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Liquidity Constraints and University Participation in Times of Recession. Evidence from a Small-scale Programme[*]

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Abstract

In this paper we investigate the relationship between liquidity constraints and university participation. We assess an educational programme introduced in the Province of Trento (North-East of Italy) in 2009 in order to enhance university participation and to reduce social inequalities in access to higher education. The programme, known as Grant 5B, consists in generous financial aids targeted to students from low-income families with outstanding secondary school achievement. We exploit a unique dataset resulting from the linkage of administrative data with an ad hoc survey carried out on a sample of upper secondary graduates from 2009 to 2012. We use a regression discontinuity design to estimate the impact of the intervention on the transition from secondary to tertiary education and on other choices connected to university attendance in each year considered and on strata of the population of interest. We find that the programme has no significant effect on enrolment rates, but it exerts a positive and remarkable effect on redirecting students already bound for university to enrol away from their place of residence. However, that effect changes over time and, as the economic recession persists, it disappears. Our findings suggest that students who attended successfully a secondary academic track have higher probability to benefit from the Grant 5B. Moreover, given the fact there is no effect on the enrolment probability, we specify a set of regression models to account for the interplay between income and merit, in order to simulate what would happen if a change in the eligibility rules will take place. Evidence shows that a relaxation of the eligibility rules based on secondary school achievement might be more effective in fostering access to university.

Keywords: financial aid, university enrolment, regression discontinuity, programme evaluation.

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1. Introduction

The provision of financial aid to encourage the progression to higher education (HE henceforth) of young people from disadvantaged backgrounds is a major component of education policies of governments in many advanced countries. It has been found that the share of university graduates influence positively the economic development of a country (OECD 2008, Hanushek and Wössman 2010) and that, at the individual level, a university degree can result in better outcomes with regards to labour market and social outcomes, such as volunteering, trust and health (OECD 2014). The underlying idea of programmes providing financial aid to foster HE participation is that university enrolment is heavily influenced by liquidity constraints connected to the costs of university attendance, in both a direct (e.g. tuition fees, accommodation, school equipment) and indirect (e.g. the renounce of a labour income) way. Hence, with the reduction of these costs through the provisions of scholarships and other monetary transfers, students will be more likely to enrol at the university. However, the empirical literature on the effects of financial aid on HE participation has not been able so far to provide uncontroversial results on its effectiveness (for a recent literature review, see Dynarski and Scott-Clayton 2013).

In this paper, we illustrate the main empirical results of a research project aimed at evaluating the effectiveness of a grant provision, named Grant 5B, implemented in the Province of Trento – an area in the North-East of Italy – from the academic year 2009/2010 to 2012/2013. More precisely, we study whether and to what extent transitions to HE are affected by lowering the costs of university attendance. Our aim is twofold: on the one hand, we provide an evaluation of the programme in order to draw some policy recommendations to improve the effectiveness of the intervention, and, on the other hand, we contribute to the literature on the role of liquidity constraints on university participation, with a special focus on the four-year period of Great Recession.

The university participation of the first cohort of students awarded with the Grant 5B has been previously assessed. The Grant has proven not effective on the enrolment probability (Covizzi et al. 2012), but has exerted a positive and quite large effect on other choices related to HE participation, such the location of the HE institution and the field of study (Vergolini and Zanini 2011, 2013). Those studies focussed on one cohort of students and therefore they relied on samples appropriate only to retrieve average effects, but not sufficiently large to study their heterogeneity across subgroups of students. The current availability of data from four cohorts of students allowed us to analyse the heterogeneity of the effects according to social origins and therefore to understand whether the programme had been able to reduce social inequalities among students from different backgrounds. Furthermore, this paper adds from the previous studies as it investigates whether, and to what extent, the effects of the Grant 5B varies over a four-years period of prolonged recession from 2009 to 2013. Therefore, our paper could shed light on the interplay between liquidity

constraints, financial aids and HE choices of students from different backgrounds and how these are affected by the conjunctural cycle.

The remainder of the paper is organized as follows. Section 2 reports the results from previous studied about the role of financial aid and highlights the different research streams on this topic. Section 3 describes the main characteristics of the programme, focusing the attention on the take-up rate and on the evolution of the programme over time. Section 4 is devoted to the description of the data and to the evaluation strategy. Section 5 reports both the results showing the determinants of HE participation and the main findings about the counterfactual evaluation of the programme. Section 6 presents the results of a simulation of a change of the eligibility criteria. Finally, section 7 draws some conclusive remarks and policy implications.

2. Previous studies

Previous studies on the effects of financial aids on enrolment show controversial results. Yet, they are not completely comparable in terms of both the context in which programmes have been implemented and the eligibility rules adopted. It should be noted that the latter has a key role in the design of this kind of programmes, as the eligibility criteria may have relevant consequences in terms of social inequalities. Grants based only on merit tend to favour well off students due to the strong correlation between social origins and educational attainment (Orfield 2002). On the other side, if based only on the financial need, the risk is that the applicants exploits the financial aid to enrol at the university even if they do not have enough motivations and skills to obtain a degree. Moreover, the comparison between different studies is complicated by the fact that the costs of HE vary a lot across countries. Furthermore, it should be considered that HE attendance can be supported through different kind of incentives such as tuition cuts, loans or monetary transfers. However, the common aim of all these programmes is to provide financial incentives in order to reduce (or postpone in the case of loans) the educational costs.

For example, in the United States, the Georgia's HOPE programme (Helping Outstanding Students Educationally) is based only on merit, while the federal Pell grant and the Social Security Student Benefit Programme consider only financial need. Dynarski (2000) and Cornwell et al. (2006) show that HOPE produces a significant increase in the HE attendance, while Hansen (1983) and Kane (1994, 1995) find no significant effects for the Pell grant. At the same time, Manski and Wise (1983) and Seftor and Turner (2002) find a significant effect of the Pell grant. Moreover, Dynarski (2003) finds significant effects for the Social Security Student Benefit Programme that was addressed to children of deceased or retired social security beneficiaries and the composition of this group resembles the one who usually apply for need-based programme.

Contrasting results are found also in Europe where the cost of attending university is substantially lower. Lauer (2002) and Stenier and Wrohlich (2008) find that the monetary benefits supplied by the BAfoeG (*Berufsausbildungsfoerderderungsgesetz*) programme raise the enrolment rates of German students, as well as similar programs in Sweden and Denmark (Fredriksson (1997); Nielsen et al. (2010), respectively). The effectiveness of BAfoeG is not so clear because Baumgartner and Steiner (2006) find non-significant effects of that programme on the student decision of attending university. In Italy, there are few studies about the effectiveness of financial aids. Garibaldi et al. (2011) find that the time to complete a degree is affected by tuition fees reduction in an Italian private higher institution. Mealli and Rampichini (2012), analysing data from four big universities (Catania, Milan, Padua and Salerno), show that Italian university grants have a positive role in reducing drop-out from higher education. For what concern local programmes[1], Vergolini and Zanini (2011), Covizzi et al. (2012) and Schizzerotto et al. (2012) analyse the effects of a grant implementation in an Italian province (the province of Trento). They find that the programme does not have any effects on enrolment, but it exerts a remarkable influence in enrolling in a university away from the Trento.

From a theoretical point of view, financial aid policies rely on the idea that the role of students' family income and social origins is crucial for their transition to HE. Indeed, several studies point out that there is a direct influence of family income on school attainment (Mayer 1997, Hobcraft 1998, Levy and Duncan 2000, Gregg and Machin 2001, Huston et al. 2001, Clark-Kaufman et al. 2003). Students and their families have to face several direct and indirect costs if they want to enrol at the university and these costs are less affordable for people from lower social strata. This means that they have a liquidity constraint problem and, therefore, a generous grant could foster HE participation by reducing major costs.

Another approach suggests that social origins shape both ability and expectations of children (Cameron and Heckman 2001, Carneiro and Heckman 2002). Hence, students from disadvantaged background do not enrol for a lack in abilities and motivations, while the role of liquidity constraints is marginal. This research strand suggests that public spending on financial aid is a waste of money and that it will be more valuable to intervene on children motivations and competencies during their school career, when they are very young. Indeed, cognitive abilities are formed very early in life and it is more difficult to intervene as children grow up (Cunha and Heckman 2009).

The above argumentations may be better understood once integrated in the frame of primary and secondary effects developed by Boudon (1974). Primary effects regard the association between pupil's social origins and their academic performances. Secondary effects are expressed by the educational choices that students from different socio-economic backgrounds make at net of

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[1] Other studies find positive effects of financial aids on academic performances at the local level (Graziosi 2012, De Paola et al. 2012, Rattini 2014).

performances. Following Erikson et al. (2005) and Jackson (2013), we represent the interplay between primary and secondary effects using a graph (figure 1). The primary effects are represented by the line that connects social origins with academic performances (b), while the secondary effects are the direct link between social origins and enrolment (a). Obviously, social origins have also an indirect effect on university enrolment via academic performances (b*c). Given this rough representation of the relationship between social origins, performance and enrolment, the programmes based on financial aids wish to have an impact on the (a) link, thus reducing direct and indirect costs connected to HE participation. On the other side, the Heckman approach suggests to improve enrolment reducing the connection between social origins and performances. The idea is that early interventions targeted to disadvantaged children can have higher returns than late interventions (Heckman 2006, Neugebauer and Schindler 2012). Since both approaches are plausible, policy makers should act on both primary and secondary effects if they want to enhance university enrolment.

Figure 1.   Graphical representation of the interplay between the various dimensions affecting university enrolment.

The problem arises in a world of limited or scarce resources in which there is not enough money to implement a wide range of educational policies, especially as it happens in times of recession. In a situation like this, it is crucial to know which of the two effects is more relevant for the reproduction of inequalities. For what concerns Italy, Contini and Scagni (2013: 176) conclude that social-origin inequalities can largely be attributed to secondary effects. On this point, Jackson and Jonsson (2013) argue that a promising approach is the manipulation of financial costs together with persuasive guidance programmes addressed to both students and their families.[2]

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[2] In this report we limit our attention to the transition to university and to a programme based on financial aids. See Azzolini and Vergolini (2014) for a review of the policy interventions at the transition to upper secondary school.

Our goal is to study the effects of a specific grant introduced at local level that aims to increase university enrolment and to reduce social inequalities by manipulating financial costs, *i.e.* it acts on the (a) arrow in figure 1. Our main contribution to the existing literature is to provide empirical evidence on how liquidity constraints affect access to HE of specific subgroups of students. This kind of analysis is quite innovative for Italy as previous studies on the Italian case (with the exception of those referred to the Grant 5B mentioned earlier in the paper) look at the effects on academic performances and the time to complete the degree.

3. The Italian education system and the Grant 5B programme

The Italian education system is organised into three steps[3]: primary, secondary and tertiary. In the 1960s the Italian educational system was reformed in a more egalitarian fashion by widening the university access to students with technical and vocational secondary qualifications. Therefore, the only constraint that students face in the access to university is the so-called *Esame di maturità*, the final examination that students have to take to complete upper-secondary school. The examination is graded and the grades range between 60 and 100. Even if access to university is open to students coming from both academic, technical and vocational secondary tracks, a set of upper secondary schools (*licei*) is specifically conceived to prepare students for university. The HE system is mainly based on public universities, which award degrees with the same legal value. This implies that, in particular for the competitive public-sector entrance examinations, what really matters is the attainment of a degree and not the prestige of the university attended.

