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Academic performance and the Great Recession

by Effrosyni Adamopoulou and Giulia Martina Tanzi

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ACADEMIC PERFORMANCE AND THE GREAT RECESSION

by Effrosyni Adamopoulou* and Giulia Martina Tanzi†

Abstract

In this paper we study how the Great Recession affected university students in terms of performance, with a focus on the drop-out probability. To do so, we use individual-level data on a representative sample of university students in Italy in 2007 and 2011. We measure the severity of the recession in terms of increases in the adult and youth unemployment rates and we exploit geographical variation to achieve identification. On the one hand, an increase in the adult male unemployment rate worsens the financial condition of the family, raising the drop-out probability. On the other hand, by reducing the opportunity cost of tertiary education, an increase in the youth unemployment rate reduces the drop-out probability. Focusing on students who were enrolled at university before the Recession we are able to study the effects of the crisis on performance net of any potential effect on enrolment. We find evidence that overall, university drop-out decreased as a result of the Recession and that the probability of graduating on time increased for more motivated students.

Contents

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1 Introduction[1]

Labour market prospects and the financial situation of the family are known determinants of educational decisions (Becker, 1964). Job insecurity during the Great Recession (hereafter the Recession) might have changed the incentives to accumulate human capital. In the US there is evidence that the Recession increased university enrolment (Long, 2014). Little is known though on how university students reacted to this shock in terms of effort and the probability of dropping out. Although both the enrolment and the drop-out decision are part of the decision to invest in human capital, dropping out entails one extra cost: the time and resources already invested in tertiary education. In this paper we use individual-level data on Italian university students who enrolled before the Recession and suffered its effects in their 2nd year of university studies, in order to examine the effect of the Recession on academic performance. We focus on three distinct measures of performance, i.e., the drop-out probability, the probability of graduating on time (i.e., 3 years after enrolment), and the frequency of course attendance.

The reason we focus on Italy is threefold. First, the availability of individual-level data that are nationally-representative and allow us to compare multiple student cohorts, enables us to exploit regional variation for identification, and provides us with information on the students' field and university of study, family background and ability measures, even for those who drop out. This kind of information is generally unavailable in population or labour force surveys. Second, the fact that Italy is among the European Union countries with the lowest percentage of university graduates and the highest youth unemployment rate. Third, the fact that contrary to the US, the Recession in its initial stage (2008-2010) was a shock that came to Italy from abroad.[2] Differently from Long

[2]See the discussion in Section 4.2.

(2014), we can consider the Recession as an exogenous "treatment".

The university drop-out rate has received a lot of attention in Italy because it has been very high. Since the 1970s and until the early 1990s it reached values well above 60 per cent (Cingano and Cipollone, 2007). In a related paper before the Recession, Di Pietro (2006) finds that regional unemployment rates are negatively associated with the drop-out rate. We focus our analysis on the latest cohort of students and we examine whether the Recession had a causal effect on the probability of dropping out of university.

Our identification strategy is based on regional variation in the severity of the Recession. We measure this in terms of the change in the adult male unemployment rate and the change in the youth unemployment rate between 2005-2007 and 2008-2010.[3] The first is a proxy of changes in the financial situation of the student's family while the second is a proxy of changes in the opportunity cost of studying. We estimate a linear probability model with regional fixed effects using data on university students in Italy and we find that youth and adult unemployment rates have opposite effects on the probability of dropping out of university. The coefficient of the youth unemployment rate is negative and statistically significant, suggesting that the drop-out probability decreases as the opportunity cost of studying goes down. By contrast, the coefficient of the adult male unemployment rate is positive and statistically significant, and is larger in size. An adverse employment shock to the family of origin increases the drop-out probability due to financial constraints. Given that the unemployment rate has increased more sharply for the young during the Recession, the net effect is a decrease in the drop-out probability especially for men.[4] A placebo test confirms that the estimated effects are not due to preexisting trends.

Our findings are in line with Aguiar, Hurst, and Karabarbounis (2013) who document that time spent in education by men in the US increased during the Recession. Using the cross-state variation in foregone market work they find that singles in general allocate more than 10 per cent of their increased time to education. Our results are also consistent with earlier papers on the countercyclicality of college enrolment in the US (Betts and McFarland, 1995; Dellas and Sakellaris, 2003). However, there is no direct correspondence

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[3]The Recession hit Italy in the last quarter of 2008 and had adverse effects on labour markets (See D'Amuri, 2011).

[4]This gender difference depends on the students' field of study and on the educational level of the mother. See Section 3.3 for details.

between enrolment and drop-out as the latter entails the sacrifice of initial resources. Our data allow us to identify the effect of the Recession on the probability of dropping out net of any possible enrolment effect.

Recent papers shed light on the negative effects of graduating from college in a recession in the US (Kahn, 2010) and Canada (Oreopoulos, von Wachter and Heisz, 2012). Both papers find negative wage effects that persist over time. Hershbein (2012) focuses on high school graduates in the US and finds that their wages were less affected by the Recession than those of college graduates. We focus instead on the educational outcomes of university students and we find that the Recession may also affect human capital accumulation through changes in the university drop-out probability.

The idea that the Recession affects academic performance can be viewed as part of the broad literature on credit constraints in education. Lovenheim (2011) and Lovenheim and Reynolds (2012) find that households used their housing wealth to finance college enrolment in the 2000s when housing wealth was most liquid. Their findings imply that the recent housing bust could significantly affect college enrolment and completion through the reduction in the housing wealth of families with college-age children. Bound, Lovenheim, and Turner (2010) find that a rise in the housing wealth of the student's family increases the probability that the student will attend a better university (flagship public university instead of a non-flagship one). They also find some evidence of an increase in the likelihood of completing college for lower income students. Cameron and Taber (2004) instead do not find evidence that borrowing constraints generate inefficiencies in the market for schooling. Their identification is based on the prediction that the opportunity cost of schooling (measured by local low-skill wage rates) and the direct cost (measured by whether there is a college in the individual's county of residence) affect borrowing-constrained and unconstrained persons differently.

Credit constraints may be confused with adverse initial conditions. Carneiro and Heckman (2002) find that long-run factors reflected in ability are the major determinants of the family income-schooling relationship, and that only 4 per cent of the US population is credit-constrained in the short-run. Belley and Lochner (2007) find that family income has become a much more important determinant of college attendance in the early 2000s than in the 1980s suggesting that credit constraints might be more relevant for the recent

cohorts. The richness of our data allows us to control for initial conditions by providing us with information on the parents' education, labour market status, and occupation when the students were 14 years old.

Credit constraints can be a reason for dropping out of university. Stinebrickner and Stinebrickner (2008) use direct information on the reasons given by students for dropping out of a college in Kentucky, and examine how many students would drop out even if credit constraints were removed. They find that although credit constraints are likely to play an important role in the drop-out decisions of some students, the large majority of students from low income families drop out primarily due to reasons other than credit constraints. In a more recent paper using the same data, Stinebrickner and Stinebrickner (2012) find that college drop-out occurs as students learn about their academic ability or grade performance after matriculation. Our database, which is representative of the entire population of university students in Italy, also contains information on the reasons for dropping out, with "studies being too costly" among the possible reasons. In our data, both before and during the Recession, only around 5 per cent of university students dropping out report "studies being too costly" as the main reason.

