases.

Furthermore, dealing with residential and commuter students one can notice that the analyses are mostly based on aggregated unbalanced data in which residential institutions are often over-represented (Gianoutsos 2011). In order to better compare the two statuses across student population we should go into the micro-data and use a balanced sample. Our data satisfies both these requirements. Our sample contains micro-information of a sufficiently balanced number of commuter and residential students, 341 and 826 respectively. This allows us to correctly identify and measure the impact of this status on student's performance.

As we will discuss later, some policy implications could be derived from this study. First of all, despite the relevant institutional reforms that occurred in Europe in the last twenty years, like for instance the ''Bologna Reform'' (Eurydice 2010), the importance of understanding the critical situation of students' careers is still at the top of political agenda. Students' drop-out is currently an important issue in higher education institutions in many European Countries (Heublein 2014). In this regard, the Italian university system represents an interesting case study since it accounts the highest dropping-out rates among the European countries (Eurostat 2014).

The paper is organized as follows. First, Section 2 presents the literature review. Section 3 presents the Italian context. Then, Section 4 discuses the empirical strategy, including data description (4.1) and the econometric approach (4.2). Section 5 comments the results of the analysis while Section 6 presents some robustness checks. Then, Section 7 gives a discussion of the analysis. Finally, Section 8 concludes the paper.

2. Literature Review

This section is aimed at giving an account on the literature related to the empirical studies about tertiary-level students (performance, career duration, wellbeing, etc). Their performance has been largely studied by many scholars from economics, psychology, sociology and neighbouring disciplines, in order to understand which factors affect their behaviour and decision-making. In general two main lines of research can be distinguished. The first one refers to the analysis of the role played by the "macro-categories", such as the background of the student. These studies have identified the influence of relevant social indicators like genre, socio-economic and family context (family background), ethnic groups and so on (Aikens and Barbarin 2008; Thielea et al. 2014; Van Den Berg and Hofman 2005). The second strand of research focuses on the impact of "micro-categories" on students' performance. In this framework we can consider the effects of personal or character aspects, the role of (internal and external) motivation, student's attitude to the study and to the related profession (Adelfio et al. 2014; Mega et al. 2014; Richardson et al. 2012).

This research deals with the ongoing debate on students' performance at higher education. In this regard we shed the light on two issues that, as far as authors know, have not been fully explored yet:

---

[2] Web data from MIUR, Italian Ministry of Education, University and. Research.

1. *The role played by institutions' environment (department's teaching and research quality) on students' performance*. A wide literature has been published about students' evaluation as instruments for validity and usefulness of teaching effectiveness and quality (Marsh 1982, 2007; Abrami et al. 2007; Theall and Feldman 2007). Although nearly all universities collect vast amounts of students' feedback using a wide range of evaluation instruments (Tucker 2014), we observe a lack of published research worldwide on the quality of student feedback or on what students say (Braskamp et al. 1981; Hirschberg et al. 2011, Tucker 2014). However, student comments provide valuable insights about their experience and teaching quality (Braskamp et al. 1981; Lewis 2001; Zimmaro et al. 2006; Oliver et al. 2007; Hodges and Stanton 2007; Alhija and Fresko 2009). The use of students' feedback as instruments for teaching quality is justified by Beltyukova and Fox (2002) which argued that student success, retention and development are closely linked to student satisfaction. Our paper contributes to the debate on the impact of the institution's quality on students' performance, aiming to address the question of balance between teaching and research orientation. If the positive effects of teaching quality are well known in literature, the analysis of research performance on students' career is still under-covered. As pointed out by several scholars, research drives teaching excellence. In this framework, it does make sense to allocate much more resources to research projects then to teaching programs. But, the existence of a direct connection going from research to teaching activity is not obvious (Gibbs 1995) and in many cases it has been demonstrated that the relationship between research productivity and teaching efficacy could be very low (Noser et al. 1996).

Furthermore, one should consider the incentives at an individual level that could trigger an inefficient equilibrium. Often academic teachers perceived teaching as a highly demanding career with low return in terms of salary and social status, if compared to research or institutional activities (Young 2006). This aspect drives the academics to give much more emphasis to their research since it repays more than teaching activities actually do (Taylor, 2001).

These aspects can lead to an equilibrium in which an institution "specializes" in only one dimension. Analysing the impact of the two activities is a fundamental step in order to adopt the most appropriate policy both at institute and national level. Of course, it is not a novelty since many authors have stressed the role played by the model organization and college mission on students' results and well-being (Breen and Jonsson 2005; Sutton and Trust 2010; Thielea et al. 2014; Choi and Rhee 2014).

2. *The difference in performance between residential and commuter students*. The paper tries to address another relevant issue that is common to many universities and other higher education institutes. Since Chickering's work (1974), the comparison between commuter and residential students has been analysed in last four decades. According to Horn and Berktold (1998) and Snyder and Dillow (2012), the majority of college students commute to campus in US. However, it is rationale that these students have a high likelihood to be less involved in academic pursuit due to time constraints (Jacoby, 2000). This could be problematic because this kind of academic engagement, such as interacting with instructors and other students (Kuh, 2001), is a clear value added in their college experience (Pascarella, 2001). A bunch of empirical studies has confirmed this phenomenon (Chickering, 1974; Pascarella and Terenzini, 1991; Kuh et al. 2001; Newbold et al. 2011). But, Alfano and Eduljee (2007) have found something different. They have performed a survey analysis at the Saint Joseph'S College of Maine (US) in order to investigate the relationship between the number of hours worked and GPA among residential and commuter students. The results indicated no statistically significant relationship between work and academic performance for the two groups.