For what concerns financial aids in Italy, the main national programme for facilitating university participation is the so called *Diritto allo studio* ('Right to study') that is regulated at national level and administered by the universities and financed by local authorities. It covers direct costs (tuition, accommodation and living allowance), and students can access to it according to family income and academic performance. In addition to the national scheme, there are a few small programmes funded by local governments or by private foundations that offer further monetary aids.

Since the 2009/2010 academic year, the local government of the Province of Trento introduced the Grant 5B, a merit-based financial aid for students from low-income families. The aim of the policy maker was to increase university enrolment and reducing inequalities among social classes. Grant 5B covers the indirect costs connected with the participation to HE, while the direct costs are covered by *Diritto allo studio*. The novelty of Grant 5B is that it works as a generous top-up of the national schemes and thus it provides a remarkable reduction of the educational costs. In order to

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[3] For a deep description of the Italian education system and its main changes see Schizzerotto and Barone (2006) and the Eurydice site (https://webgate.ec.europa.eu/fpfis/mwikis/eurydice/index.php/Italy:Overview).

attract applications, the programme was widely advertised on the local media before the end of the school year.

The target population comprises students resident in the Province of Trento for at least three years who have successfully completed the last year of secondary school, obtaining a final grade above 93/100, and whose family equivalent income is below € 30,000.[4] The amount of the benefit varies according to the family income and the geographic location of the university chosen. In principle, students enrolling at universities located within the Province of Trento are entitled to financial aid ranging from € 1,200 to € 4,800 per year. Differently, students enrolling at universities outside the province receive grants that range from € 1,800 to € 6,000 per year according to family income. Overall, the majority of Grant 5B recipients receive an amount larger than € 4,800 per year, which corresponds to a monthly grant of about € 400–500.

Beneficiaries must fulfil the eligibility criteria for renewal at the beginning of each academic year both in terms of family income criterion and the merit condition required. Specifically, to obtain the renewal of the grant, students must achieve at least 83% of the total amount of credits required.[5]

4.   Data, descriptive statistics and identification strategy

4.1 *Data and variables*

The dataset used in this paper is the result from a linkage procedure of survey data covering four consecutive cohorts of students (those potentially entering HE in the academic years comprised between 2009/2010 and 2012/2013) and information from different administrative archives. The list of the entire cohort of upper secondary school graduates residing in the Province of Trento who could enrol at university came from the records of the Department of Education of the Province of Trento. The total reference population consisted of 10,819 students (table 1). Exploiting CAWI (Computer-Assisted Web Interviewing) and CATI (Computer-Assisted Telephone Interviewing) procedures, it was possible to gather information on more than 10,000 students that account for about the 80% of the target population. More precisely, the information on students enrolled at the University of Trento (UniTN) are gathered with a CAWI questionnaire administrated at the moment of enrolment by the Research Office of UniTN. While for the students enrolled outside the province of Trento and for those not enrolled in tertiary education, we rely on CATI procedure. The fieldwork was carried out by the Department of Sociology and Social Research of UniTN.

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[4] This predetermined threshold is measured by an *ad hoc* index called Icef (Household Economic Condition Index) which summarizes the incomes and assets of each family using a scale of equivalence similar to the OECD one. Some additional information on Icef are supplied in appendix A.
[5] See Schizzerotto et al. (2012) for some preliminary results about the effect of the Grant 5b on academic performances.

Table 1.   Comparison between sample size and the total reference population.

Academic year	Sample size	Population	Response rate (%)
2009/2010	2,733	3,191	85.6
2010/2011	2,656	3,278	81.0
2011/2012	2,738	3,409	80.3
2012/2013	2,692	3,439	78.3
Total	10,819	13,317	81.2

Other sources of data were used to gather the necessary information. The archives of the agency in charge of the programme's administration (*Opera Universitaria*) provided the list of students entitled to Grant 5B and the exact amount of the monetary benefit for each of them. The data on family income for each student in the sample was extracted from the databases compiled by the local agency which gathers information on the incomes and assets of households and which computes eligibility for social benefits provided by the local government *(Clesius)*. Additional information was gathered from publicly available databases. To measure the prestige of each faculty at the chosen university, we used the most popular Italian ranking, *i.e.* the Censis Guide from *La Repubblica* newspaper (CENSIS 2008, 2009, 2010, 2011), published every year and advertised by the national media. We also measured the distance between Trento and the location of the course of study using Google Maps.

The linkage of survey data with administrative archives and other available data sources allowed us to rely on a comprehensive and unique datasets. For each school leaver interviewed, we know: a) participation decisions (enrolment status, and for those enrolled at university: the field of study, the prestige of the course attended of study, the distance from Trento of the university chosen, and the cost of living in that city); b) Grant 5B recipient status (whether the student was receiving the monetary transfer and, if so, the actual amount received) and eligibility for the grant (exact final grade at *Esame di maturità*; if above or below the household equivalent income threshold, and for those below this threshold, the exact amount); c) background characteristics of students and their families (socio-demographic characteristics such as gender, family size, geographic area of residence, age; social origins such as parental social class, parental education, economic resources, parental support; type of upper-secondary school attended, and the grade obtained on conclusion of lower-secondary school as a measure of prior attainment). The main data sources are summarised in table 2.

Table 3 shows the breakdown of the reference populations by the two eligibility criteria.[6] It is evident that the merit criteria is more selective than the financial need one, since only 11% of students

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[6] Table 3 highlights a problem of missing values for what concerns income, in particular for students above the income threshold. Indeed, students are obliged to supply information about income for the Icef calculation only if they want to

attained a grade of at least 93 out of 100 at the *Esame di maturità*. There are 729 students eligible for both income and merit. However, the administrative archives show that only 571 students claimed Grant 5B, because either some of the eligible did not enrol at university or did not claim the grant.[7]

Table 2. Data sources for the main variables.

Group of variables	Source
Enrolment choices	Survey data
Background characteristics	Survey data
Income	Administrative archive (*Clesius*)
Recipient status	Administrative archive (*Opera Universitaria*)
Faculty's prestige	Censis Guide
Distance from Trento	Google maps

Table 3. Subpopulations for the upper secondary school graduates, 2008/09 – 2012/2013 academic years.

		Final grade at *Esame di maturità*		Total
		< 93	≥ 93	
Income	≤ € 30,000	Control group A N=4,806	Eligible group N=729	N=5,535
	> € 30,000	Control group B N=480	Control group C N=116	N=596
	Total	N=5,286	N=845	N=6,131

Table 4 reports descriptive information about the main outcomes such as: enrolment probability; enrolment outside Trento; enrolment in faculties who are not available at UniTN; the distance from Trento; and the prestige of the chosen faculty. The three outcomes about enrolment are dummy variables assuming value 1 if enrolled, enrolled outside Trento, enrolled in faculties absent from UniTN and 0 otherwise. As mentioned above, the distance from Trento is measured in kilometres using Google Maps[8], while the prestige of the faculty comes from the Censis guide and it is a normalised score varying continuously from 0 to 1. Values close to 1 denoted a high-ranked course, while measures far from 1 indicated low-ranked courses. The higher value on this variable can be explained by taking into account that the majority of the students are enrolled at UniTN, which performs very well in the national rankings, with a set of courses (Sociology, Law and Natural Sciences) at the top of the faculty rankings considered. In general, the enrolment rate at the university for upper secondary school graduates in the Province of Trento is about 70%, with a sharp decline

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apply for some programmes. In appendix A we report a set of analysis to demonstrate that the presence of missing values do not bias the results.

[7] The take-up rate will be deeper analysed in the fifth section.

[8] We do not use the Euclidean distance, but we consider the shorter path from Trento to the selected city. It should be noted that alternative measures of distance (such as driving time and the cost of public transport) have been considered, but results are not different from those presented in this paper.

for the last cohort considered. This result is not surprising, it simply mirrors what is going on in Italy for what concerns participation in HE. In the last years there is clear evidence of a dramatic decrease in the enrolment rates all around the country (Schizzerotto et al. 2015). The other outcomes do not show any relevant trend in the observed cohorts. Indeed, the enrolment rate outside Trento varies from 36% to 39% and the enrolment in faculty absent at UniTN ranges from 21% to 26%. Finally, even the distance from Trento is quite stable with a variation from 152 to 170 kilometres. This last result is particularly interesting, because it highlights a preference of the students to avoid faculties very far from home. Indeed the majority of these students choose university located quite nearby such as those of Bolzano, Verona, Padua and Bologna.

Table 4. Descriptive evidence on outcomes variables by enrolment cohort.

	2009/2010			2010/2011			2011/2012			2012/2013		
	Mean	S.D.	N	Mean	S.D.	N	Mean	S.D.	N	Mean	S.D.	N
Enrolment	0.70	0.46	2,733	0.71	0.45	2,656	0.71	0.46	2,738	0.65	0.48	2,674
Enrolment outside Trento	0.39	0.49	1,915	0.37	0.48	1,897	0.36	0.48	1,931	0.37	0.48	1,727
Faculties not in UniTN	0.26	0.44	1,904	0.21	0.41	1,896	0.26	0.44	1,873	0.24	0.43	1,667
Faculty prestige	0.94	0.05	1,763	0.95	0.04	1,625	0.96	0.05	1,719	0.95	0.05	1,525
Distance from Trento	162.62	104.35	728	169.32	122.57	690	151.93	85.30	640	165.77	97.70	568

Note: the statistics for the distance from Trento are computed only for students enrolled outside Trento.

4.2 *Identification strategy*

In order to identify the effects of the Grant 5B, we consider merit and income among the determinants of educational outcomes, including performances, progression and other preferences. For this reason, the rough difference in the enrolment propensity and preferences between eligible and ineligible could be affected by *selection bias*, such as the differences in the composition of the two groups that could remain also in the absence of the programme. Therefore we employ an evaluation strategy able to identify the effects of the Grant 5B, accounting for other confounding factors, such as merit and financial conditions.

To solve this issue, it is possible to exploit the administrative rules determining the eligibility to the Grant 5B. As mentioned earlier, the eligibility is based on two thresholds, one based on merit and the other one based on financial need. Those thresholds outline clearly a discontinuity in the treatment. Only students with the final grade above 93/100 and from families with an equivalent income below € 30,000 are eligible, while other students are excluded. Given this setting and following Vergolini and Zanini (2014), the most suitable identification strategy consists in the

comparison in terms of students progression and other enrolment decisions around the threshold values. This strategy is known as Regression Discontinuity Design (Rdd henceforth).[9]

The basic idea underlying Rdd is that a subtle change in the assignment variable should not have significant impacts on the individuals' behaviours. Indeed, in our case, albeit the final grade depends also on the previous scholastic career and so that is a determinant of the enrolment decisions, it is feasible to suppose that slightly variations in the grade and in the income are not influential. As a consequence, we can compare subjects immediately below and just above the given threshold because we can consider them equivalent except for the eligibility to the treatment.

As shown in table 3, we have two different thresholds (based on merit and income) and thus we deal with four subpopulations:

i) eligible group: students with a grade above or equal to 93/100 and income lower € 30,000;

ii) control group A: individuals with a final grade below 93/100 and income lower € 30,000;

iii) control group B: subjects with a grade of at least 93/100 and income above € 30,000;

iv) control group C: those with a final grade below 93/100 and income above € 30,000.