Students' college preparation as well as collegiate characteristics may also affect the drop-out decision (Bound, Lovenheim, and Turner, 2010). We use high school grade as a measure of students' ability. We also exploit official data on the ranking of Italian universities by field of study. We can thus control for the ability of the students and the quality of the university they attend.

There are also papers studying the relationship between local labour market conditions and the probability of leaving post-compulsory secondary education before the Recession (see Petrongolo and San Segundo, 2002 for Spain; Clark, 2011 for the UK; Mocetti, 2012 for Italy). Given the young age of high school students, the decision to drop out might mainly reflect the will of the family rather than that of the student. By focusing instead on university students we are more likely to capture the decision to drop out being made by the students themselves. Moreover, secondary education in Italy is practically free of charge as most students attend public high schools, where there are no tuition fees. By contrast, tertiary education is costly, as both private and public universities charge tuition fees.

8

The rest of the paper is organized as follows. Section 2 describes the data and presents evidence on regional differences in the severity of the Recession. Section 3 introduces the empirical strategy, discusses the identification issues, and presents the main findings. Section 4 includes robustness checks and the results for other outcome variables. Section 5 concludes.

2   Data

Our data come from the Survey on Educational and Professional Paths of Upper Secondary School Graduates conducted by the Italian National Institute of Statistics (Istat).[5] The survey covers a representative sample of high school graduates in Italy three years after high school graduation. There are 4 waves available: Survey 2001 on graduates of 1998, Survey 2004 on graduates of 2001, Survey 2007 on graduates of 2004, and Survey 2011 on graduates of 2007. The survey consists of more than 20,000 respondents in each wave and provides detailed information on educational and employment history as well as on parental background. High school graduates at the time of the survey might study at a university, work, study and work at the same time, be unemployed, or be inactive. In the case of drop-outs there are questions regarding educational history up to the moment of dropping out as well as information on the reason for dropping out.[6]

The last wave (Survey 2011) is the survey conducted during the Recession. Our aim is to compare students' academic achievement before and after the Recession. However, for administrative reasons, the last wave took place 4 years after high school graduation. This makes the comparability of the last wave with previous waves less straightforward. Exploiting the information on the exact time of dropping out, we focus on individuals who dropped out no later than their 3rd year of university studies. This ensures comparability with previous waves with respect to our key variables.

We construct our measures of the severity of the Recession using data from the Italian

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[5]The analyses were conducted at the Istat-Italian Research Data Center (Laboratorio Adele) in compliance with confidentiality policies and procedures. The opinions expressed in this paper are the sole responsibility of the authors and do not represent the official position of the Italian National Institute of Statistics.

[6]This survey contains information that is not generally available in population or labour force surveys. First, the grade obtained at high school in order to control for student's ability. Second, the field and the university of study, including for those who have dropped out.

Labour Force Surveys in the period 2005-2007 and 2008-2010 (3-year averages corresponding to the academic years of each cohort). We compute the change in the unemployment rate for adult males aged 35-74 years old by educational attainment, and for young high school graduates aged 20-24 by gender in the student's region of origin (Figures A1 and A2). The first measure is a proxy of the current financial situation of the father.[7,8,9] Contrary to the US, student loans in Italy are not a common practice (Brown and Sessions, 1999). In most cases parents finance the university studies of their children. In our data less than 15 per cent of university students combine work and study. Therefore, the employment situation of the father matters. The second measure is a proxy of the opportunity cost of studying. As Table 1 shows, in Italy student mobility is low between regions (around 20 per cent) but much higher between provinces (around 50 per cent). Given that the majority of students study in the region of origin we assign them with the corresponding unemployment rate. For those who study in a different region we assume that if they drop out before finishing university, they will look for a job in the region of origin as high school graduates. In the 2011 survey, the only wave which gives the region of a person's current job, a mere 8 per cent of university drop-outs found a job in a region different from the region of origin.[10,11]

In order to control for the quality of the universities we merge our database with official data on quality indicators for all the universities in Italy by field of study. The data come from a research evaluation survey conducted in 2006 by the Supervising Committee for Research Evaluation (CIVR) with the collaboration of the Ministry of Education, Universities, and Research (MIUR). The measure of quality is an aggregate indicator that

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[7]The survey does not contain information on the current situation of the parents. The only available information on parents' education, employment and occupational status refers to 8 years before the survey, i.e. to the time when the respondents were 14 years old. In order to proxy the current employment status of the father we assign to each student the adult male unemployment rate that corresponds to the educational group of his/her father in the region of origin.

[8]We focus on adult males since in Italy more than 50 per cent of adult females do not work.

[9]Our proxy does not need to capture parental layoffs. Our results go through as long as the perception of the father about the probability of layoff is affected. Narrowing the age group to 45-64 produces similar results.

[10]The figure is around 20 per cent for drop-outs who used to study in a region different from the region of origin.

[11]In the analysis that follows our results hold, even if we exclude the students who study in a different region from their region of origin. Moreover, assigning each student with the youth unemployment rate in the region of study instead of the one in the region of origin produces similar results (available upon request).

takes into account the number and the rating of courses on offer, the average characteristics and the number of courses of excellence, the number of years spent by researchers in international mobility programs, the number of PhD and post-doctoral researchers, as well as the amount of research funds received from various sources (Ministry of Education, European Union, etc.).

Table 1 shows the descriptive statistics for the variables of interest for 3 different cohorts. We first focus on the last 2 columns (the cohort before the Recession and the cohort of the Recession). We observe that the drop-out rate slightly decreased between 2007 and 2011.[12] At the same time, the percentage of students who graduate on time and of those who attend classes more than 3 times a week increased. Both the adult male and the youth unemployment rate have risen during the Recession with the rise being larger for the young. Figures A1 and A2 show that there has been variation in the severity of the Recession across regions. We now move to the empirical exercise in order to examine whether the Recession has had any effect on students' performance.

3   Empirical exercise

According to the predictions of Becker's basic model on human capital accumulation (1964), the Recession has two opposite effects on academic performance. On the one hand, parental resources decrease as the unemployment rate of the fathers goes up. We expect this to positively affect students' performance in order to speed up graduation. On the other hand, the opportunity cost of studying decreases as the youth unemployment rate goes up. We expect this to negatively affect performance by delaying graduation. Regarding drop-out, we expect the opposite effects. The rise in the unemployment rate of the fathers is expected to increase drop-out due to financial difficulties, while the rise in the youth unemployment rate is expected to decrease drop-out due to the scarcity of outside options. In our data 76 and 67 per cent of university drop-outs in 2007 and 2011 respectively are working, suggesting that finding a job became more difficult during the crisis.