This broader comparative literature, however, is prodigal of contributions that have been conducted among unbalanced students' samples which were weighted more toward residential

institutions (Dugan et al. 2008; Weissberg et al. 2003). Understanding the difference in performance between commuter and residential students is a significant step in order to identify the students' group most at risk. In Italy, students' flows are increasing in response to a more competitive academic system. Similarly, an increase in undergraduate students' flows among European countries is expected in the future. In this framework, it is important to study the careers of commuter and residential students in order to help the students group most at risk.

3. Background information and data

3.1. Background information

The University of Sassari is an Italian medium-sized State university of over 12,000 students with a 452-year-long tradition. Research, discovery, and promotion of knowledge are core activities of the university, which offers a wide range of undergraduate and graduate programmes.

In this paper we analyse a panel of undergraduate full-time students that enrolled at the University of Sassari (Sardinia) in 2008, September (i.e. the academic year 2008/2009). We restrict our study to this group since in this way we can observe the entire cycle of their academic career, which nominally should be completed in three years. Furthermore, this period entirely fits into the post reform (2006), which means that the new guidelines have already been introduced. It is worth noting that students enrolled in a single-cycle degree course, i.e. a 5-years programme, have not been included in the analysis because they would not become out of the year within the period under study. The sample is representative of most of the students' population of the University of Sassari, except for the Department of Medicine and Surgery[3].

3.2. Data description

Our data contain information on individual and family background of each student, which are registered at the moment of students' submission. The sample age ranges from 18 to 69 years but it is interesting to observe that more than 50% of the students are younger than 20 years, which comprises 30.3% males and 69.7% females. Students come mainly from high schools (more than 58%) or technical institutes (more than 24%). Furthermore, 70.8% of them are residential students, which means that they come from a place further than 30 km from the University. In other words, it means that this group of students cannot commute and they need to find an accommodation at the campus or the neighbouring structures. Then, the dataset contains other relevant information, like family income and final mark at secondary school.

According to the data, 62.8% of students enrolled in 2008 take more then the three years to obtain the degree.

Furthermore, since 2001 the Bureau of Research, Evaluation and Program Support (Ufficio di Supporto al Nucleo di valutazione) of the University of Sassari collects students' evaluation about their satisfaction. The anonymous self-administered questionnaires are collected in class at two third of each semester. The completion is voluntary and over 20,000 questionnaires are analysed each year. The evaluation is based on a 1-5 scale where 1 (one) represents the least in the item and 5 (five) represents the most.

The questionnaire is mainly composed by three areas:

1) Organizational aspects of the course: (a) "*The schedule of lectures, practice and any other teaching activities has been respected*"; (b) "*The workload required for this course is appropriate compared to the number of credits allocated to it*". The former item (*Organization*)

---

[3]   The bachelors degree in Medicine and Surgery and in Dentistry are 6 years.

represents how a given department is able to organize teaching and supporting activities. A positive impact is expected since students can benefit from a good organization. The latter item (*Study_load*) measures the relationship between the efforts required to pass successfully the exam and the number of credits associated with the course. An unbalanced relationship, i.e. too much efforts are required, is expected to have a negative effects on students' career.

2) Teaching and study activities: *The teacher and the teaching assistants are available to answer questions, address issues, and provide teaching support*. This item (*Teacher_availability*) is a proxy of teachers and TAs efforts in supporting and helping students. Thus, a positive effect is strongly expected.

3) Infrastructure: *The infrastructure (classrooms, libraries, public areas, meeting rooms etc.) are adequate*. This item (*Infrastructure*) indicates the quality of the infrastructure provided by the department. As before, a positive impact is expected.

As a final indicator, the questionnaire contains the following item: *Overall assessment* (On the whole I am satisfied about the way the course has been carried out). This item (*Overall assessment*) represents the overall student's satisfaction about services, infrastructures and teaching quality/availability provided by the department. The aim is to estimate the effect of students' satisfaction (both in general and in the specific areas under study) on their career and performance.

Finally, the research quality of the departments under study is taken into account. We employ a composite index calculated by the National Agency for the Evaluation of the University System and Research (ANVUR) in Italy. The index measures the "distance" between the research productivity of a given department and the median productivity in the same field at national level.

4. Empirical approach

The variable of interest of this study (Y) is to be interpreted like "being" or "not being" a student that takes more than three years to obtain the degree. It is clearly a binary response variable since it has only the values 0 and 1. Then it can be written like:

Y = {1 if delayed graduation; 0 otherwise} (1)

In order to achieve our goal, in this study we propose a probit model, as it is appropriate for the binary variable Y and it allows us to model the probability to finish the university programme in the nominal duration following the expression:

Y = Xb + u (2)

where *X* includes the explanatory variables, *b* is a vector of unknown parameters and *u* represents the residuals. The independent or explanatory variables, used for explaining the likelihood to finish the degree programme in the nominal duration can be divided into three groups. In the first group there are the inherent characteristics of the student such as the gender (*Male* = 1 if he is male; zero otherwise) and age (*Age*). Furthermore, five dummy variables represent student's (upper) secondary studies (*Other institutes, Technical institute, Professional institute, Teacher training school, Lyceum*). The final score of such secondary studies is also included, calculated on a 100 points scale (*Diploma_mark*). In the second group we consider family and geographical factors like the place of arriving (*Residential*=1 if he/she comes from a village/city which is placed more than 30 km from the university; zero otherwise) and the

family's average income (*Income*). The third group includes the environmental variables that could affect students' performance. More precisely, we refer to those variables that directly relate to the quality features of the departments such as: the number of teachers per student (*Teacher_ps*), the quality of the research (*DipQR*) and the students' opinions about teaching and environmental quality (*Study_load; Organization; Teacher_availability; Infr_quality*). *Study_load* represents students' subjective statement about the relationship between the ECTS-credits and the minimum effort requested to pass the exams. *Organization* and *Infr_quality* are related to students' opinions about department quality in terms of organization and infrastructure. *Teacher_availability* measures how alumni evaluate the department provision of teaching assistantship and other services, like tutoring and mentoring. In order to avoid endogeneity problems, since a positive students' evaluation can be driven by "generous" marks which in turn can help to achieve a regular career (Taylor et al. 2008), we instrument these indicators using their difference between 2008/2009 and 2011/2012, which represent the beginning and the end of the period under study respectively.

Table 1 shows the descriptive statistics of the variables under study.

5. Results

Table 2 and Table 3 report the marginal coefficients of the probit estimations. According to our first analysis (Table 2) we can say that the main factors that have an influence in reducing the probability to be out of year are the final mark at secondary school, the quality of departments' research, the number of teachers per student and the students' overall satisfaction. In particular, an increase of the final mark by 1% leads to a decrease of the likelihood to not finish the university programme in the nominal duration by 0.0058% (column 1). However, this variable suffers from a well-known endogenous problem. Following the famous example in Wooldridge (cap. 15; 2010), the final mark at secondary school and the probability to end the undergraduate programme as soon as possible depend on an unobservable variable, the *ability*. We are aware of this issue and thus only include such variable as part of the controls set.

Then, we observe that department's features matter: the higher environment quality of department, the higher the likelihood that students exhibit a good performance. Students in departments with a higher quality research standard have higher probability to finish their studies within the nominal duration (*DipQR* = -0.25). A bigger number of teachers per student also helps students to finish their studies in the expected time (*Teacher_ps* = -0.037). Finally, students' overall satisfaction affects students' behaviour in the extent that higher students' satisfaction is associated with a lower probability to end up with a longer period than the nominal one (*Satisfaction* = -3.32).

The family's average income has a very small negative effect, but still significant at 0.10 level, on the variable of interest (*Income* = -2.6e-07). The place of living shows the opposite effect and allows us to confirm that those students that moved to Sassari to attend the chosen programme are more likely to end their studies in more than three years (*Residential* = 0.12).

Students belonging to technical institute and teachers institute have, on average, a lower performance with respect to students from high schools.

Still focusing on table 2, now we discuss about interaction terms in order to analyse the relationship among some of the variables under study. Looking at columns 2-4, one can see the interaction effect between the continuous variable age and the dichotomic characteristic male. It seems that male students have, on average, a lower rate of success (*Male* = 0.29) but such effect decreases as their age increases (*Age*Male* = -0.016). Furthermore, it is observed that male residential students are, on average, more likely to finish their studies in the given time than the female group (*Male*Residential* = -0.13). Finally, we find any empirical evidence about the

interaction between income and residential status. So, the negative performance in terms of duration of the career among the residential students is not due to low-income issues.

As anticipated in Section 2, we consider the set of the sub-indicators that represent students' subjective satisfaction in the following areas: *Organization, Teaching and study activities*, and *Infrastructure*. Table 3 provides the above-mentioned estimates.

All these sub-indicators, except *Teacher_availability*, do not exhibit any significant effect on students' performance, although all the coefficients have the expected sign. From these results it seems that teachers and TAs availability matters in explaining students careers (*Teacher_availability* = -5.99).

6. Robustness checks: the Propensity Score Matching and the Blinder–Oaxaca decomposition

A concern arises in the analysis of students' performance is that some variables could not be exogenous. More precisely, the difference in the careers observed between residential and commuter students may be driven by other variables rather than these characteristics themselves. This empirical issue is called sample selection bias. A convincing argument is given by Table 4, which shows the descriptive statistics of all the variables under study for the two groups: commuter and residential students. According to the t-tests (third column), the two groups are different in a number of variables, namely *Income, Age, Male*, secondary education (*Lyceum, Teachers_institute, Other_institute*) and department features (*DipQR, Satisfaction, Organization, Teacher_availability*).

A possible solution to deal with this problem is provided by the Propensity Score Matching, PSM (Rosenbaum and Rubin, 1983; Heckman et al. 1998). When considering residential differences, the ideal analysis would consider a sample of observations, which are identical except for the observed characteristics. The difference in the outcomes of the "treated" sample and the "control" sample can then be correctly attributed to the variable under study.

We apply the PSM technique to obtain unbiased estimates of residential effects on students' career. Briefly, the matching technique is to select a control group of commuter students that are similar to the treated ones, residential students. In the first stage a probit regression is estimated on the data set using measurable variables of the characteristics of the students to predict the likelihood of being in the treated group. The estimated parameters are used to calculate the fitted probabilities of being a male. These fitted values are known as the propensity scores.

To do so, the *teffects psmatch* command (STATA 13) has been employed. The estimated coefficient associated with the residential feature equals to 0.111 (sd = 0.039 and p-value = 0.004). As is evident from the results above, although the *Residential* coefficient is smaller than that obtained in the previous standard estimations, it is still statistical significance and its sign is consistent. These results are confirmed by graphical representation of the degree of overlap, which clearly show that problems of overlap do not appear in this dataset[4].