In principle, in similar cases, it is possible to implement Rdd with multiple assignment variables jointly considered (Imbens and Zajonc 2011, Choi and Lee 2014). However, in this specific case, given the fact that accurate data on income is only available for those individuals below the income threshold (see appendix A), we can only perform the threshold comparison based on the merit requisite.

For those students eligible on income, the algebraic difference between the sample mean of the enrolment behaviour immediately below and just above the grade threshold provides an unbiased estimate of the average effects of the Grant 5B. In fact, as previously shown by Vergolini and Zanini (2012) with a battery of over-identification tests based on control groups B and C, the comparison at the merit threshold is not affected by any other confounding factor.

In order to evaluate the impact of the Grant 5B on the enrolment rate, the treatment considered is the eligibility to the monetary aid, which means that the analyses are conducted on the whole cohorts of secondary school leavers. Differently, for the evaluation of the effects of the programme on enrolment decisions (such as the location of the HE institution and the field of study), the sample of analysis is restricted to those enrolled at university. In this way, Rdd identifies the effects of the monetary transfer and not just of the eligibility to the Grant 5B. In this latter case, it should be noted that our evaluation strategy provides unbiased estimates only if there is no selection of university students due to the Grant 5B. This means that the evaluation strategy for the enrolment decisions holds only under the assumption that the Grant 5B does not affect the enrolment probability.

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[9] For recent development regarding Rdd see Imbens and Lemieux (2008) and Lee and Lemieux (2010).

A second possible threat to our identification strategy could be linked to the manipulability of the score variable. Testing this assumption is indispensable to demonstrate that, in the absence of the treatment, there would have not been any discontinuities on the threshold. This is particularly relevant in our case study since the threshold value (93/100) was known by students and teacher before the final exam and thus before the assignment of the final grade. This implies in principle that, teachers might be inclined to grade students with a 93 instead of a 92 and, at the same time, students that aim at the grade at the eligibility threshold might put more effort in order to get a final grade above 93. We address this point in appendix B.

5. Empirical results

In this section we present the main results from the analysis of the effectiveness of the Grant 5B programme. More precisely, we supply some information about demand and supply of HE in the Province of Trento, looking above all at the main determinants of enrolment and at the choice of the field of study. Such framework is useful for understanding the context in which the measure has been implemented. For the evaluation purpose, we first investigate the take-up behaviour. Take-up is a very relevant issue in policy evaluation because a policy that is not able to reach its potential beneficiaries cannot claim to be effective. Afterwards, we conduct the impact evaluation on the pooled data in order to detect the heterogeneity of the effect. Last, we focus on the variation over time to study the possible influence of the worsening of the economic crisis.

5.1 *Demand and supply of HE in the Province of Trento*

In the Province of Trento the University has been established in 1962 with the faculty of Sociology and in the following 50 years others faculties and departments were added. Nowadays the supply of faculties is very high ranging from humanities to STEM (science, technology, engineering and mathematics) and social sciences. The only faculties that are not present are those in the medical fields such as the faculties of Medicine, Veterinary and Pharmacy. As stressed earlier, Trento scores very high in the overall faculty quality, according to the national rankings.

Regarding the HE demand in the Province of Trento, the main factors that influence the enrolment probability are social origins, parental style, family structure and prior school career (see logistic model in Table 5). In general, these findings follow what is known in the literature (Brand and Xie 2010). Also, for what concerns the variation over time, the model confirms what we find in the descriptive analysis, that is a clear and dramatic negative trend in the enrolment probability over time.
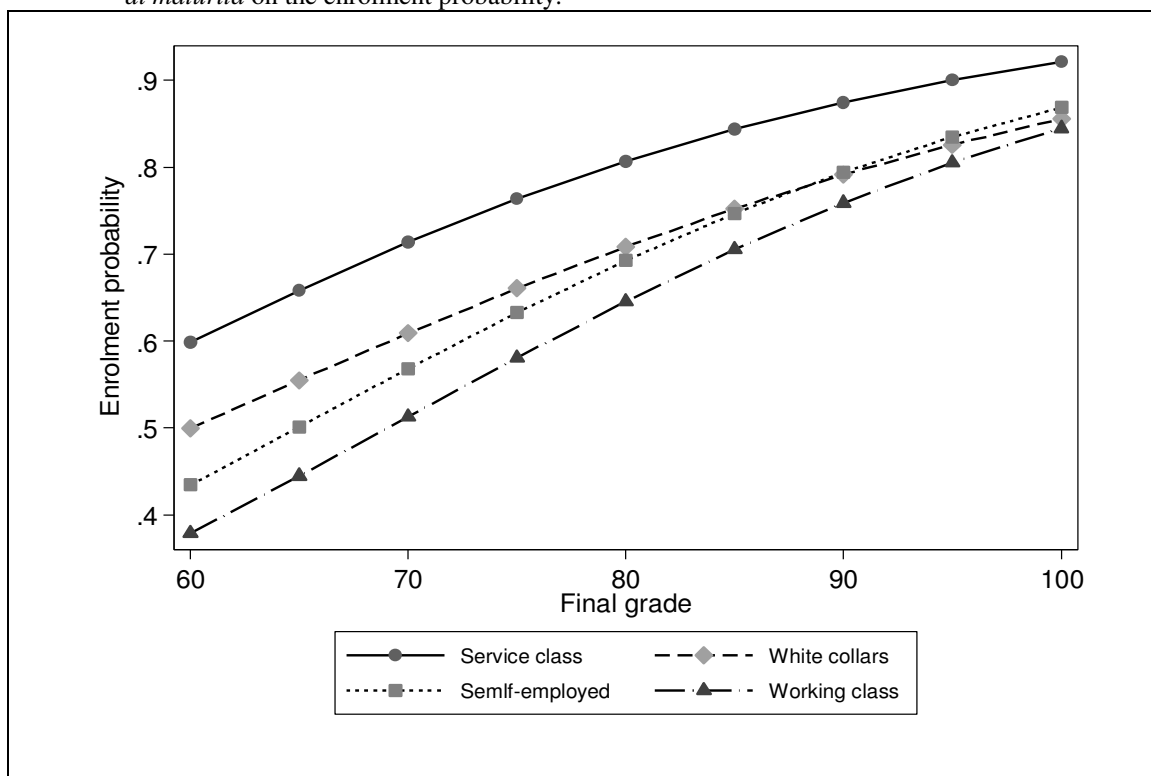
Table 5. Binomial logistic regression predicting the enrolment probability of students resident in the province of Trento. Average partial effect (APE) and standard errors (SE).

	APE	SE
Enrolment cohort		
2009/2010	0	---
2010/2011	-0.016	0.012
2011/2012	-0.030**	0.012
2012/2013	-0.250***	0.014
Sex		
Female	0	---
Male	-0.019**	0.009
Area of residence		
Non-urban	0	---
Urban	0.052***	0.011
Finale grade upper secondary school	0.010***	0.000
Upper secondary school track		
Technical and vocational	0	---
Academic	0.284***	0.011
Finale grade lower secondary school		
Grade C	0	---
Grade B	0.068***	0.015
Grade A	0.126***	0.017
Grade A*	0.154***	0.022
Parental social class		
Service class	0	---
White collars	-0.055***	0.014
Self-employed	-0.071***	0.017
Working class	-0.104***	0.015
Parental education		
Primary and lower secondary	0	---
Upper secondary	0.018*	0.011
Tertiary	0.070***	0.018
Number of siblings	-0.009	0.006
Parental supervision	0.034***	0.009
Material deprivation	-0.125***	0.014

N=7,590
Pseudo-R^2=0.30

Last, when we consider the interaction between social class and the final grade obtained at the *Esame di maturità* (see Figure 2), class differences in enrolment behaviour tend to disappear once the final grade is considered. In fact, working-class children with high grades behave similarly to the offspring of other social classes. In our study, risk aversion (Breen and Goldthorpe 1997; Checchi et al. 2008) is weak for pupils from disadvantaged backgrounds that performed well at the upper secondary school. To sum up, our empirical analysis in the Province of Trento shows that disadvantaged families tend to invest in HE if their children do well at school.

Figure 2. Predicted probabilities of the effect of interaction between social class and final grade at the *Esame di maturità* on the enrolment probability.

In the recent years, there is an increase of interests in the horizontal aspects of inequalities of educational opportunities (Davies and Guppy 1997, Lucas 2001, Triventi et al. 2013). The general idea is that, in a context of educational expansion, what makes the difference is more the choice of a remunerative field of study rather than just the enrolment to the university. In table 6 we report the results emerging from a multinomial logistic regression in which the dependent variable is the field of study that consider three main area: quantitative faculties, faculties that lead to the liberal professions and humanities and social sciences.[10] It is interesting to notice that the effect of social origins, measured via parental class and education, do not exert any significant impact on the choice

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[10] Liberal professions field includes Medicine and Law, Quantitative field contains Natural Sciences, Engineering, Architecture, and Economics and Statistics, while the others are in Humanities and Social Sciences.

of the field of study, with the exception of Humanities and Social Science.[11] In that case, students whose parents earned a university degree tend to avoid the enrolment in both those fields of study. There are also clear gender differences in the choice of the field of study and our results are in line with previous studies on this topic (Triventi 2010, Barone 2011). Indeed, males show higher probability than females to enrol in Quantitative fields, while females are overrepresented in Humanities and Social Sciences. The situation is slightly different when we look at the fields that can lead to Liberal professions such as Medicine and Law. In this case, we observe a small advantage for females. This finding could be explained keeping in mind that the field of Medicine includes also health professions such as nursing and physiotherapy that are usually fields dominated by females. It is remarkable to notice that school grades in the lower and upper secondary school are correlated with the choice of the field of study. More precisely, worthy students tend to enrol in Quantitative and Liberal profession fields, while the under-performing pupils are more likely to choose Humanities or Social Sciences.

When looking at the upper secondary school track, graduation in the academic track is positively linked with the enrolment in the Liberal profession field, while it is negatively correlated with the other fields. In the case of Humanities and Social Sciences, the explanation could be that the less talented students choose faculties that are considered easier in order to reduce the risk of dropping-out. For what concerns the negative effect of graduation in academic track on the choice of a Quantitative field, this result could be driven by the fact that worthy pupils from some technical school concerning specific subject such as: economics, accountancy, technology, informatics, chemical and so on are inclined to . The argument is that student from a disadvantage backgrounds tend to choose a technical track that works as a sort of security-option, in the sense that a technical track can guarantee a job also without university, while an academic track has not direct returns on the labour market. Good performance at the final exam of upper secondary school could act as a signal of future college success. We find that risk aversion (Breen and Goldthorpe 1997) is weak for high-achieving secondary school pupils from disadvantaged background. Those students and their families are inclined to invest in a high remunerative field of study at the university. Moreover, in case of failure, they can rely on their previous vocational educational qualification to find a job (Vergolini and Vlach 2014).

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[11] These results persist even if we do not consider in the model final grades and the upper secondary school track.

Table 6. Multinomial logistic regression predicting the enrolment in each field of study in the province of Trento. Average partial effects (APE) and standard errors (SE).