The Recession might also have influenced enrolment, with indirect effects on students'

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[12] A recently released report from the National Agency for the Evaluation of Universities and Research Institutes (ANVUR, 2014) confirms the decrease in the drop-out rate.

performance. Less competent students who before the Recession would have preferred to work instead of going to university, might decide to go to university during the Recession due to a lack of job opportunities. Likewise, more competent students who before the Recession would have preferred to go to university might not be able to do so during the Recession due to lower parental income. As a result there would have been a composition effect which might have undermined performance. The timing of the survey enables us to study the effect of the Recession on performance net of any potential effect on enrolment. The most recent wave of the survey took place in 2011, i.e. during the Recession and involved young individuals who graduated from high school in 2007. The vast majority of those who enrolled at a university did so immediately after graduation in 2007, i.e. before the Recession hit Italy.[13] Hence, these students' enrolment decision was not affected by the Recession. Given that the Recession had not been predicted (Bezemer, 2009), we can also rule out anticipation effects.

The university system in Italy underwent a major reform in 2001. In particular, a 3-year first-level degree followed by a 2-year second-level degree (3+2) replaced the old degree, typically of 4-year duration in most fields (Bratti, Broccolini and Staffolani, 2006). In our exercise we use only students in 3+2 programmes who enrolled at university after the reform (the earliest cohort of students in our sample started university in 2001). Moreover, tuition fees increased during the Recession. According to the available data for a group of universities (Federconsumatori Surveys 2010, 2011, 2012), university tuition fees increased around 10 per cent between 2011 and 2012 for students with a family income of less than 10,000 euros but remained practically unchanged in the period 2010-2011. In our sample we define as the "Recession cohort" the cohort of students who enrolled at university in 2007 and we analyze the probability of dropping out up to the year 2010. Hence, tuition-fees increases are unlikely to affect our results.

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[13]In our analysis we only take into consideration young individuals who enrolled at university immediately after high school graduation.

3.1 Specification and main results

We start with a linear probability model with regional and cohort fixed effects.[14] The surveys in 2007 and 2011 refer to two different cohorts, therefore we do not observe the same individual over time. We proxy the financial situation of the student's family with the adult unemployment rate for males aged 35-74 in the student's region of origin according to the education of his/her father. We also proxy the opportunity cost of the student with the youth unemployment rate for high school graduates aged 20-24 years old by gender in the student's region of origin. We start our analysis with the drop-out probability as the outcome variable.

Our benchmark specification is the linear probability model specified in (1),

$$
\begin{aligned}
dropout_{i,r,c} \;=\; & \beta_o + \beta_1 (Adult\ male\ unemployment\ rate)_{r,c} \\
& + \beta_2 (Youth\ unemployment\ rate)_{r,c} \\
& + \beta_3 X_{i,r,c} + \beta_4 (cohort)_c + \beta_5 (region)_r + \epsilon_{i,r,c} \quad (1)
\end{aligned}
$$

where i stands for the individual, r for the region, and c for the cohort. The dependent variable is discrete and takes the value 1 if the student dropped out of university and 0 otherwise. The independent variables are the adult male unemployment rate, the youth unemployment rate, time (cohort) dummies, regional dummies, and $X_{i,r,c}$ that includes individual controls, namely the gender, the school grade as a proxy of ability, a dummy for having a father with a high school diploma, a dummy for having a father with a university degree, an indicator for coming from a disadvantaged family in order to account for initial conditions,[15] a dummy for studying in a private university and a dummy for studying in a different region from the region of origin. We also include dummies for the particular university of study and for the specific field of study (e.g. engineering, political sciences, etc.). Hence, we are able to control for the level of difficulty that differs across fields and

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[14]This is equivalent to a Difference-in-Differences approach with continuous treatment where we compare the outcomes before and after the Recession and across treated and untreated individuals. This approach has the advantage that individuals are not strictly assigned to treated and untreated groups with a switch-on/switch-off dummy variable. Instead, the unemployment rate is used as a variable with differing treatment intensity across regions and cohorts. See Angrist and Pischke (2009) for more details.

[15]We define as students from disadvantaged families those whose father was either dead, an unqualified worker (active or retired), or unemployed, and whose mother was either dead, an unqualified worker (active or retired), unemployed, or a housewife.

universities, as well as for university-specific traits (tuition fees, teaching practices, etc.).

We first estimate the model without the individual controls $X_{i,r,c}$ (Table 2, Column 1). We find a positive and statistically significant effect of the adult male unemployment rate on the probability of dropping out. Moreover, as expected, there is another channel at work, that generated by the increase in the youth unemployment rate. Indeed, we find that the youth unemployment rate has a negative and statistically significant effect on the drop-out probability. These effects are robust to the inclusion of individual controls. Both coefficients decrease in magnitude but remain statistically significant (Table 2, Column 2). Going through the coefficients of the individual controls (Table A1), we find that the probability of dropping out is lower for women, for more able students (proxied by the high school grade), and for those whose father has a high level of education. Moreover, the drop-out probability is higher for students who come from a disadvantaged family, and it is lower for students that study away from home (in another region) or at a private university, probably because of the high initial sunk cost.[16]

In Columns 3 and 4 of Table 2 we estimate the same regressions (with and without individual controls) substituting the regional fixed effects with fixed effects that capture, at the same time, the region, the level of education of the father and the gender of the student. As previously explained, our proxy of the intensity of the Recession for the parents is the unemployment rate of the adults located in the same region, and with the same level of education as the student's father. Moreover, the youth unemployment rate varies not only according to the region of the student but also according to his/her gender. Including more specific dummies than the regional ones allows us to better disentangle the effects on drop-outs that can be attributed to the crisis. Results are completely in line with those found using simple regional dummies and in the complete specification (Table 2, Column 4) the coefficients of our variables of interest are even larger than those in Column 2.[17]

In order to see which effect dominates and to compute the net effect of the Recession on the drop-out probability, we need to consider the changes in the adult male and the youth

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[16] We also repeat the analysis by including the unemployment rates one by one and the results are very similar (Table A2).

[17] In Column 2 the specification includes among the individual controls the gender of the student and the level of education of the father, so as to take into account these covariates even when we include simple regional dummies.

unemployment rates. As shown in Table 1 the adult male and the youth unemployment rates have increased in Italy by 0.99 and 2.36 percentage points between the period 2005-2007 and 2008-2010. Multiplying these numbers with the most conservative estimates from the linear probability model (Table 2, Column 2) we get a decrease in the drop-out rate of 0.08 percentage points. This suggests that the opportunity cost channel outweighed that of the financial situation of the parents. Given that the drop-out rate between the two cohorts fell by 0.65 percentage points, the Recession explains 12.3 per cent of this drop. Considering that in the years that followed (2011-2013) the youth unemployment rate has further increased at a fast pace, the overall fall in the drop-out rate due to the Recession is potentially large for this specific cohort of students.