Another way to deal with a sample selection bias is proposed by Blinder (1973) and Oaxaca (1973). The so-called Blinder–Oaxaca decomposition is a methodology used to study wages differences between groups (sex, race, etc.). This approach divides the observed output differential between the groups into two parts: the first one is "explained" by group differences in individual characteristics (such as education or age), while the second one represents the "unexplained" component, which accounts for both a measure for discrimination and the group

---

[4]   The graphics are available upon request.

differences in unobserved predictors (for more details on Blinder–Oaxaca decomposition, see Jann, 2008).

We perform the *oaxaca* command in STATA 13. Table 5 shows the results of the Blinder–Oaxaca decomposition. The mean share of irregular careers is 0.547 for commuter students and 0.661 for residential students, yielding a statistically significant gap of -0.116. This gap is divided into two components. The first part represents the mean increase in residential students' performance if they had the same characteristics as commuter ones, namely *Income*, *Age*, *Male*, *Lyceum*, *Teachers_institute*, *Other_institute*, *DipQR*, *Satisfaction*, *Organization*, *Teacher_availability*. However, such differences account only for a 0.0024 increase in students' performance. In fact, such a small number is not statistically significant from zero. So, the differences in endowments account for an insignificant part of the performance differential while a gap of -0.118 remains unexplained. This analysis confirms what we have found with the PSM technique: the difference in performance between the two groups remains also after controlling for potential selection bias.

7. Discussion

Students' performance in Italian universities is an important issue which is needed to be addressed. As it has been mentioned in the introduction, Italy occupies a low position in the ranking of universities in terms of the number of graduates and the timing at which students end up their studies in a period not longer than the nominal one.

The aim of our study was to investigate whether differences in the profile of students, family and geographical factors as well as environmental variables in terms of quality research departments, teaching availability and students overall satisfaction have different impacts on the performance of students in finishing their studies in the established time. This work has produced important insights on classifying and defining a pattern of students as well as specifying those environmental variables that influence students' performance.

As it was mention in section 2, there are divergent opinions concerning the relationship between teaching and research. However, the main finding of our study arising from the empirical analysis are that the quality of the University in terms of research and teaching helps decreasing the probability of students being out of year. This result gives additional information to the growing literature on this issue, providing more evidence on the relationship between departments' environment and students performance. In particular, as we have pointed out in previous sections, there are few studies supporting the positive relationship between the quality of the institutions and students' results. Nevertheless, other scholars believe that both students' performance and the teaching quality are independent from the research (Gibbs 1995). Since university resources are scarce, a vast literature highlights the negative relationship between teaching and research activities (Coate et. al. 2001). However, our analysis clearly confirms that both activities have a positive influence on students' career.

A second major issue here addressed is the empirical evidence about the link between students' success and their own satisfaction. Our model confirms that a high students' overall satisfaction drives to better results in their studies. Notably, it seems that teaching availability satisfaction plays the main role in explaining students' success, as in Kernan and Lord (1991). This result is also confirmed by the significant and positive impact of the ratio between teachers and students: the higher this ratio, the better the students' performance. Our findings support what appeared in other studies (Hartman and Schmidt 1995). These results confirm that, in particular, students' satisfaction and high supply of teaching services are positively linked to students' performance (Zeichner 2010).

These findings contribute to the discussion about the supposed conflict between research and teaching duties. It is worth noting that the research quality of the departments' research plays an important role in determining students performance which in turn translate into their personal satisfaction and motivation (Kerman and Lord 1991; Zeichmer 2010). In this extent, institutions should allocate their resources in order to promote students' motivation and increase both, teaching and research quality. So, incentives can play a role in motivating university members to concentrate their activities in research and teaching as it is a key point for students' success.

In addition, this work also allows us to identify the profile of students more at risk. In other words, the results illustrate the main characteristics of the students who are more likely to have a "regular" career. It allows us to define a sub-set of factors which could be used to identify those cases with a higher probability of finishing their studies in more than three years. In particular, the results demonstrated that residential students show a higher likelihood to conclude their career much latter than commuter students. This result is quite surprisingly since both the theory and the previous experimental investigations and surveys show a different relationship. A possible rationale of this controversial outcome is the fact that the quality level of services provided by the University of Sassari is not sufficient to give the same opportunity to the two groups. Students that move to live in the campus or neighbouring structures might have high costs in terms of adaptation to the new environment. Maybe, this aspect has had some influence on their productivity. Another motivation comes from the fact that we can have a sample bias here. Good students might prefer to complete their studies in prestigious and notorious universities. This is even more true for the students coming from out of Sassari, since the difference between the expenditures associated to the two options, i.e. stay in Sassari or move to another university in the North of Italy or abroad, is lower. However, this result is meaningful since it encourages the University of Sassari to promote new policies in order to balance the situation between residential and commuter students filling up such a gap.

8. Final remarks and future developments

The present analysis documents the main factors in explaining undergraduate students' careers, taking the University of Sassari as a case study. We emphasise the role played by Departments' research quality: the empirical evidence shows that high research productivity is positively correlated with the likelihood to regular careers of students. Then, the number of professors per students, taken here as a proxy of teaching supports, has a positive effect on students' ability to finish the graduate studies within the given period. High teaching standard is positively correlated with student's performance, as in Beltyukova and Fox (2002). A direct policy implication of these findings is that supporting the academic staff, in order to potentiate their performance both in research and teaching, has a positive effect on students' performance.