	Quantitative		Liberal profession		Humanities & Social Sciences	
	APE	SE	APE	SE	APE	SE
Enrolment cohort						
2009/2010	0	---	0	---	0	---
2010/2011	0.002	0.017	-0.020	0.014	0.018	0.017
2011/2012	-0.030 *	0.017	0.012	0.015	0.018	0.017
2012/2013	-0.129 ***	0.023	0.107 ***	0.023	0.022	0.024
Sex						
Female	0	---	0	---	0	---
Male	0.359 ***	0.014	-0.065 ***	0.012	-0.294 ***	0.013
Area of residence						
Non-urban	0	---	0	---	0	---
Urban	-0.019	0.015	-0.010	0.013	0.029 **	0.015
Final grade upper secondary school	0.004 ***	0.001	0.001 *	0.001	-0.005 ***	0.001
Upper secondary school track						
Technical and vocational	0	---	0	---	0	---
Academic	-0.037 **	0.016	0.064 ***	0.013	-0.027 *	0.015
Final grade lower secondary school						
Grade C	0	---	0	---	0	---
Grade B	0.056 *	0.029	-0.039	0.029	-0.017	0.031
Grade A	0.086 ***	0.029	-0.015	0.029	-0.071 **	0.032
Grade A*	0.143 ***	0.033	0.027	0.032	-0.171 ***	0.034
Parental social class						
Service class	0	---	0	---	0	---
White collars	0.001	0.019	0.006	0.016	-0.008	0.019
Self-employed	0.035	0.026	-0.022	0.021	-0.013	0.025
Working class	-0.021	0.022	0.031	0.019	-0.009	0.021
Parental education						
Primary and lower secondary	0	---	0	---	0	---
Upper secondary	0.018	0.018	0.019	0.015	-0.037 **	0.017
Tertiary	0.026	0.024	0.034	0.021	-0.060 **	0.024
Number of siblings	0.015 *	0.009	0.004	0.007	-0.019 **	0.009
Parental supervision	0.015	0.014	-0.031 **	0.012	0.016	0.014
Material deprivation	0.008	0.015	0.028 **	0.013	-0.037 **	0.014

N=4,719
Pseudo-R^2=0.10

5.2 *Take-up rate*

One of the relevant points in the programme evaluation consists in the estimate of the take-up rate, that is the share of the eligible people who effectively apply for the measure. Take-up rate can be considered as a first measure of the efficacy of the policy under scrutiny. Indeed, if the policy is not able to reach the target population, it is hard to think that it could have any significant effect. Previous studies (Costigan et al. 1999) highlight that the take-up rate could be influenced by the ignorance of the existence of the programme, insufficient knowledge of the administrative procedures or entitlement criteria, and social stigma. Table 7 presents an estimate of take-up rate for the measure. The values reported have to be considered as estimates, because we know exactly who claim the grant, but, as stressed in the previous section, we do not have the complete information on the students' family income which would allow us to calculate the precise size of the eligible population. Hence, these estimates are an upper bound of the true rate.[12] In general, the take-up rate is close to the 80% with the only exception of the first wave for which the take-up rate is about 72%. The estimates become a bit more sizeable if we consider only the enrolled students. Given the nature of the programme, it is not plausible that students do not apply for the grant for the fear of stigmatisation. It is more likely that, although the informative campaign, they ignore the existence of the programme or they have some troubles with the administrative procedure.

Table 7.   Trend in the Grant 5B take-up rate, 2008/09 – 2012/2013 academic years

Wave	All students				Enrolled students			
	No	Yes	Total	N	No	Yes	Total	N
2009/2010	28.1	71.9	100.0	185	24.4	75.6	100.0	176
2010/2011	21.5	78.5	100.0	144	16.3	83.7	100.0	135
2011/2012	17.4	82.6	100.0	201	12.6	87.4	100.0	190
2012/2013	20.1	79.9	100.0	199	13.6	86.4	100.0	184
Total	21.7	78.3	100.0	729	16.6	83.4	100.0	685

In order to understand which factors influence the take-up probability, we estimate a logistic regression (table 8). The results show that students from lower social classes and from families with disadvantaged economic condition, measured by Icef[13] indicator, tend to have lower probability to apply for Grant 5B once they are eligible. The same is true for individuals coming from numerous families and living in non-urban areas. The emerging picture suggests that the take-up rate is strongly affected by socio-economic condition of the students' families. These findings suggest that the informative campaign has not been effective for the lower social strata or these families could have some difficulties with the administrative procedure. In any case, it is clear that for augmenting the

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[12] In any case, given the results presented in the appendix, we believe that the take-up rate should be quite precise.
[13] Icef is an indicator of the economic condition of a household that consider together income and assets. See appendix A for a detailed explanation of this index.

effectiveness of the programme the future informative campaigns have to be targeted to these social groups adding also some practical information on the application process.

Table 8. Binomial logistic regression predicting the take-up rate probability in the province of Trento. Average partial effects (APE) and standard errors (SE).
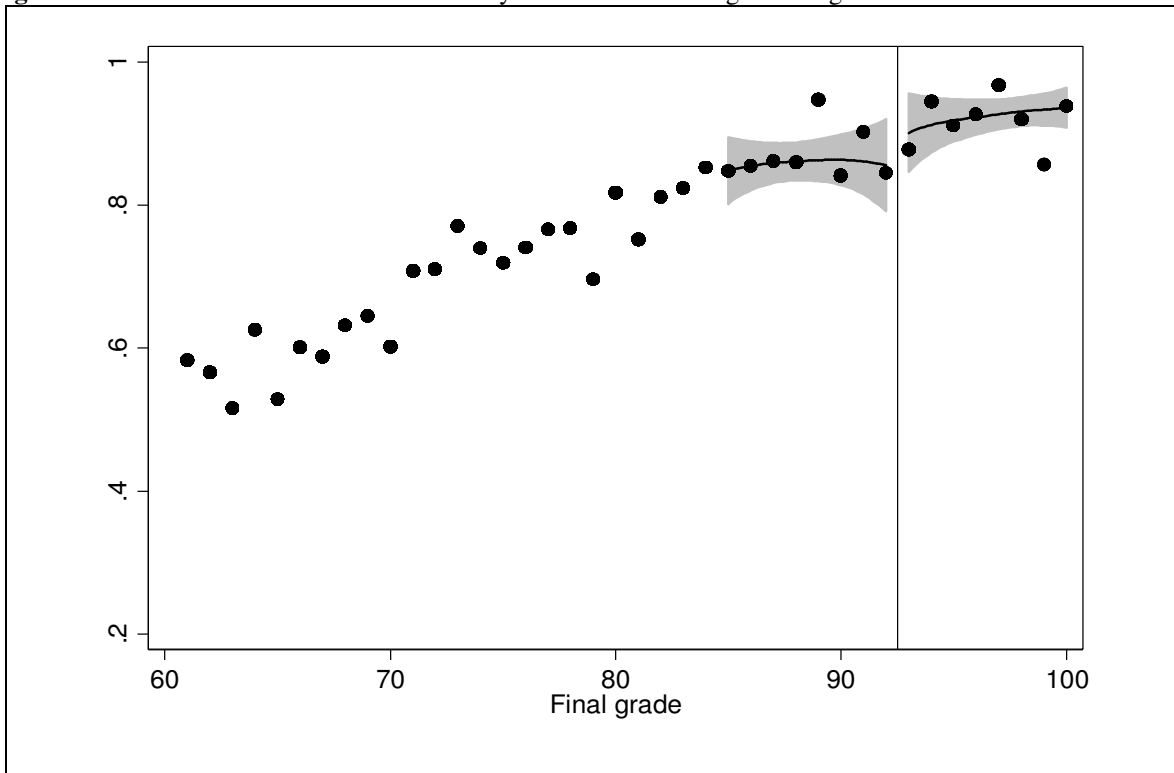
	APE	SE
Enrolment cohort		
2009/2010	0	---
2010/2011	0.023	0.053
2011/2012	0.078*	0.047
2012/2013	-0.029	0.060
Sex		
Female	0	---
Male	0.002	0.039
Upper Secondary school track		
Technical and vocational	0	---
Academic	0.090**	0.039
Parental social class		
Service class	0	---
White collars	-0.200***	0.050
Self-employed	-0.156**	0.077
Working class	-0.157***	0.055
Parental education		
Primary and lower secondary	0	---
Upper secondary	0.036	0.042
Tertiary	-0.115	0.083
Area of residence		
Non-urban	0	---
Urban	0.073*	0.040
Number of siblings	-0.040*	0.024
Icef indicator	0.274*	0.167
N=526		
Pseudo-R^2=0.07		

5.3 Rdd results – pooled data

In this sub-section we present the overall results of the effects of the policy on the various outcomes coming from the four waves pooled dataset. In this way, we supply an overall evaluation of the programme and, at the same time, the sample size is large enough to estimate the heterogeneity of the effects for specific groups of students. As explained in the third section, the main aim of the policy is to enhance HE participation. Figure 3 shows that Grant 5B does not influence the enrolment

rate. In fact, the positive jump on the threshold is not statistically significant.[14] This result is in line with what emerged in figure 2, that is the reduction in social inequalities in the enrolment probability once the final grade is taken into account. This implies that good students decide to go to the university even if they come from low-income families. Such finding suggests that perhaps the policy is not properly designed and it targets students that would have enrolled anyway.

Figure 3.   The effect of Grant 5B on university enrolment according to final grade.

Nevertheless, we find some interesting and policy relevant results when we look at the choice of the university location (figure 4). More precisely, eligible students show a higher probability to enrol outside Trento and, above all, in faculties that are not available at UniTN. This result is noteworthy because the policy act as an incentive for students to choose their preferred faculty independently from its location. Hence, the policy is effective in allowing students to follow their preferences by reducing liquidity constraints. For example, a student from a low-income family who wishes to enrol in a medical school that is not available at UniTN, by the means of Grant 5B, can afford the living costs of moving to another city.

Furthermore, we aim at understanding which are the mechanism underlying the choice to move away from Trento. Even if it could be reasonable to suppose that students wish to enrol in a prestigious faculty, the empirical evidence does not support this hypothesis. Indeed, the result is not

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[14] In appendix C we report the parametric estimates in order to help the quantification of the results.

significant and, moreover, the jump on the threshold seems to be negative. At the same time, even the impact on the distance from Trento is not statistically significant. To sum up, given the empirical evidence depicted in figure 3, it is reasonable to claim that eligible students who enrol at a university away from Trento make this choice to fulfil their academic preferences, even if they do not move too far away from home.

Figure 4.   The effect of Grant 5B on redirecting enrolled students according to final grade.

Note: the effects of Grant 5B on faculty prestige and on the distance from Trento are estimated only on students enrolled outside Trento.

Another policy goal set by the local government was the attempt to reduce social inequalities in the enrolment chances. In figure 5, we report the main relevant results from the previous models once it has been stratified according to social origins measures, such as parental education.[15] We present results only for the two outcomes who yield significant results: enrolment away from Trento and enrolment in faculties not available in Trento.[16] It emerges that Grant 5b is more effective for students from disadvantage social background. Indeed, for what concerns the children with high-educated

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[15] Due to the sample size, parental education is coded as dummy variables and the comparison is made between pupils from a high educated family (upper secondary and tertiary education) with pupils from less educated families (primary and lower secondary education). We do not present in the main text the results stratified for social class or family income, because the results confirm what we find with parental education. These results are available in appendix C.