3.2 Heterogeneous effects

The changes in the opportunity cost of studying and in the financial situation of the family during the Recession may have affected students' drop-out probability in a heterogeneous way. We thus perform the same analysis by different groups according to individual characteristics (such as the student's gender, ability, and family background), and university characteristics (field of study and quality of the university).

As Table 3 shows, the effects of the Recession differ vastly according to gender. First, the increase in the adult male unemployment rate led to an increase in the drop-out probability only for women, while the effect is not statistically different from zero for men. Second, the increase in the youth unemployment rate led to a greater decrease in the drop-out probability for males than for females. These two findings imply that the net effect of the Recession was a decrease in the drop-out probability for males and an increase in the drop-out probability for females. In the next subsection we discuss possible explanations behind these gender differences.

We find that the Recession mainly affected less able students in terms of drop-out probability (Table 4). This is not surprising given that less able students are the students at most risk of dropping out. More able students instead remained unaffected.

There are also large differences according to paternal socioeconomic status (Table 5).[18] For students coming from disadvantaged families we find a large and statistically

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[18] Here, instead of splitting the sample we introduce interactions as the size of the disadvantaged

significant increase in the drop-out probability as the adult unemployment rate goes up. Moreover, for these students the change in the opportunity cost of studying does not seem to matter. As expected, families with a more vulnerable economic situation had more difficulties in sustaining the burden of the cost of education. This is consistent with Christian (2007) who finds more procyclical enrolment among people from lower-income, lower-education households in the US.

We then consider whether there are heterogeneous effects according to university characteristics. Table 6 presents the estimates of the probability of dropping out by field of study. The coefficient of adult male unemployment rate is positive for students in the humanities (political/social sciences, law, literature, languages) but negative for students in the sciences (math/physics, geology/biology, engineering/architecture, economics/statistics). Studying science might be considered by parents as an important investment for the future of their children and therefore drop-out decreases in spite of the worsening of financial conditions.

Lastly, we analyze the choices of students according to the quality of the university by field of study chosen. We find that the net effect of the crisis is a large increase in the drop-out probability for students in universities placed below the 25th percentile in the rankings, an increase smaller in magnitude for students in medium quality universities, and no significant increase for students in high quality universities (Table 7).

3.3 Gender differences

The analysis so far has revealed a disparity in the effects of the Recession on the drop-out decisions of young men and women. In this subsection we try to shed light on these gender differences. Why do women drop out more as adult male unemployment rises while men remain unaffected? One possible explanation is the field of study. Women are traditionally concentrated in the humanities while men are concentrated in the sciences. In Table 8a we analyze the behaviour of women and men by field of study. We find that the effect of adult male unemployment rate is positive for both genders in humanities. However, the effect is statistically significant only for women and much larger in magnitude. It seems that parents consider studying humanities more as a "luxury" for

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students' group is small.

their daughters.

Another possible explanation lies in the education of the mother. Mothers may act as a role model for their daughters and as a result the choice to finish university or drop out might differ according to the educational attainment of the mother (See Cardoso, Fontainha, and Monfardini, 2010 for the pronounced role of the mother on children's human capital investment in Italy). In Table 8b we investigate this possibility. Indeed the positive effect of the adult male unemployment rate on the drop-out probability is counterbalanced for women whose mother has finished university. This means that an adverse financial shock to the father makes women drop out more especially in the case that their mothers are not university graduates.

4   Robustness

4.1   Refining the measurement of the unemployment rate

In our baseline specification we exploit regional variation in a continuous way in order to achieve identification. In Italy the prospective labour market for the young lies often beyond the borders of their province, and therefore it is more reasonable to proxy the employment conditions that the young face with those in the corresponding region. Nevertheless, we moved to provincial variation in order to proxy the opportunity cost and the financial situation of the family in a more detailed way.[19] We obtained similar results (Table 9) but by disaggregating the unemployment statistics, we increased the measurement error. The labour force measures of unemployment for particular age groups, gender, and educational attainment are not representative at the provincial level and as a result our estimates are more noisy.

4.2   Endogeneity

One might worry that a Recession cannot be considered as an exogenous treatment. Indeed, if the origin of the Recession had been idiosyncratic and related to preexisting structural differences across regions, our results would not have been causal. The Reces-

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[19]We also adjusted the adult unemployment rate to include workers on redundancy payments (Cassa Integrazione) but this did not change our results.

sion instead started with the US subprime mortgage crisis in 2007 and was transmitted to Europe in October 2008 (Bordo, 2008). Hence, it was a shock that came to Italy from outside its borders. Caivano, Rodano, and Siviero (2010) find that 75 per cent of the crisis that Italy experienced in the period 2008-2010 was imported from abroad while only 16 per cent can be attributed to internal financial factors or a lack of confidence. It is only after 2010 that structural problems started to play an important role.

Yet, how severely the different regions of Italy experience the Recession might depend on the economic and social conditions of each region. For example, the South of Italy was typically characterized by a high unemployment rate while the opposite was true for the North. However, as shown in Figures A1 and A2, contrary to what one would expect, the Recession had different effects on regions that shared similar characteristics in terms of economic development.

Another possible concern is that as university drop-outs enter the labour force the youth unemployment rate will become endogenous. In our analysis we focus on the 20-24 age group (instead of 19-21) in order to alleviate this concern. Most of the drop-out decisions take place in the 1st year of studies when the students are 19 years old. Moreover, dropouts represent a very small fraction of all young people in the 20-24 age group.

4.3   Common trend assumption

The Difference-in-Differences approach is based on the "common trend" assumption, i.e. that the underlying trends in the outcome variable are the same in treated and control groups. It is in general difficult to test whether this assumption is violated. In our case it is possible, since we have data on the 2004 cohort. We thus run a placebo regression using data on two cohorts before the Recession (the 2004 and 2007 surveys) but using the unemployment rates during the Recession (2005-2007 and 2008-2010). We estimate the same model as in (1) for the placebo exercise (Table 10) and we get statistically insignificant estimates, that are very small in magnitude and have the opposite coefficients to those in the benchmark true regression.[20] This reassures us that the estimated effects

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[20] In the placebo regression we do not include university and field of study dummies as this information is not available for drop-outs in the 2004 survey. For the same reason we are not able to control for studying in a different region from the region of origin and for studying in a private university. We

of the unemployment rate on the drop-out probability are indeed due to the Recession and not due to preexisting trends.

4.4   Asymmetric effects of the business cycle

Our results so far indicate that the net effect of the Recession on the drop-out probability was to reduce it. One might wonder whether during booms the opposite is true. Going back to Table 1 we observe that between the periods 2002-2004 and 2005-2007 the adult male and youth unemployment rates had decreased. At the same time the drop-out rate had increased. We now estimate the same linear probability model for the probability of dropping out as in (1) using the 2004 and 2007 surveys and the corresponding unemployment rates (Table 11). For the earliest cohort the university and the field of study is not available for drop-outs so we are not able to include the corresponding dummies and the controls for private university and for studying in a different region in the estimated specifications. As soon as we control for individual characteristics we do not find any statistically significant effect of the boom on the drop-out probability. It seems that the effect of the business cycle on academic performance is not symmetric. One possible explanation is that the Recession, in contrast to the previous business-cycle fluctuations, was an unexpected shock that students did not internalize when deciding to enroll at university.