Furthermore, we find that students' satisfaction, both in terms of teaching and environmental features, has a positive influence on their performance (Marsh 1982, 2007; Abrami et al. 2007; Theall and Feldman 2007). This result is in line with the empirical literature (see, for instance, Machado et al. 2011) that highlights the importance of students' satisfaction in improving the efficacy of their careers and their future employability. As Taylor et al. (2008) and Waggoner and Goldman (2005) discussed, a winning strategy to improve students' satisfaction and reputation is to encourage higher levels of success and graduation rates.

The paper gives also some clues about which are the individual and background factors that help on keeping regular careers. We find that residential students are the group most at risk of underperformance. This should be translated into a higher effort by the institution in order to fill up this gap. This research highlights the need to calibrate the teaching provision in response to the various typologies of students, like for instance residential and commuter students, full time

and part time students, students with disabilities and not. It is important to support all groups accordingly to their needs, in order to facilitate and increase the sentiment of community among the students, which will help them to increase their productivity and well-being.

As we have remarked in previous section, the higher productivity of commuter students compared to residential ones could be due to a sample selection bias. In other words, good students might prefer to complete their studies in institutions more prestigious than the university of Sassari. This effect could be stronger among the incoming students since their opportunity cost is higher than students from Sassari.

This result is quite surprisingly since both the theory and the previous experimental investigations and surveys show a different relationship. A possible rationale of this controversial outcome is the fact that the quality level of services provided by the University of Sassari is not sufficient to give the same opportunity to the two groups. Students that move to live in the campus or neighbouring structures might have high costs in terms of adaptation to the new environment. Maybe, this aspect has had some influence on their productivity. Another motivation comes from the fact that we can have a sample bias here. Good students prefer to complete their studies in prestigious and notorious universities. This is even more true for the students coming from out of Sassari, since the difference between the expenditures associated to the two options, i.e. stay in Sassari or move to another university in the North of Italy or abroad, is lower.

The regularity of students' careers, in terms of the ability to conclude the degree programme within the nominal duration is an important issue in Italy since it is used by MIUR as a proxy of teaching performance. Hence, students' behaviours impact on university system transfers. In this framework, our findings can be a tool for university's policies in order to help and support students during their career. These findings will allow to promote and elaborate new strategies in order to satisfy the students' expectations and encourage a supportive and collaborative relationship between teachers, administration and students (OECD 2002; Taylor and Machado 2006).

This paper contributes to the international ongoing discussion about the development and the implementation of teaching methods to support students' performance. Notably, both students and university will benefit from these practices. Determining the main factors of students' career (in terms of duration, performance or drop-out) can help to identify new strategies and to design opportune actions in order to support students' community. For all these reasons, the interest of this paper is not only for the academic community, but it could also be useful for policy makers to identify strategies and incentives to improve students' well-being and performance.

In conclusion, our analysis could be extended in order to analyse the temporal moment in which it is more frequent for students to fail down in their careers. For instance, Dekker et al. (2014) highlights that the higher drop-out rate is observed during the first year of their study. One reason can be that they do not get to adapt to the new university environment. Alternatively, we can think to a simple problem of matching between students and institutions: working with a limited set of information, students have a higher likelihood to commit a mistake during the first year then within the rest of their career. Thus, in future analysis it could be very useful to analyse this issue in order to determine some strategies for motivating and involving students in the university context.

References

Abrami, P. C., d'Apollonia, S., & Rosenfield, S. (2007). The dimensionality of student ratings of instruction: What we know and what we do not. In R. P. Perry & J. C. Smart (Ed), The scholarship of teaching and learning in higher education: An evidence based perspective (pp. 385–445). Dordrecht: Springer.

Aikens, N. L., & Barbarin, O. (2008). Socioeconomic Differences in Reading Trajectories: The Contribution of Family, Neighbourhood, and School Contexts. *Journal of Educational Psychology,* 100 (2), 235–251.

Alfano, H. L., & Eduljee, N. B. (2007). Differences in work, levels of involvement, and academic performance between residential and commuter students. *College Student Journal*, 47 (2), 334-342

Alhija, F. N., & Fresko, B. (2009). Student evaluation of instruction: What can be learned from students' written comments? *Studies in Educational Evaluation*, 35(1), 37–44.

Almalaurea (2014). Profilo dei laureati 2013. Report. Almalaurea. https://www.almalaurea.it/sites/almalaurea.it/files/docs/universita/profilo/profilo2014/rapporto20 14-profilo_volume-completo.pdf. Accessed 28 August 2015.

Beltyukova, S. A., & Fox, C. M. (2002). Student satisfaction as a measure of student development: Towards a universal metric. *Journal of College Student Development, 43(2), 161-172.*

Blinder, A. S. 1973. Wage discimination: Reduced form and structural estimates. *Journal of Human Resources*, 8, 436–455.

Braskamp, L. A., Ory, J. C., & Pieper, D. M. (1981). Student written comments: Dimensions of instructional quality. *Journal of Educational Psychology*, 73, 65–70.

Breen, R., & Jonsson, J. O. (2005). Inequality of Opportunity in Comparative Perspective: Recent Research on Educational Attainment and Social Mobility. *Annual Review of Sociology,* 31, 223–43.

Choi, B. K., & Rhee, B. S. (2014). The influences of student engagement, institutional mission, and cooperative learning climate on the generic competency development of Korean undergraduate students. *Higher Education*, 67 (1), 1-18.

Chickering, A.W. (1974). *Commuting vs. residential students: Overcoming educational inequities of living off campus*. San Francisco: Jossey-Bass.