[16]In particular, there are no significant effects for what concerns enrolment probability even after the stratification according to parental education.

parents, the jump around the threshold is positive but not statistically significant for both outcomes. The jump becomes significant if we look at students with less educated parents. For both outcomes it is possible to observe a difference between eligible and not eligible students that is greater than 20 percentage points. These findings confirm the positive effects of the programme for what concerns social inequalities. Indeed the eligibility to the programme pushes students from lower social strata to follow their preferences enrolling outside Trento and in faculties that are not present at UniTN. It is clear that the effects found in the main models (figure 4) are mainly driven by the enrolment decision of people from lower social strata. Hence, Grant 5B succeeds in reducing inequalities in the choice of the university location.
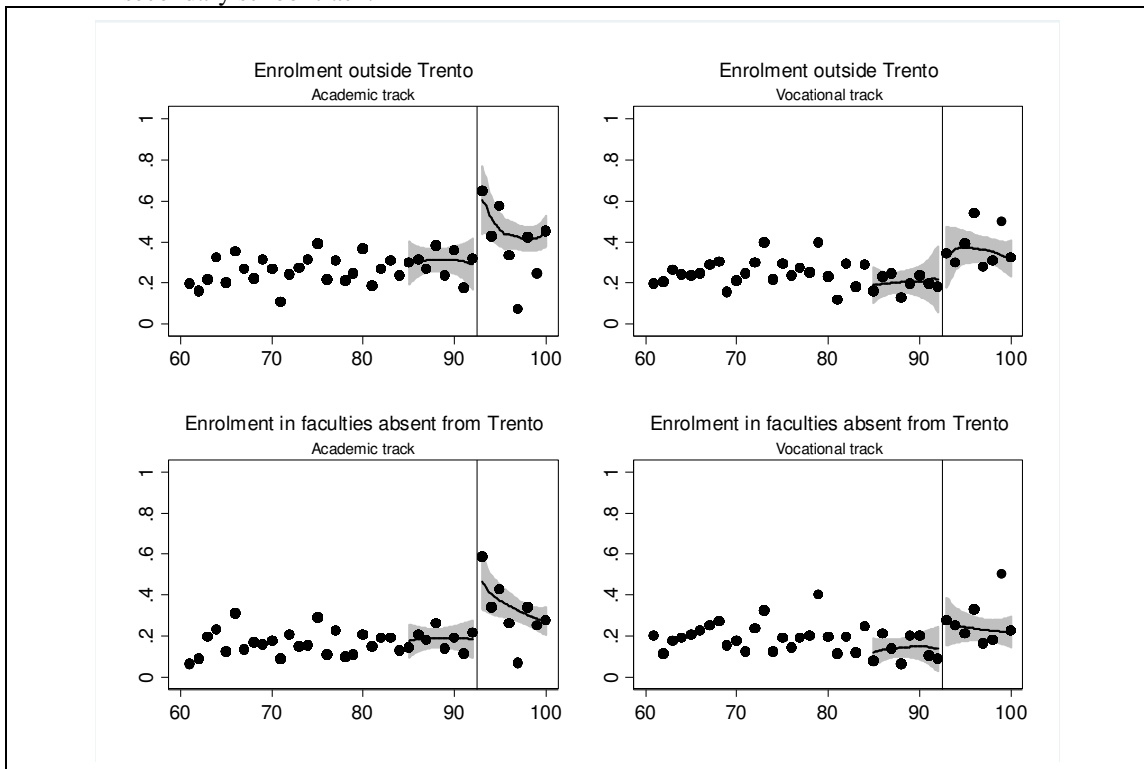
Figure 5. The effect of Grant 5B on redirecting enrolled students according to final grade and parental education.
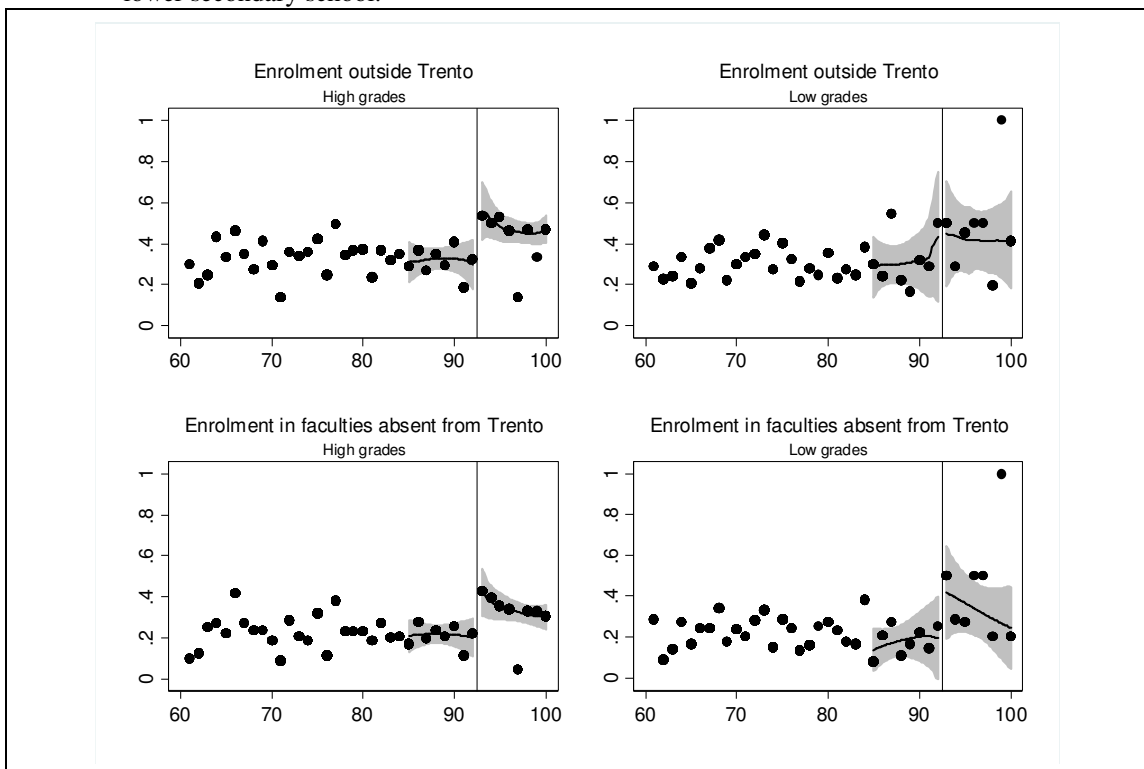

In order to better understand the kind of students that receives the major gains from Grant 5B, we consider heterogeneity of the effects also with respect to their secondary school track (figure 6) and to their grades at the final exam at lower secondary school (figure 7). In these cases, students graduated from an academic track and those with higher grades at the end of the lower secondary school show higher probability to enrol outside Trento in faculties that are not available at UniTN. These findings show that students who enrol outside the province of Trento are more likely to attend faculties like Medicine, Veterinary or Pharmacy. Considering that these faculties are particularly demanding, it is not strange that the Grant 5B works well for good students from academic track.

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Figure 6. The effect of Grant 5B on redirecting enrolled students according to final grade and upper secondary school track.

Figure 7. The effect of Grant 5B on redirecting enrolled students according to final grade and grades at the lower secondary school.

5.4 *Rdd results – cohorts data*

In this sub-section we replicate the analyses shown before stratifying the whole sample by enrolment cohort. The goal is to look at the possible variation over time of the policy effects. This kind of analysis is particularly interesting because the programme at the beginning of the economic crisis in Italy. The crisis could have increased the participation costs into HE and, as a consequence, it could have made financial aids less effective. The results concerning enrolment probability (figure 8) do not reveal any significant changes from 2009 to 2012. In all the surveyed cohorts, the effect of Grant 5b is null, even if in 2011 and 2012 the jump is positive however not statistically significant. It is possible to observe some variation in the levels of enrolment probability, that are declining over cohorts, in particular in the last one, confirming what emerged in the descriptive analysis (table 4). The worrying decline in the enrolment rate is not a peculiarity of the province of Trento but a more spread problem that has affected the whole country.

Some relevant changes in the role played by the programme can be detected in the probability of enrolment outside Trento (figure 9). In this case, a clear trend emerges by which the effect of the policy tends to disappear. More precisely, in 2009 and 2010 the effect is still remarkable and significant, while in 2011 it is only marginal significant and in 2012 the jump around the threshold is null. Figure 10 shows similar results for what concerns the enrolment probability in faculties absent from Trento. Even in this case the positive influence of the measure starts to disappear with the 2011 cohort.[17]