We obtain similar results when we pool all 3 cohorts (the 2004, 2007, and 2011 surveys) and we interact the adult male and youth unemployment rates with a dummy for the Recession (Table 12). The coefficient of the adult male unemployment rate is statistically significant only when interacted with the Recession dummy. The youth unemployment rate seems to matter both in good and bad times but its effect increases further during the Recession.

4.5   University premium

In our analysis we proxied the opportunity cost of tertiary education using the youth unemployment rate of secondary-education graduates. However, a university student might also consider factors related to the university premium when deciding whether to

exclude these variables from the benchmark true regression to ensure comparability.

drop out or not. In particular, the probability of finding a job as a university graduate might differ from the probability of finding a job as a high school graduate. Likewise, the wage that one will earn as a university graduate might be different from the wage of a high school graduate.

In order to account for the university employability premium we compute the unemployment rate of university graduates aged 25-29 by region and gender using the Labour Force Survey. We define the university employability premium as the difference between the unemployment rate of university and high school graduates. Indeed, the employability of university graduates with respect to high school graduates has improved during the Recession (Table A3, upper panel).

Data on wages by education, gender, and age group at regional level are more difficult to find. The Labour Force Survey started collecting information on wages only in 2009. We use the Survey on University Graduates' Vocational Integration in 2007 and 2011 in order to compute the monthly net wage of university graduates three and four years after graduation by gender and region. Similarly, we draw information on the monthly net wage of high school graduates from the Survey on Educational and Professional Paths of Upper Secondary School Graduates in 2007 and 2011.[21] We compute the university wage premium as the difference in the monthly net wage of university and high school graduates. It seems that the university wage premium has increased during the Recession (Table A3, lower panel).

We now re-estimate the model of the probability of dropping out including the university employability premium (Table 13, Column 1) or the university wage premium (Table 13, Column 2) as an extra regressor. None of the university premium variables is statistically different from zero. By contrast, the youth unemployment rate remains statistically significant. This result implies that during the Recession university students did not seem to consider the university premium in their decision to drop out. In fact, the increase in the youth unemployment rate has received a lot of attention by the Italian media. This might explain its key role in shaping the drop-out decisions.

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[21] We restrict the sample to high school graduates who never enrolled at university so as not include drop-outs.

4.6 Other outcomes

Apart from the effect on the drop-out rate, the Recession may also have altered the behaviour of the students that did not interrupt their studies. In particular, there might have been an effect on the timing of graduation and on the regularity of class attendance, which are both measures of the effort exerted by the student. The youth and adult male unemployment rates may have opposing effects on these outcomes as well. We expect a positive effect of an increase in the adult male unemployment rate. Parents may put pressure on their child to graduate on time so as to save money in terms of university fees or to be a more attractive candidate when entering the labour market. At the same time, an increasing youth unemployment rate may make students delay graduation, as job opportunities become scarce. Similarly for the regularity of class attendance. Indeed, we find a positive effect of adult unemployment rate on the probability of graduating on time and a negative effect of youth unemployment rate (Table 14).[22] These effects though are not statistically significant when we consider all students (Table 14, Column 1). Moving to the analysis by different groups we consider those students that chose to study at a particular university because it was the most convenient in terms of distance (less motivated students) versus those that made the choice of university based on its prestige, and the quality of the services it offers (more motivated students).[23] The adult unemployment rate has a large positive effect on more motivated students. These students try to graduate as soon as possible as their families face financial difficulties. When we perform the analysis by university quality, we find a negative effect of the youth unemployment rate for students at low quality universities. Lastly, we do not find any effect of the Recession on the regularity of class attendance (Table 15).

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[22]In our analysis we only consider students who are enrolled in 3+2 programmes, i.e. 3-year bachelor degree followed by a 2-year master. In 2011 the survey took place 4 years after university enrollment and we defined as on-time graduates those who graduated by the end of 2010. In 2007 the survey took place 3 years after enrollment but as the interviews were conducted at the end of 2007 (between November 2007 and February 2008), we have information on on-time-graduation.

[23]See Sestito and Tonello (2011) and Rizzica (2013) on the issue of student mobility and university choice in Italy.

5   Conclusions

This paper adds to the understanding of university drop-out by examining the effect of the Recession in Italy. The effect of a recession on the student drop-out rate is theoretically ambiguous. The decrease in the opportunity cost of studying due to the increased difficulty in finding a job may lead to a fall in the drop-out probability. At the same time, the worsening of the labour market conditions for adults may translate into more adverse financial conditions for the families. This may result in an increase in the drop-out probability due to the lower availability of funds. In order to capture the causal effect of the Recession, it is fundamental to disentangle its effect on students' drop-out decisions from its effect on enrolment. In order to do this, we used unique information on a cohort of university students in Italy who enrolled before the Recession and were affected by it during their second year of studies. This made this cohort perfectly comparable to a previous cohort of students who enrolled and completed (or dropped out from their studies before the occurrence of the Recession. We then explored regional variation in changes in the adult male and the youth unemployment rate, that proxied respectively the adverse financial conditions of the student's family and the falling opportunity cost of studying. We found evidence that increases in the adult unemployment rate have a positive effect on the drop-out probability of university students, while increases in the youth unemployment rate have a negative effect, albeit smaller in magnitude. Since the unemployment rate of the young has increased to a greater extent than the unemployment rate of adults, the net effect of the Recession is a fall in the drop-out probability that can be translated into an increase in human capital accumulation. Considering that in the years 2011-2013 the youth unemployment rate increased further, the net effect of the Recession is potentially larger for this specific cohort of students.

Understanding to what extent and through which channels a crisis may affect students' choices has important policy implications. Our results suggest that human capital accumulation increased during the first years of the Recession. This is of particular importance as human capital can lead to economic growth (Ciccone and Papaioannou, 2009), a key feature in order to exit the Recession. Nevertheless, before drawing conclusions, one should consider any other possible side effects like over-education or the possibility that students are merely "parking" themselves at the university. Despite our finding

that on-time graduation increased for more motivated students, our data did not allow us to observe whether the students who did not drop out managed to graduate eventually. Even in the case that the number of graduates increases, it is not clear whether the Italian labour market will be able to absorb them and if so in positions that match their qualifications. Moreover, the effect of the Recession was not homogeneous across different socioeconomic groups. The drop-out rate increased sharply for students from disadvantaged families as a result of the Recession. In a period of economic turbulence policy makers should make scholarships available to students in this specific target group.