Coate, K., Barnet, R., & Willliams G. (2001). Relationships Between Teaching and Research in Higher Education in England. *Higher Education Quarterly,* 55(2), 158-174.

Costantini P. & Vitale M.P. (2010). Analyzing Undergraduate Student Graduation Delay: A Longitudinal Perspective in Contributions to Statistics, *Statistical Methods for the Evaluation of University Systems*. Part of the series Contributions to Statistics pp 145-159, Springer – Verlag, Berlin.

Dekker, G.W., Pechenizkiy, M., & Vleeshouwers, J.M. (2014). Predicting Dropout Student: An Application of Data Mining Methods in an Online Education Program. *European Journal of Open, Distance and E-Learning*, 17(1) 118–133.

Dion, D. P. (2005). The Lisbon Process: a European Odyssey. *European Journal of Education,* 40 (3), 295-313.
Eurydice (2010) Focus on Higher Education in Europe 2010: the impact of the Bologna Process. Resource document. Education, Audiovisual and Culture Executive Agency (EACEA P9 Eurydice). http://www.eurydice.org. Accessed 25 June 2015.

Dugan, J.P., Garland, J.L., Jacoby, B., & Gasiorski, A. (2008). Understanding commuter student self-efficacy for leadership. A within-group analysis. NASPA Journal, 45(8), 282-310.

European Commission (2005) Mid-term review of the lisbon strategy: regional and local players need to step up their involvement. European Commission Report. http://www.eipa.eu/files/repository/eipascope/SCOPE2005-2_7.pdf. Accessed 30 October 2014.

European Commission (2004) Implementation of the Education and Training 2010 Work Programme. European Commission Working Paper. http://www.cedefop.europa.eu/files/916-att1-1-SEC_Education_Training.doc. Accessed 17 June 2015.

European Commission (2009) Progress toward the Lisbon Objectives in Education and Training- Indicators and Benchmarks 2009 (Brussels, European Commission).

Eurostat (2009). Youth in Europe. A statistical portrait. Luxembourg, Luxembourg: Office of the European Union.

Eurostat (2014). Share of young adults having completed tertiary education up to 37%. Luxembourg, Luxembourg: Office of the European Union.

Gianoutsos, D. (2011). Comparing the student profile characteristics between traditional residential and commuter students at a public, research-intensive, urban community university. Doctoral dissertation, University of Nevada-Las Vegas. http://digitalscholarship.unlv.edu/thesesdissertations/925

Gibbs, G. (1995) The Relationship Between Quality in Research and Quality in Teaching. *Quality in Higher Education*, 1(2), 147-157.

Grilli L., Rampichini C.& Varriale R. (2015). Statistical modelling of gained university credits to evaluate the role of pre-enrolment assessment tests: An approach based on quantile regression for counts. *Statistical Modelling*, p.1-20.

Hanushek, E.A., & Rivkin, S.G. (2006). Teacher Quality. In E.A. Hanushek & Finis Welch (Eds.), Handbook of the Economics of Education. Amsterdam: North-Holland.

Hartman D.E & Schmidt S. L. (1995). Understanding student/alumni satisfaction from a consumer's perspectives: the effects of institutional performance and program outcomes. Research in Higher Education, 36(2), 197-217.

Heckman, J., Ichimura, H., Smith, J., and Todd, P. (1998). Characterizing Selection Bias Using Experimental Data. Econometrica, 66(5), 862-74.

Heublein, U. (2014). Students drop-out from German Higher Education Institutions. *European Journal of Education*, 49(4), 498-513.

Hodges, L. C., & Stanton, K. (2007). Translating comments on student evaluations into the language of learning. *Innovative Higher Education*, 31(5), 279–286.

Horn, L.J., & Berktold, J. (1998). Profile of undergraduates in U.S. postsecondary education institutions: 1995-96. Washington, DC: Office of Educational Research and Improvement, U.S. Department of Education.

Jann, B. (2008). The Blinder–Oaxaca decomposition for linear regression models. *The Stata Journal*, 8 (4), 453–479.

Johnes, G., & McNabb, R. (2004). Never Give up on the Good Times: Student Attrition in the UK. *Oxford Bulletin of Economics and Statistics*, 66 (1), 23-47.

Lewis, K. G. (2001). Making sense of student written comments. *New Directions for Teaching and Learning,* 87, 25–32.

Kernan M. C. & Robert G. Lord R. G. (1991). An Application of Control Theory to Understanding the Relationship Between Performance and Satisfaction. *Human Performance*, 3, 173-185.

Kuh, G.D. (2001). Assessing what really matters to student learning: Inside the National Survey of Student Engagement. *Change*, 33(3), 10-17.

Kuh G.D., Gonyea R.M., Palmer M. (2011). The Disengaged Commuter Student: Fact or Fiction? *Commuter Perspectives*, 27(1), 2-5

Jacoby B. (2000). Why Involve Commuter Students in Learning? *New Directions for Higher Education,* 109, 3-12.

Machado, M., Brites, R. , Magalhães, A., & Sá, M. J.(2011), Satisfaction with Higher Education: critical data for student development. *European Journal of Education*, 46 (3), 415- 432.

Marsh, H. W. (1982). SEEQ: A reliable, valid and useful instrument for collecting students' evaluations of university teaching. *British Journal of Educational Psychology*, 52, 77–95.

Marsh, H. W. (2007). Students' evaluations of university teaching: Dimensionality, reliability, validity, potential biases and usefulness. In R. P. Perry & J. C. Smart (Ed.), The scholarship of teaching and learning in higher education (pp. 319–383). Dordrecht: Springer.