A potential explanation of the dramatic changes just highlighted refers to the persistence/worsening of the economic crisis that strikes Italy starting from 2009. Indeed, it is realistic to suppose that students do not react immediately to the economic crisis and that in the first years of the programme they act in an optimistic way. However, the enduring adverse situation at the economic level, together with the negative forecasts for the future could have changed the individual preferences toward the HE participation. In particular, in the province of Trento youth unemployment rate raised dramatically from 11.5% in 2009 to 20.5% in 2012, while in 2010 and 2011 it is respectively 15.1% and 14.5%. In 2008, before the economic crisis and before the implementation of the measure, youth unemployment rate was equal to 8.5%.[18] It is evident that the largest jump in unemployment happened in 2012 (6 percentage points), while from 2008 to 2009 the variation was smaller (3 percentage points). It seems reasonable to suppose that the complete disappearance of the
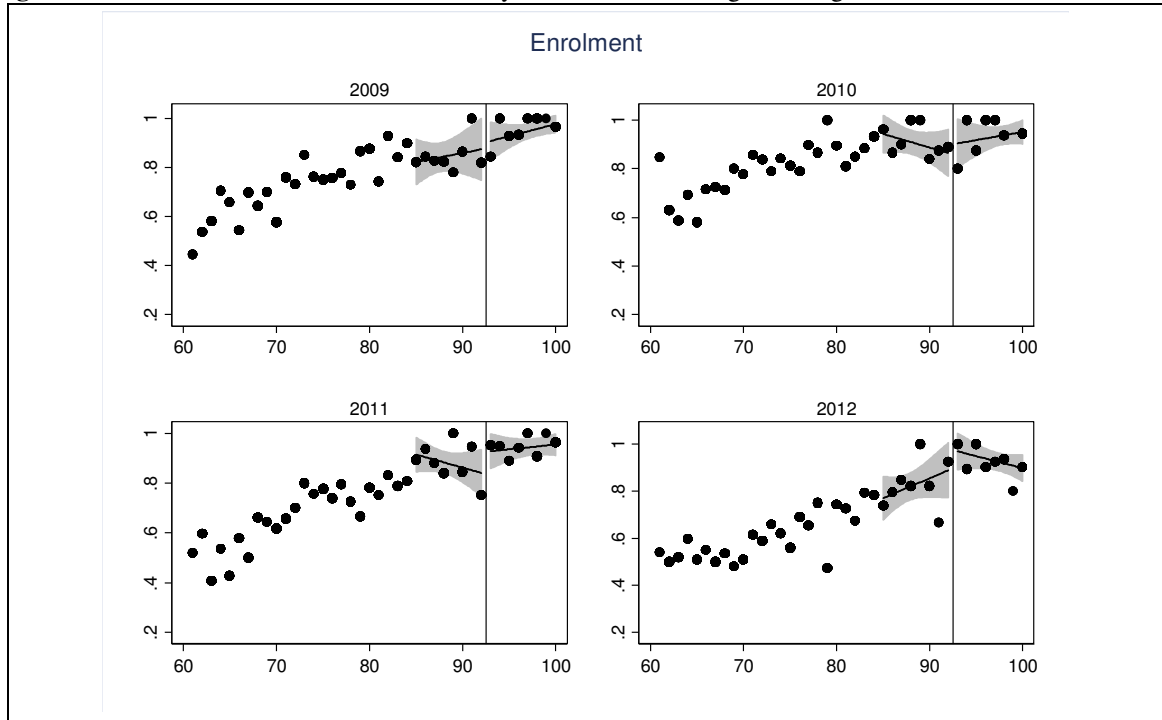
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[17] We do not report the results for the faculty prestige and for the distance from Trento of the chosen university, because the results are not statistically significant.
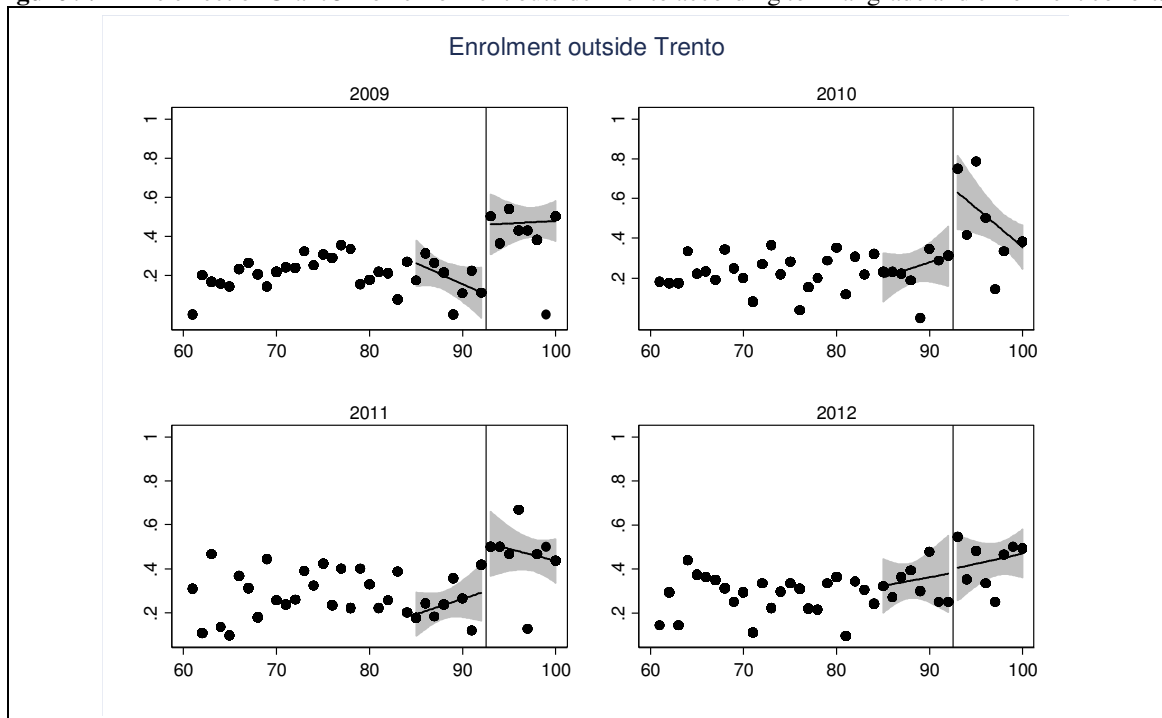
[18] Data on youth unemployment rate for the province of Trento come from the elaboration of the Local Statistical Office (www.statweb.provincia.tn.it/INDICATORISTRUTTURALI/indicatore.aspx?idInd=33) starting from data on the labour forces at national level supplied by the Italian Statistical Office (Istat) (http://timeseries.istat.it/index.php?id=60&user_100ind_pi1%5Bid_pagina%5D=163&cHash=953962bf6f630c6448bb30 c0b84d966d).

Grant 5B effect could be partially due to the persistence of the unfavourable economic conditions. In other words, after few years students stop to be optimistic and they began to perceive an increase in the HE costs.
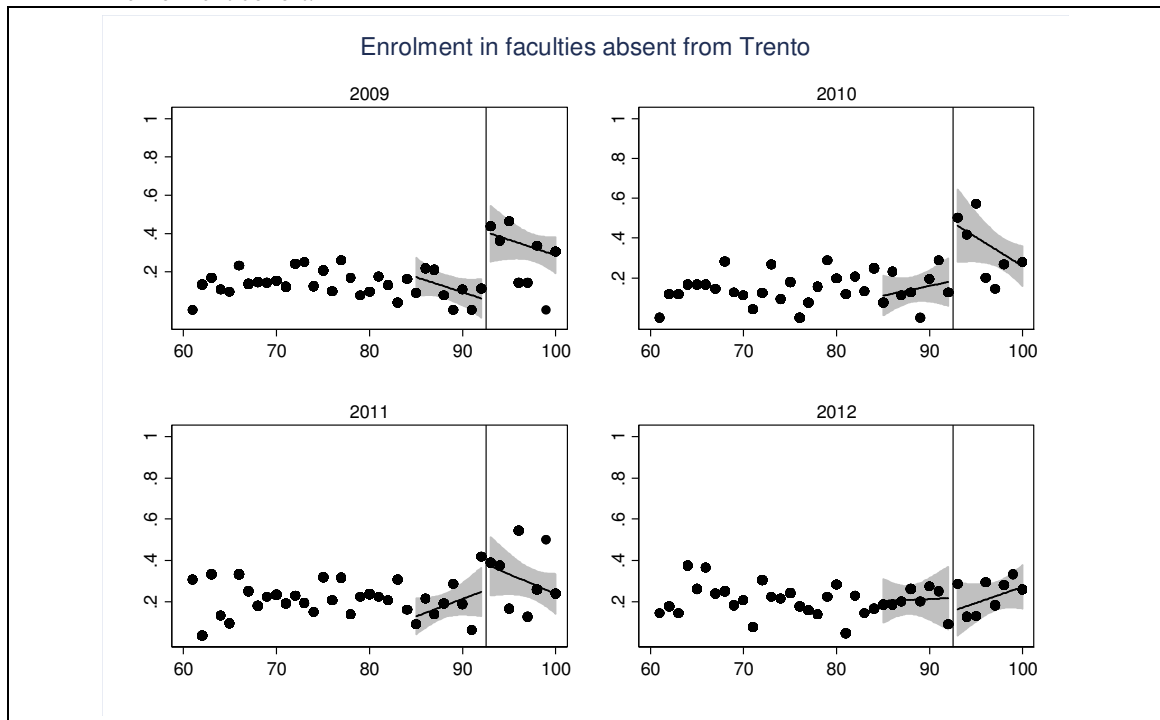
Figure 8. The effect of Grant 5B on university enrolment according to final grade and enrolment cohort.

Figure 9. The effect of Grant 5B on enrolment outside Trento according to final grade and enrolment cohort.

Figure 10. The effect of Grant 5B on enrolment in faculties absent from Trento according to final grade and enrolment cohort.

Given this setting, we find evidence that students use Grant 5B not for matching their academic preferences with the liquidity constraints, but as a sort of economic transfer for sustaining their family income. Hence, they choose to study at UniTN and to use the money of the Grant 5B as an income support. This hypothetical picture seems to be quite realistic if we remind that, the effects of the policy are stronger for students from disadvantage backgrounds, who are more exposed to economic crisis.

6. Simulations

In this section, we aim to perform some additional analysis in order to provide a set of suggestions for the policy maker about the modifications for improving the programme's effectiveness. The empirical evidence presented here shows that there are two main limits in the implementation of Grant 5B. The first one is that the policy fails in the goal of increasing the enrolment probability. The second one is linked to the observation that in the last two years there has been a worrying reduction in the positive effects exerted by Grant 5B.
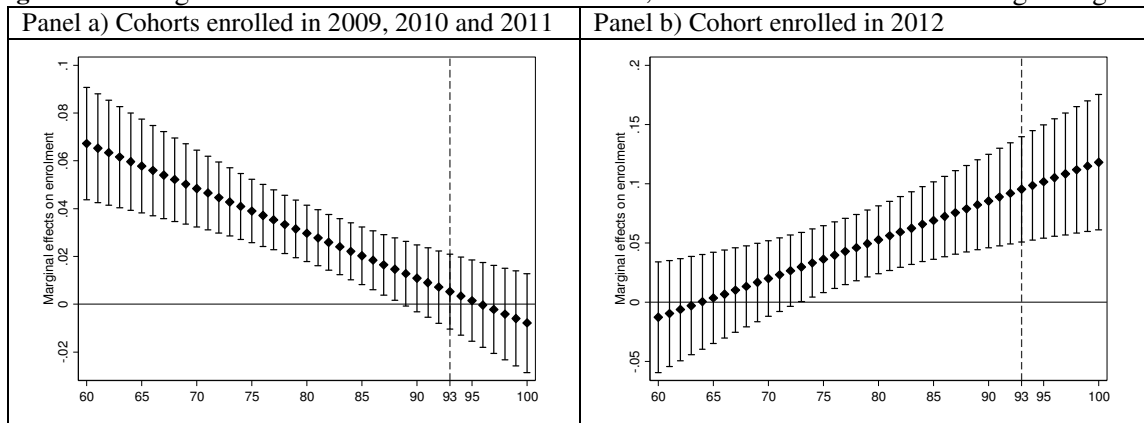
Regarding the first problem, we rely on the analyses performed in Vergolini and Zanini (2013) that try to provide evidence on the causes of the inefficacy of Grant 5B in boosting enrolment probability. The idea is that there is a sort of substitution effect, according to which students from low-income families with good grades are not discouraged to enrol at the university, because the

high academic performance could be interpreted as a positive sign of the future academic success. Hence, students and their families are likely to invest in HE. In order to test the presence of this substitution effect, we analyse, for students below the income threshold, the marginal effects of income on enrolment probability letting vary final grades. This marginal effect can be calculated by this formula:

$$\frac{\partial enrolment}{\partial income} = \beta_{income} + \beta_{(Final\ grade\ *income)} \cdot Final\ grade$$

where β is the OLS coefficient of the regression of university participation on income, final grade, their interaction and a set of characteristics potentially affecting the enrolment probability.

Figure 11. Marginal effects of an income increase of € 5,000 on enrolment rate according final grade.

Note: the graphs derives from an OLS regression on enrolment probability for students below the income threshold. The model includes the following covariates: final grade, income, interaction between grade and income, cohort, sex, upper secondary school track, parental supervision, number of siblings, parental class, parental education, final grade at lower secondary school and area of residence, level of deprivation.