Tables

Table 1. Descriptive statistics of the working sample, Mean (standard error)

Survey year year of enrolment at university	2004 2001	2007 2004	2011 2007
% drop-out	11.41	13.72	13.07
% on-time graduates	n.a.	14.59	18.50
% students attending class >3 times/week	90.96	89.53	93.73
% students working while studying	10.19	14.91	13.29
adult male unemployment rate (3-year average)	2.83	2.61	3.60
	(2.75)	(1.94)	(2.43)
youth unemployment rate (3-year average)	24.16	20.05	22.41
	(18.14)	(12.09)	(11.17)
% female	55.11	56.65	57.26
average high school grade	80.38	82.46	81.07
	(12.55)	(13.00)	(12.64)
% from disadvantaged families	18.24	19.58	18.96
% with father university graduate	18.02	16.61	18.41
% with father high school graduate	42.64	45.05	46.08
% who study at a private university	n.a.	5.66	6.36
% study in a different region from that of origin	n.a.	17.20	18.22
% study in a different province from that of origin	n.a.	48.15	47.22
N	8,060	12,835	12,419

Notes: corrected for the survey design using the corresponding weights.

The working sample includes university students or drop-outs in 3+2 programmes, who enrolled at university immediately

after high school graduation

Table 2. Probability of university drop-out, 2007-2011

	(1)	(2)	(3)	(4)
Adult male unemployment rate	0.020***	0.004*	0.010*	0.008*
	(0.002)	(0.002)	(0.005)	(0.004)
Youth unemployment rate	-0.009***	-0.002**	-0.005***	-0.003***
	(0.001)	(0.001)	(0.001)	(0.001)
Individual controls	No	Yes	No	Yes
Cohort dummies	Yes	Yes	Yes	Yes
Field of study dummies	Yes	Yes	Yes	Yes
University dummies	Yes	Yes	Yes	Yes
Regional dummies	Yes	Yes	No	No
Region*education*gender dummies	No	No	Yes	Yes
N	24,417	24,417	24,417	24,417
R^2	0.042	0.087	0.047	0.087

Notes. Robust standard errors reported in parenthesis, clustered at the regional level.

Individual controls: gender, high school grade, father with university degree, father with high school degree,

private university, studying in a different region, coming from a disadvantaged family.

Cross-sectional weights used in all specifications. Significance levels: *** = 1%, ** = 5%, * = 10%.

Table 3. Probability of university drop-out, by gender

	(1)	(2)
	Women	Men
Adult male unemployment rate	0.008**	-0.002
	(0.003)	(0.004)
Youth unemployment rate	-0.003*	-0.005**
	(0.002)	(0.002)
Individual controls	Yes	Yes
Cohort dummies	Yes	Yes
Field of study dummies	Yes	Yes
University dummies	Yes	Yes
Regional dummies	Yes	Yes
N	14,658	9,759
R^2	0.071	0.103

Notes. Robust standard errors reported in parenthesis, clustered at the regional level.

Individual controls: high school grade, father with university degree, father with high school degree,

private university, studying in a different region, coming from a disadvantaged family.

Cross-sectional weights used in all specifications. Significance levels: *** = 1%, ** = 5%, * = 10%.

Table 4. Probability of university drop-out, by ability

	(1)	(2)
	Low	High
	school grade	school grade
Adult male unemployment rate	0.008*	0.003
	(0.004)	(0.003)
Youth unemployment rate	-0.003*	-0.001
	(0.002)	(0.0009)
Individual controls	Yes	Yes
Cohort dummies	Yes	Yes
Field of study dummies	Yes	Yes
University dummies	Yes	Yes
Regional dummies	Yes	Yes
N	9,426	14,991
R^2	0.081	0.056

Notes. Robust standard errors reported in parenthesis, clustered at the regional level.

Individual controls: gender, father with university degree, father with high school degree,

private university, studying in a different region, coming from a disadvantaged family.

Cross-sectional weights used in all specifications. Significance levels: *** = 1%, ** = 5%, * = 10%.

Table 5. Probability of university drop-out, by paternal socioeconomic status

	(1)
Adult male unemployment rate	0.002
	(0.003)
Youth unemployment rate	-0.002*
	(0.001)
Disadvantaged father	-0.003
	(0.011)
Adult male unemployment rate	0.006***
*disadvantaged father	(0.002)
Youth unemployment rate	-0.000
*disadvantaged father	(0.000)
Individual controls	Yes
Cohort dummies	Yes
Field of study dummies	Yes
University dummies	Yes
Regional dummies	Yes
N	24,417
R^2	0.086

Notes. Robust standard errors reported in parenthesis, clustered at the regional level.

Individual controls: gender, high school grade, father with university degree, father with high school degree,

private university, studying in a different region.

Disadvantaged father: absent, unqualified worker (active or retired), or unemployed

Cross-sectional weights used in all specifications. Significance levels: *** = 1%, ** = 5%, * = 10%.

Table 6. Probability of university drop-out, by field of study

	(1)	(2)
	Science	Humanities
Adult male unemployment rate	-0.006*	0.011**
	(0.003)	(0.005)
Youth unemployment rate	-0.003	-0.003**
	(0.002)	(0.001)
Individual controls	Yes	Yes
Cohort dummies	Yes	Yes
Field of study dummies	Yes	Yes
University dummies	Yes	Yes
Regional dummies	Yes	Yes
N	7,641	8,992
R^2	0.121	0.089

Notes. Robust standard errors reported in parenthesis, clustered at the regional level.

Individual controls: gender, high school grade, father with university degree, father with high school degree,

private university, studying in a different region, coming from a disadvantaged family.

Cross-sectional weights used in all specifications. Significance levels: *** = 1%, ** = 5%, * = 10%.

Table 7. Probability of university drop-out, by quality of the university

	(1)	(2)	(3)
	University ranking <25th percentile	University ranking 25th-75th percentile	University ranking >75th percentile
Adult male unemployment rate	0.014**	0.008**	-0.000
	(0.006)	(0.003)	(0.011)
Youth unemployment rate	-0.003	-0.000	0.002
	(0.002)	(0.002)	(0.003)
Individual controls	Yes	Yes	Yes
Cohort dummies	Yes	Yes	Yes
Field of study dummies	Yes	Yes	Yes
University dummies	Yes	Yes	Yes
Regional dummies	Yes	Yes	Yes
N	4,567	9,962	5,469
R^2	0.130	0.089	0.091

Notes. Robust standard errors reported in parenthesis, clustered at the regional level.

Individual controls: gender, high school grade, father with university degree, father with high school degree,

private university, studying in a different region, coming from a disadvantaged family.

Cross-sectional weights used in all specifications. Significance levels: *** = 1%, ** = 5%, * = 10%.