Mega, C., L. Ronconi & De Beni R. (2014).What Makes a Good Student? How Emotions, Self-regulated Learning, and Motivation Contribute to Academic Achievement. *Journal of Educational Psychology*, 106 (1), 121–31.

Newbold, J.J., Mehta, S.S., & Forbus, P. (2011). Commuter students: Involvement and identification with an institution of higher education. *Academy of Educational Leadership Journal*, 15(2), 141-153.

Noser T.C., Manakyan H & Tanner J. R. (1996). Research productivity and perceived teaching effectiveness: A Survey of Economics Faculty. *Research in Higher Education*, 37, (3), 299-319.

Oaxaca, R. 1973. Male–female wage differentials in urban labor markets. *International Economic Review*, 14,693–709.

OECD (2002). Responding to Student Expectations. Paris, France: OECD Publications Service. Oliver, B., Tucker, B., & Pegden, J. (2007). An investigation into student comment behaviours: Who comments, what do they say, and do anonymous students behave badly? Paper presented at the Australian Universities Quality Forum 2007, 11–13 July, in Hobart, Australia. http:// www.auqa.edu.au/files/publications/auqf2007_proceedings_final_website_text.pdf. Accessed 5 May 2015.

Richardson, M., C. Abraham & R. Bond R. (2012). Psychological Correlates of University Students' Academic Performance: A Systematic Review and Meta-analysis. *Psychological Bulletin*, 138, (2), 353–87.

Rosenbaum, P. R., and Rubin, D. B. (1983). The Central Role of the Propensity Score in Observational Studies for Causal E ects. Biometrika, 70(1), 41-55.

Snyder, T.D., & Dillow, S.A. (2011). Digest of Education Statistics 2010 (NCES 2011-015). U.S. Department of Education, National Center for Education Statistics. Washington, DC. http://nces.ed.gov/pubs2011/2011015.pdf.

Sutton Trust (2010), Responding to the New Landscape for University Access. London: Sutton Trust. http://socialwelfare.bl.uk/subjectareas/serviceactivity/education-skills/suttontrust/ responding10.aspx

Taylor, J. S., & Machado, M. L. (2006). Higher education leadership and management: from conflict to interdependence through strategic planning. *Tertiary Education and Management*, 12, 137–160.

Taylor, J., Brites, R., Correia, F., Farhangmehr, M., Ferreira, B., Machado, M. L., Sarrico, C. & Sa´, M. J. (2008) Strategic enrolment management: improving student satisfaction and success in Portugal. Higher Education Management and Policy, 20, 129–145.

Taylor J. (2001). The Impact of Performance Indicators on the Work of University Academics: Evidence from Australian Universities. *Higher Education Quarterly*, 55, (1), 42-61.

Theall, M., & Feldman, K. A. (2007). Commentary and update on Feldman's (1997) identifying exemplary teachers and teaching: Evidence from student ratings. In R. P. Perry & J. C. Smart (Eds.), The scholarship of teaching and learning in higher education (pp. 130–143). Dordrecht: Springer.

Thielea, Singletonb, Popec & Stanistreetc (2014). Predicting students' academic performance based on school and socio-demographic characteristics. *Studies in Higher Education*,1-23.

Tucker, B. (2014). Student evaluation surveys: anonymous comments that offend or are unprofessional. High Education, 68(3), 347–358.

Young, P. (2006) Out of balance: lecturers' perceptions of differential status and rewards in relation to teaching and research. *Teaching in Higher Education*, 11(2), 191-202.

Van den Berg, M. N., & Hofman, W. H. A. (2005). Student Success in University Education. A multi-measurement study into the impact of student and faculty factors on study progress. *Higher Education*, 50, 413-446.

Waggoner, D. & Goldman, P. (2005). Universities as communities of fate. Institutional rhetoric and student retention policy. *Journal of Education Administration*, 43, 86–101.

Weissberg, N.C., Owen, D.R., Jenkins, A.H., & Harburg, E. (2003). The incremental problem: Enhancing the predictability of academic success in an urban, commuter institution. Genetic, Social, and General Psychological Monographs, 129(2), 153-180.

Wooldridge, J. M. (2010). Econometric Analysis of Cross Section and Panel Data. London, UK: The MIT Press.

Zeichner K.(2010). Rethinking the Connections Between Campus Courses and Field Experiences in College- and University-Based Teacher Education. *Journal of Teacher Education*, 61, 1, 289-299.

Zimmaro, D. M., Gaede, C. S., Heikes, M. P., & Lewis, K. G. (2006). A study of students' written course evaluation comments at a public university. Resource document. University of Texas at Austin. http://ctl. utexas.edu/ctl/sites/default/files/cis_forms/A-Study-of-Students-Written-Course-Evaluation-Commentsat- a-Public-University-2006.pdf. Accessed 30 August 2015.

Zotti, R. (2015). Should I Stay Or Should I Go? Dropping Out From University: An Empirical Analysis Of Students' Performances. Working Papers 70, AlmaLaurea Inter-University Consortium. http://www2.almalaurea.it/universita/pubblicazioni/wp/pdf/wp70.pdf. Accessed 14 August 2015.