The panel a) of figure 11 shows the marginal effects of an income increase of € 5,000 (an amount close to the one provided by Grant 5B) the effect on enrolment probability becomes statistically significant only when the final grade is below 88. In general, the findings suggest that an income increase is more effective for students with low grades. Indeed, in the final grade range of 60-85, it varies from about 7 to 2 percentage points, suggesting that setting the merit threshold at 93 does not affect the decision to enrol at university. This finding suggests that to improve the effectiveness of the programme a possible solution could be the reduction of the final grade threshold in order to favour the enrolment of students that otherwise would not attend university. In fact, if the aim is to increase the enrolment, the policy has to be focused on students who are not highly inclined to attend

university. A plausible new threshold could be establish at 82/100, which might guarantee a positive effect of about 3 percentage points.[19]

The depicted picture changes completely when we consider the last cohort (figure 11, panel b) of students enrolled at the university in 2012. It emerges that students more sensitive to income changes are the worthy ones. A possible explanation for these opposite results, we can consider that for 2012 cohort we observe a dramatic decline in the enrolment rate (table 4) and the disappearance of the positive and significant effects of the Grant 5B (figures 6-7) that we partially linked to the worsening of the economic crisis. To this evidence, we can add the fact that in Italy, in the last years the economic returns of HE are declined (Triventi et al. 2013, Schizzerotto et al. 2015, Vergolini and Vlach 2014). Moreover, there is an increase in the enrolment fees (ANVUR 2013) and a reduction in the disposable income of families from lower social classes (Schizzerotto et al. 2015). As a result, the overall picture indicates an increase in the costs of participation together with a decrease in the returns. A situation like this could affect negatively the students' attitudes toward university enrolment. This is true in particular for students from disadvantage backgrounds with low grades, for them the cost-benefit balance could lead to consider the investment in HE too risky. Therefore, even an income increase will not foster university enrolment for these students, while it could be considered a positive incentive for worthy students. They have the ability to succeed at the university and, in the portrayed economic context, a financial aid could move their enrolment decisions. According to this argument, figure 5 shows that the effect of Grant 5B on enrolment probability in 2012, even if not statistically significant, is positive, while in the first two cohorts the effect is practically equal to zero.

The second critical point of the measure emerged in the evaluation process regards the enduring difficulties connected with the economic crisis. Following the argumentation exposed in the previous section, it seems reasonable to suppose that a negative economic situation increases the costs connected to HE participation. Hence, students could choose to stay in Trento in order to spend less money. To overcome this situation the policy maker provides two additional grants that can be accumulated with Grant 5B. The first one is targeted to students who decide to enrol in Medicine, while the second is thought for students who enrol outside Trento in faculties not present in Trento.

7. Conclusions and policy implications

This paper presents the main results concerning the evaluation of the role played by Grant 5B in shaping the enrolment decisions of students resident in the province of Trento. We analyse data of

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[19] In order to avoid problems in the identification strategy due to manipulation of the score variable, it is wise to avoid 80/100 as a threshold (see figures presented in the appendix B).

four cohorts of students, from 2009 to 2012, which allows us to investigate the role of liquidity constraints in times of recession. The findings show that the measure does not enhance enrolment probability, but it has remarkable effects on the choice of the university location. Indeed, eligible students show a higher propensity in enrolling at faculties outside the Province of Trento that are not been activated by UniTN. The overall picture is tangled by the diverging results emerged for what concern the 2012 cohort. The different findings reported for the last cohort suggest that the persistence of the negative economic growth affects students' decision regarding university participation, in spite of a generous monetary aid provided by the Grant 5B. This makes difficult to propose an uncontroversial recipe to improve the design of the policy. Hence, we try to give some suggestions that could be useful in the rethinking of the grant system.

The null effect that we find in our analyses cannot be interpreted as a sign of the failure of the liquidity constrain theory, because we show that the policy targets students whose academic ability are so high that they would have enrolled at the university even in the absence of the policy. The first recommendation for a policy maker, who wish to implement this kind of grant, is to carry out a careful analysis of the demand of HE and of the social and economic background. In this way, it is possible to define more accurately the target population that will benefit the most from the financial aids.

Based on the results and argumentations displayed in the paper, a reliable solution for the null effect on enrolment could be the reduction of the final grade threshold in order to favour the enrolment of students that otherwise would not attend university, *i.e.* students with relatively low grades and from disadvantaged social backgrounds. Moreover, we would recommend that policy makers target financial aids to students from 'true' low-income families. Therefore, in this particular case, since middle-income students are also eligible for the scholarship, we suggest reducing the financial threshold, together with the merit constraint, to improve policy efficacy. This suggestion seems reasonable if we look at the results stratified by social origins. It emerges that the Grant 5B produces significant results in particular for pupils from lower social strata, while for more affluent students the effect is absent. Moreover, it is worth noticing that the proposed threshold (82/100) still consider good performing students. The share of students above 82/100 is equal to the 28% of the considered population.[20] The idea is to enlarge the eligible populations considering students with good grades and not only the ones with outstanding performance.

As explained in the text, Grant 5B should cover the indirect costs connected to HE, while *Diritto allo studio* has to face with the direct costs. What happen is that the income threshold for *Diritto allo studio* is smaller than the one for Grant 5B, meaning that for a part of the eligible students there is

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[20] While the share of students above 93/100 represents about the 10% of the population under analysis.

not an overlapping between the two measures. Thus, for these people Grant 5b is not an instrument for covering indirect costs, but it becomes a mere substitute of the *Diritto allo studio*. This peculiarity in the policy design might be part of the explanation regarding the absence of the effects on enrolment rate and of the differential effects according to social origins emerged in the redirection of enrolled students.

Furthermore, money by itself could be not sufficient to change the attitudes towards HE participation. Low-income families could have a biased perception of the economic returns of HE, as well as the necessary workload to complete the university. Obviously, these attitudes have a strong influence in the formation of risk aversion and they could be changed only by means of guidance programmes addressed to students and their families. These programmes should guide them through a better understanding of the university offer and of the returns to education and of higher education in particular.

To conclude, the findings, along with issues mentioned above, suggest that the achieved of a more effective Grant 5B can only be achieved through a redesigning of the entire system of grant system currently working in the province of Trento. This should be flanked, especially in times of recession, by non-monetary programmes aimed at providing students and their families with a better knowledge of the benefits of education for individuals' life opportunities.

Appendix A

In this appendix, we explain in detail how the income threshold is measured and we handle with the problem of missing values on this variable. As said in section 3, one of the eligibility criteria for Grant 5B is to be below an income threshold and that it is measured according to a particular index called Icef. For the sake of simplicity in the main text, we always refer to income, but, to be more precise, Icef is a complex index that jointly considers income, assets, endowments, and family composition.[21]

The main problem regarding Icef variable regards the missing values, as we have Icef information only for the 53% of the population indeed. In any case, we believe that people with high income and with a good economic condition do not present the Icef documentation, because they are aware of their non-eligibility. To test this assumption, we model the non-response rate in order to understand the pattern of missing values. From table A1, it emerges that there is a clear pattern in the distribution

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[21] In the creation of Icef index, the various element are added and the total is made equivalent using a particular scale. This equivalence scale is equal to 1 for households with only one member; it is equal to 1.57 for two-member households; it is 2.03 for three-member households; 2.46 for four-member households; 2.85 for five-member households. The scale adds a weight equal to 0.35 for any further component. By construction, Icef takes value 1 if the total amount is equal to € 50,000. Hence, an Icef value of 2 means that the amount of income and assets is equal to € 100,000. The Icef threshold for Grant 5B is 0.5882 that corresponds to € 29,410 and in the main text, for simplicity, we have round it to € 30,000.

of missing values. More precisely, we find that the more disadvantage families (in terms of social class and education) are more likely to present the Icef documentation.

Table A1. Binomial logistic regression predicting the response probability to the Icef variable. Average partial effects (APE) and standard errors (SE).
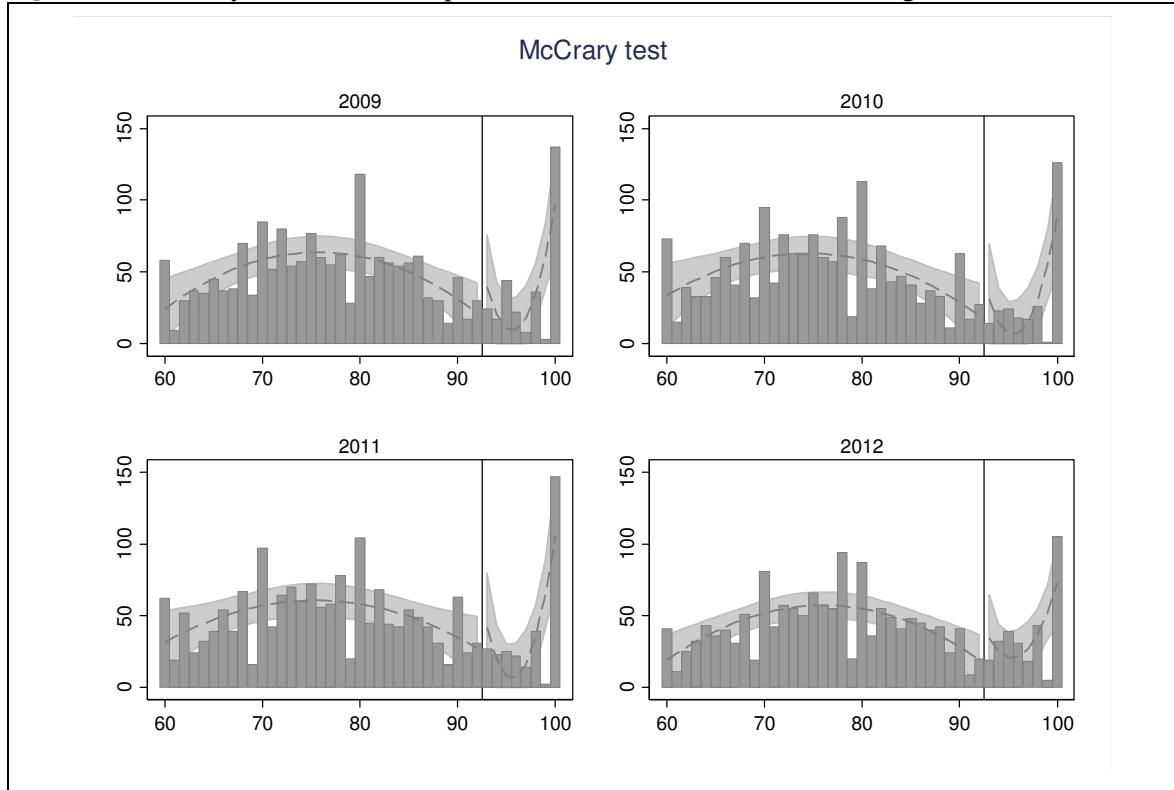
	APE	SE
Enrolment cohort		
2009/2010	0	---
2010/2011	0.001	0.014
2011/2012	0.110***	0.014
2012/2013	0.117***	0.016
Sex		
Female	0	---
Male	-0.032***	0.010
Area of residence		
Non-urban	0	---
Urban	0.072***	0.012
Parental social class		
Service class	0	---
White collars	0.063***	0.016
Self-employed	-0.075***	0.020
Working class	0.171***	0.017
Parental education		
Primary and lower secondary	0	---
Upper secondary	-0.025**	0.013
Tertiary	-0.139***	0.019
Number of siblings	0.071***	0.007
Material deprivation	0.001	0.011
N=8,676		
Pseudo-R^2=0.05		