Table 8a. Probability of university drop-out, by gender and field of study

	(1)	(2)
	Women	Men
Adult male unemployment rate	-0.005	-0.002
	(0.004)	(0.005)
Youth unemployment rate	-0.003	-0.009***
	(0.002)	(0.002)
Adult male unemployment rate	0.015***	0.002
*Humanities	(0.004)	(0.006)
Youth unemployment rate	-0.001	0.000
*Humanities	(0.000)	(0.000)
Individual controls	Yes	Yes
Cohort dummies	Yes	Yes
Field of study dummies	Yes	Yes
University dummies	Yes	Yes
Regional dummies	Yes	Yes
N	9,531	7,102
R^2	0.075	0.116

Notes. Robust standard errors reported in parenthesis, clustered at the regional level.

Individual controls: gender, high school grade, father with university degree, father with high school degree,

private university, studying in a different region, coming from a disadvantaged family.

Cross-sectional weights used in all specifications. Significance levels: *** = 1%, ** = 5%, * = 10%.

Table 8b. Probability of university drop-out, by gender and mother's education

	(1)	(2)
	Women	Men
Adult male unemployment rate	0.008**	-0.001
	(0.003)	(0.005)
Youth unemployment rate	-0.003*	-0.005**
	(0.002)	(0.002)
Mother university graduate	-0.019	-0.046***
	(0.017)	(0.022)
Adult male unemployment rate	-0.005*	-0.006
*mother university graduate	(0.003)	(0.009)
Youth unemployment rate	0.000	0.001
*mother university graduate	(0.000)	(0.000)
Individual controls	Yes	Yes
Cohort dummies	Yes	Yes
Field of study dummies	Yes	Yes
University dummies	Yes	Yes
Regional dummies	Yes	Yes
N	14,643	9,736
R^2	0.071	0.105

Notes. Robust standard errors reported in parenthesis, clustered at the regional level.

Individual controls: gender, high school grade, father with university degree, father with high school degree,

private university, studying in a different region, coming from a disadvantaged family.

Cross-sectional weights used in all specifications. Significance levels: *** = 1%, ** = 5%, * = 10%.

Table 9. Probability of university drop-out, provincial level

	(1)	(2)
Adult male unemployment rate	0.016***	0.001
	(0.002)	(0.002)
Youth unemployment rate	-0.004***	-0.001*
	(0.0004)	(0.001)
Individual controls	No	Yes
Cohort dummies	Yes	Yes
Field of study dummies	Yes	Yes
University dummies	Yes	Yes
Provincial dummies	Yes	Yes
N	23,558	23,549
R^2	0.046	0.095

Notes. Robust standard errors reported in parenthesis, clustered at the regional level.

Individual controls: gender, high school grade, father with university degree, father with high school degree,

private university, studying in a different region, coming from a disadvantaged family.

Cross-sectional weights used in all specifications. Significance levels: *** = 1%, ** = 5%, * = 10%.

Table 10. Probability of university drop-out, placebo

	(1)	(2)
	Placebo	Benchmark
Adult male unemployment rate	-0.000	0.005***
	(0.002)	(0.002)
Youth unemployment rate	0.000	-0.002*
	(0.001)	(0.001)
Individual controls	Yes	Yes
Cohort dummies	Yes	Yes
Field of study dummies	No	No
University dummies	No	No
Regional dummies	Yes	Yes
N	20,895	24,961
R^2	0.073	0.070

Notes. Robust standard errors reported in parenthesis, clustered at the regional level.

Individual controls: gender, high school grade, father with university degree, father with high school degree,

coming from a disadvantaged family.

Cross-sectional weights used in all specifications. Significance levels: *** = 1%, ** = 5%, * = 10%.

Table 11. Probability of university drop-out, 2004-2007

	(1)	(2)
Adult male unemployment rate	-0.003	0.001
	(0.002)	(0.003)
Youth unemployment rate	0.000	-0.000
	(0.000)	(0.000)
Individual controls	Yes	Yes
Cohort dummies	Yes	Yes
Field of study dummies	No	No
University dummies	No	No
Regional dummies	Yes	No
Region*education*gender dummies	No	Yes
N	20,895	20,895
R^2	0.073	0.074

Notes. Robust standard errors reported in parenthesis, clustered at the regional level.

Individual controls: gender, high school grade, father with university degree, father with high school degree, coming from a disadvantaged family.

Cross-sectional weights used in all specifications. Significance levels: *** = 1%, ** = 5%, * = 10%.

Table 12. Probability of university drop-out, 2004-2007-2011

	(1)
Adult male unemployment rate	-0.002
	(0.002)
Youth unemployment rate	-0.006***
	(0.001)
Adult male unemployment rate	0.010***
*Recession	(0.003)
Youth unemployment rate	-0.003***
*Recession	(0.001)
Recession dummy	Yes
Individual controls	Yes
Field of study dummies	No
University dummies	No
Regional dummies	No
N	31,646
R^2	0.068

Notes. Robust standard errors reported in parenthesis, clustered at the regional level.

Individual controls: gender, high school grade, father with university degree, father with high school degree,

coming from a disadvantaged family.

Cross-sectional weights used in all specifications. Significance levels: *** = 1%, ** = 5%, * = 10%.

Table 13. Probability of university drop-out, university premium

	(1)	(2)
Adult male unemployment rate	0.004*	0.004*
	(0.002)	(0.002)
Youth unemployment rate	-0.002*	-0.002*
	(0.001)	(0.001)
University employability premium	-0.0003	
	(0.0008)	
University wage premium		0.00005
		(0.00005)
Individual controls	Yes	Yes
Cohort dummies	Yes	Yes
Field of study dummies	Yes	Yes
University dummies	Yes	Yes
Regional dummies	Yes	Yes
N	24,417	24,417
R^2	0.087	0.087

Notes. Robust standard errors reported in parenthesis, clustered at the regional level.

Individual controls: gender, high school grade, father with university degree, father with high school degree,

private university, studying in a different region, coming from a disadvantaged family.

Cross-sectional weights used in all specifications. Significance levels: *** = 1%, ** = 5%, * = 10%.

Table 14. Other outcomes, probability of on-time graduation

	(1)	(2)	(3)	(4)	(5)
		Choice of university		University ranking	
	All	Low motivation	High motivation	Below median	Above median
Adult unemployment rate	0.004	-0.002	0.008**	0.003	0.006
	(0.003)	(0.004)	(0.003)	(0.004)	(0.005)
Youth unemployment rate	-0.002	-0.000	-0.002	-0.004*	0.000
	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)
Individual controls	Yes	Yes	Yes	Yes	Yes
Cohort dummies	Yes	Yes	Yes	Yes	Yes
Field of study dummies	Yes	Yes	Yes	Yes	Yes
University dummies	Yes	Yes	Yes	Yes	Yes
Regional dummies	Yes	Yes	Yes	Yes	Yes
N	21,236	10,605	10,631	8,420	8,802
R^2	0.168	0.155	0.196	0.160	0.200

Notes. Robust standard errors reported in parenthesis, clustered at the regional level.

Individual controls: gender, high school grade, father with university degree, father with high school degree,

private university, studying in a different region, coming from a disadvantaged family.