Table 1. Descriptive statistics (obs. = 1,167)

VARIABLES	Mean	Median	Std. Dev.
Irregular_carrier	0.628	1.00	0.483
Income	32,556.14	17815.08	94,948.65
Age	21.160	19.00	5.130
Male	0.303	0.00	0.460
Residential	0.708	1.00	0.454
Diploma_mark	78.891	78.00	12.178
Lyceum	0.581	1.00	0.493
Technical_institute	0.243	0.00	0.429
Professional_institute	0.049	0.00	0.236
Teachers_institute	0.091	0.00	0.288
Other_institute	0.036	0.00	0.188
DipQR	-0.074	-0.091	0.286
Teacher_ps	0.430	0.111	1.161
Satisfaction	0.015	0.012	0.024
Organization	0.005	0.014	0.058
Study_load	0.017	0.013	0.050
Teacher_availability	0.002	0.00	0.016
Infrastructure	0.007	-0.011	0.083

Table 2. Probit regression results (Dependent variable: irregular_career)

VARIABLES	(1)	(2)	(3)	(4)	(5)
Income	-2.6e-07*	-2.7e-07*	-2.4e-07*	-2.5e-07*	-5.0e-07*
	(1.3e-07)	(1.4e-07)	(1.4e-07)	(1.4e-07)	(2.9e-07)
Age	0.00039	0.0077*	0.00034	0.0080*	0.00048
	(0.0029)	(0.0041)	(0.0029)	(0.0042)	(0.0029)
Male	-0.029	0.29***	0.052	0.37***	-0.030
	(0.033)	(0.11)	(0.053)	(0.10)	(0.033)
Residential	0.12***	0.13***	0.17***	0.18***	0.11***
	(0.033)	(0.033)	(0.041)	(0.041)	(0.036)
Diploma_mark	-0.0058***	-0.0057***	-0.0058***	-0.0057***	-0.0058***
	(0.0012)	(0.0012)	(0.0012)	(0.0012)	(0.0012)
DipQR	-0.25***	-0.25***	-0.25***	-0.25***	-0.25***
	(0.055)	(0.055)	(0.055)	(0.055)	(0.055)
Teacher_ps	-0.037***	-0.036***	-0.037***	-0.036***	-0.037***
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
Satisfaction	-3.32***	-3.47***	-3.29***	-3.44***	-3.29***
	(0.63)	(0.63)	(0.63)	(0.64)	(0.63)
Technical_institute	0.076**	0.073**	0.077**	0.074**	0.076**
	(0.035)	(0.035)	(0.035)	(0.035)	(0.035)
Professional_institute	0.049	0.042	0.048	0.041	0.049
	(0.063)	(0.064)	(0.062)	(0.063)	(0.063)
Teachers_institute	0.085*	0.086*	0.082	0.082*	0.083*
	(0.049)	(0.049)	(0.050)	(0.050)	(0.050)
Other_institute	0.18***	0.17***	0.18***	0.18***	0.18***
	(0.064)	(0.065)	(0.064)	(0.066)	(0.064)
Age*male		-0.016***		-0.017***	
		(0.0062)		(0.0061)	
Male*Residential			-0.13*	-0.14**	
			(0.070)	(0.070)	
Residential*Income					5.0e-07
					(4.5e-07)
Observations	1,167	1,167	1,167	1,167	1,167
Loglikelihood	-720.03	-716.45	-718.23	-714.67	-717.92

Robust standard errors are indicated in parentheses. ***, **, and * represent the significance levels of 0.01, 0.05, and 0.10 respectively.

Table 3. Probit regression results (Dependent variable: irregular_career)

VARIABLES	(1)	(2)	(3)	(4)
Organization	-0.00050			
	(0.29)			
Study_load		-0.12		
		(0.32)		
Teacher_availability			-5.99***	
			(0.93)	
Infrastructure				-0.15
				(0.18)
Observations	1,167	1,167	1,167	1,167
Loglikelihood	-734.76	-734.53	-714.45	-734.04

Independent variables included: Income, Age, Male, Residential, Diploma_mark, DipQR, Teacher_ps, Satisfaction, Technical institute, Professional_institute, Teachers_institute, Other_institute. Robust standard errors are indicated in parentheses. ***, **, and * represent the significance levels of 0.01, 0.05, and 0.10 respectively.

Table 4. Descriptive statistics (obs. = 1,167)

VARIABLES	(N. 341) Mean (Residential=0)	(N. 826) Mean (Residential=1)	t-test
Irregular_carrier	0.547	0.661	-3.68***
Income	46,478.27	26,823.87	3.23***
Age	21.884	20.931	2.86***
Male	0.408	0.262	4.99***
Diploma_mark	78.077	79.201	-1.44
Lyceum	0.607	0.550	1.793*
Technical_institute	0.223	0.253	-1.058
Professional_institute	0.063	0.057	0.402
Teachers_institute	0.046	0.109	-3.434***
Other_institute	0.058	0.028	2.403**
DipQR	-0.041	-0.087	2.501**
Teacher_ps	0.409	0.439	-0.398
Satisfaction	0.011	0.016	-3.116***
Organization	0.010	0.003	1.923*
Study_load	0.020	0.016	1.220
Teacher_availability	0.001	0.003	-1.798
Infrastructure	0.001	0.009	-1.564

Table 5. The Blinder-Oaxaca decomposition (obs. = 1,167)

	Coef.	Rob. St. Err.	z
Differential			
Prediction I (Residential=0)	0.547	0.027	20.25***
Prediction II (Residential=1)	0.661	0.016	40.22***
Difference	-0.116	0.031	-3.64***
Decomposition			
Explained	0.002	0.010	0.23
Unexplained	-0.118	0.031	-3.73***