Controlling for drop-outs.

Cross-sectional weights used in all specifications. Significance levels: *** = 1%, ** = 5%, * = 10%.

Table 15. Other outcomes, regularity of attendance

	(1)
Adult male unemployment rate	0.001
	(0.003)
Youth unemployment rate	0.000
	(0.001)
Individual controls	Yes
Cohort dummies	Yes
Field of study dummies	Yes
University dummies	Yes
Regional dummies	Yes
N	19,485
R^2	0.041

Notes. Robust standard errors reported in parenthesis, clustered at the regional level.

Individual controls: gender, high school grade, father with university degree, father with high school degree,

private university, studying in a different region, coming from a disadvantaged family.

Cross-sectional weights used in all specifications. Significance levels: *** = 1%, ** = 5%, * = 10%.

Appendix

Table A1. Probability of university drop-out, full specification

	LPM
Adult male unemployment rate	0.004*
	(0.002)
Youth unemployment rate	-0.002**
	(0.001)
Gender	-0.033***
	(0.009)
High school grade	-0.005***
	(0.000)
With father university graduate	-0.081***
	(0.012)
With father high school graduate	-0.042***
	(0.009)
Study in a different region	-0.013**
	(0.005)
From a disadvantaged family	0.033***
	(0.007)
Private university	-0.474*
	(0.026)
Cohort dummies	Yes
Field of study dummies	Yes
University dummies	Yes
Regional dummies	Yes
N	24,417
R^2	0.087

Notes. Robust standard errors reported in parenthesis clustered at the regional level.

Cross-sectional weights used in all specifications

Significance levels: *** = 1%, ** = 5%, * = 10%.

Table A2. Probability of university drop-out, 2007-2011

	(1a)	(1b)	(2a)	(2b)
Adult male unemployment rate	0.019***		0.004*	
	(0.002)		(0.002)	
Youth unemployment rate		-0.008***		-0.002*
		(0.001)		(0.001)
Individual controls	No	No	Yes	Yes
Cohort dummies	Yes	Yes	Yes	Yes
Field of study dummies	Yes	Yes	Yes	Yes
University dummies	Yes	Yes	Yes	Yes
Regional dummies	Yes	Yes	Yes	Yes
N	24,417	24,417	24,417	24,417
R^2	0.037	0.031	0.087	0.087

Notes. Robust standard errors reported in parenthesis, clustered at the regional level

Individual controls: gender, high school grade, father with university degree, father with high school degree,

private university, studying in a different region, coming from a disadvantaged family.

Cross-sectional weights used in all specifications. Significance levels: *** = 1%, ** = 5%, * = 10%.

Table A3. University premium, Mean (standard error)

Survey year year of graduation	2007 2004	2011 2007
Employability premium		
Youth unemployment rate of high school graduates (3-year average)	20.05	22.41
	(12.09)	(11.17)
Youth unemployment rate of university graduates (3-year average)	21.35	18.22
	(11.88)	(9.91)
Wage premium		
Net monthly wage of high school graduates (in euros)	982	983
	(157)	(170)
Net monthly wage of university graduates (in euros)	1,217	1,313
	(151)	(163)

<small>Notes: corrected for the survey design using the corresponding weights.</small>

Figure A1. Change in the adult male unemployment rate by education between 2005-2007 and 2008-2010
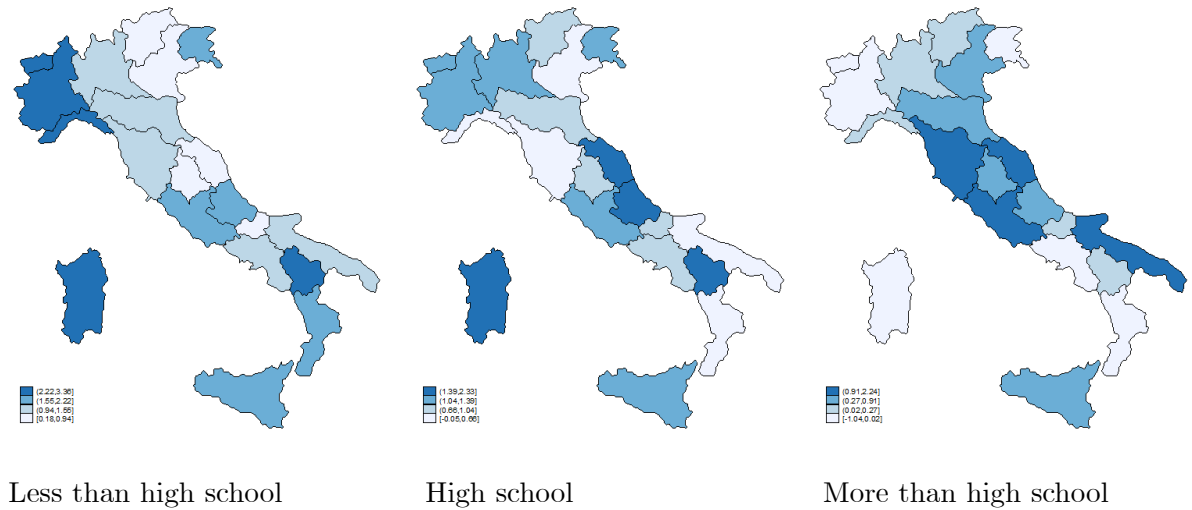
| Less than high school | High school | More than high school |

Note: darker shaded areas represent regions that experienced higher increases in the unemployment rate

Figure A2. Change in the youth unemployment rate by gender between 2005-2007 and 2008-2010
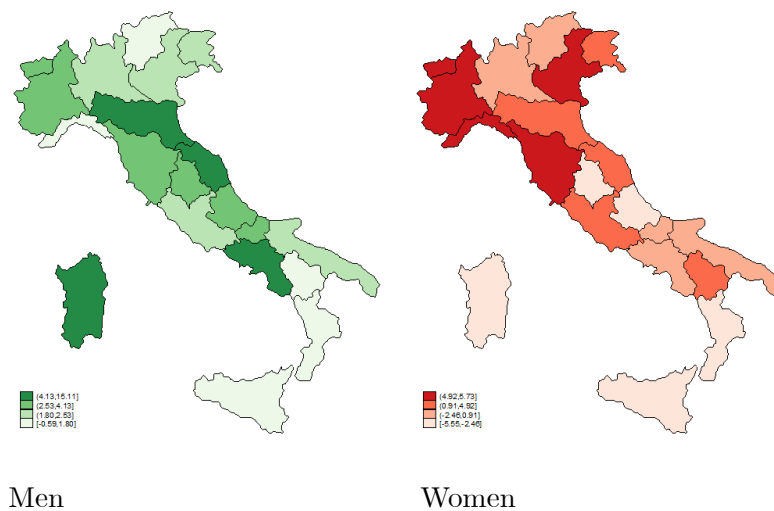
Men   Women

Note: darker shaded areas represent regions that experienced higher increases in the unemployment rate

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