The same is true for the larger families and for students from urban areas. It is interesting to notice, that students whose parents are self-employed have a lower probability to apply for Icef than students from other social classes. This result is understandable if we consider that self-employed could perceive the Icef documentation as a sort of fiscal control, and, for this reason, they prefer to avoid it. Moreover, over the years the share of students presenting Icef documentation is increasing, this could be a sign of the enduring economic crisis. People that usually do not apply for grants, in the

last years feel the necessity to benefit from financial aids. In general, we find that the missing values are more concentrated in the richer strata of the population. This result confirm the validity of our evaluation study, indeed we consider only students from low-income families for which we have all the relevant information.
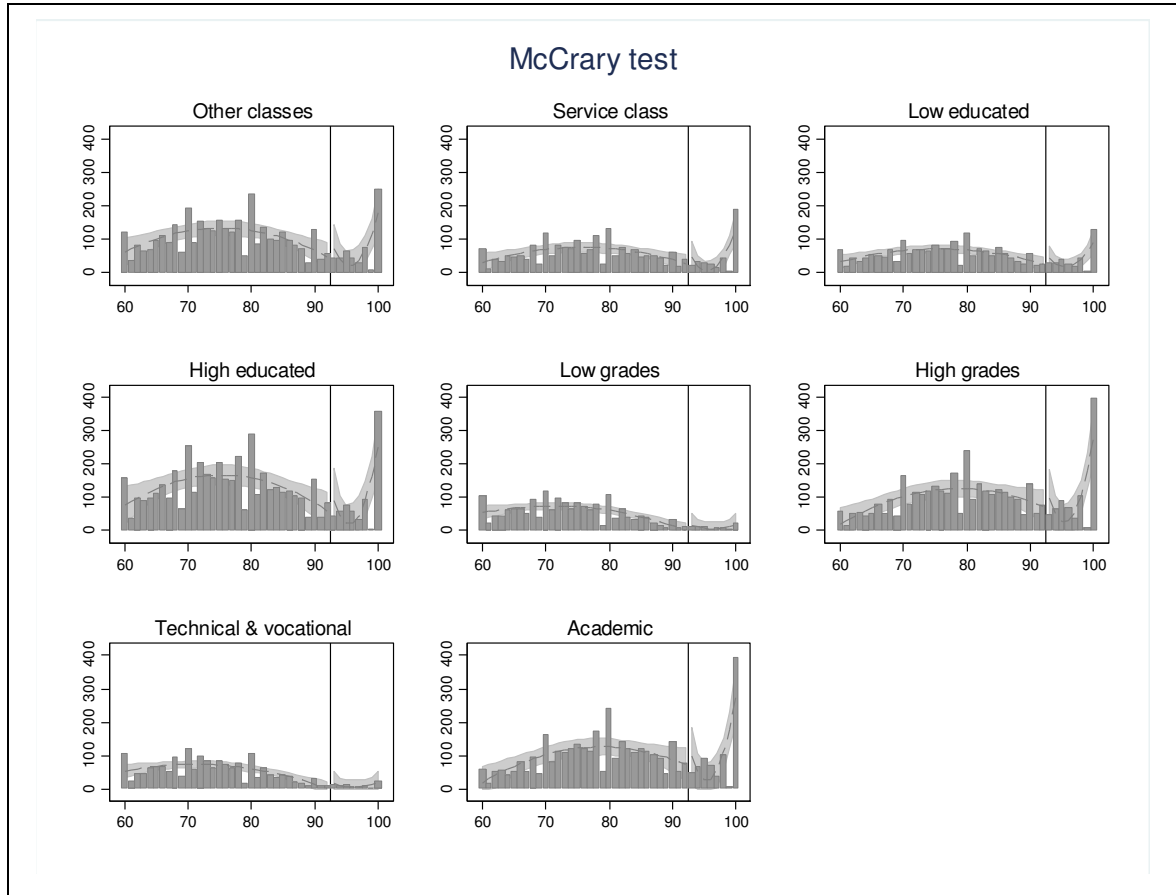
Appendix B

Figure B1. McCrary test for the manipulation of the score variable, according to enrolment cohort.

In order to provide the absence of manipulation of the score variable, it is possible to carry out the so-called McCrary test (McCrary 2008), that is based on the comparison of the score variable distribution around the threshold. Figures B1 and B2 show the results regarding the test carried out on the four cohorts and on the various stratification variables. Even if it is possible to notice a slight discontinuity on the threshold, this jump is not statistically significant. Furthermore, there are larger jumps at different values of the final grade (e.g. 70, 80, 100). Hence, we can conclude that there is no reason to think that a manipulation of the final grade took place, thus we can retain that the estimates of the effects of the Grant 5B provided by the identification strategy adopted are unbiased.

Figure B2. McCrary test for the manipulation of the score variable, according to main stratification variables.

Appendix C

In this appendix we report some additional result that is not been inserted in the main text. More precisely, in figures C1 and C2 there are the results stratified according to social class and income. It is clear that these results confirm what is emerged with the stratification according to parental education.

In table C1, we report the results obtained parametrically via the following OLS regression:
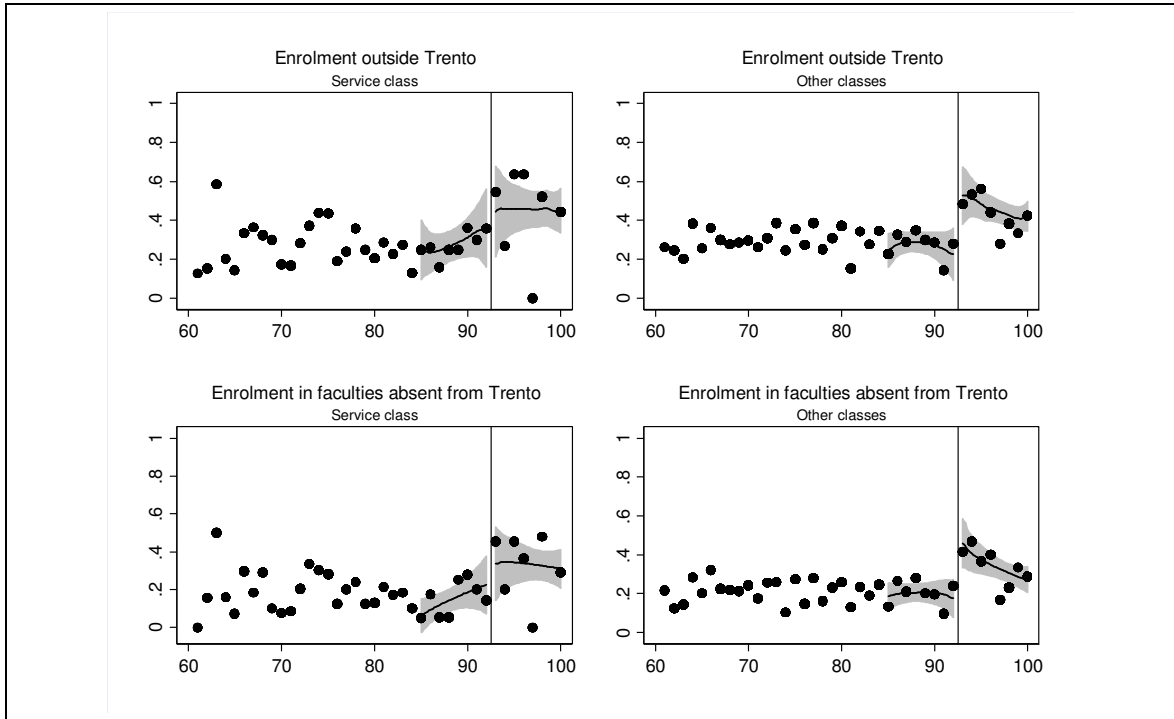
$$Y = \alpha + \beta \cdot Grade + \theta \cdot Grade^2 + \gamma \cdot D + \delta \cdot (D \cdot Grade) + \vartheta \cdot (D \cdot Grade)^2 + \varepsilon$$

Where *Y* is the outcome, *Grade* represents the score variable, and *D* is a dummy variable that takes value 1 for the treated and value 0 for the control group. The estimates are then obtained calculating the following difference:
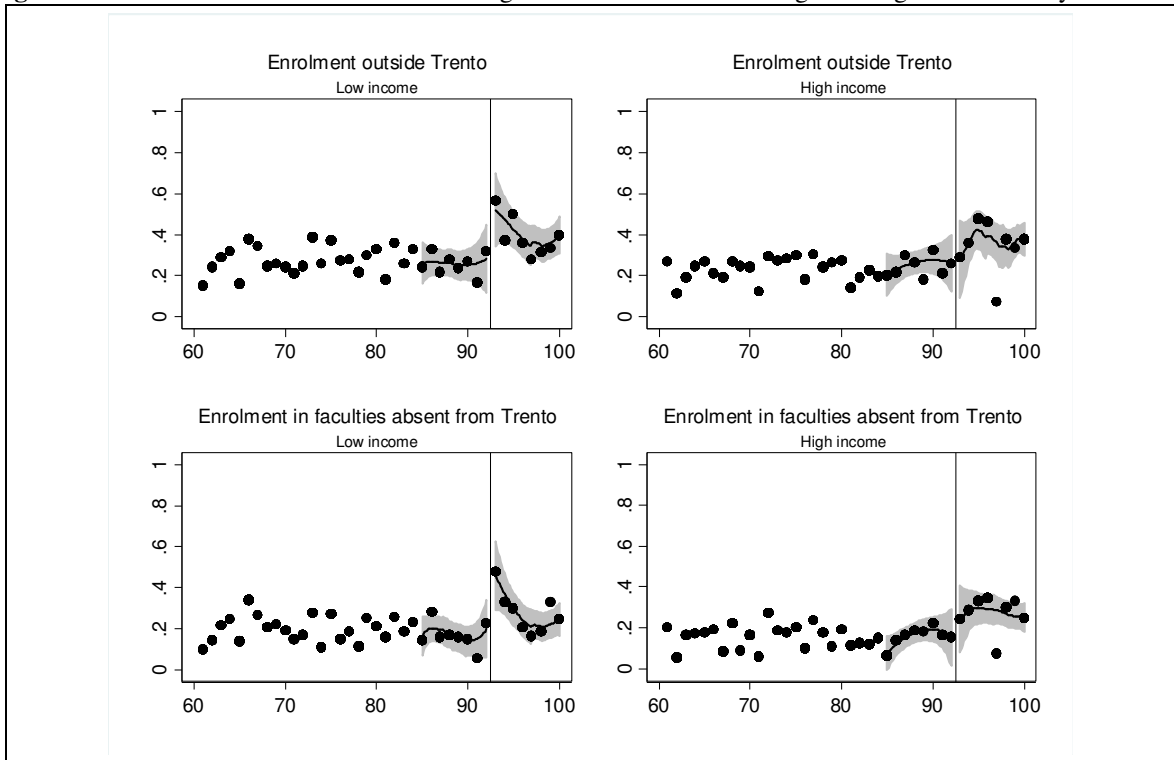
$$Effect = E[Y|D = 1] - E[Y|D = 0]$$

From the results, it emerges that the non-parametric results presented in the main text of the paper are substantially coherent with the parametric ones supplied in table C1.

Figure C1. The effect of Grant 5B on redirecting enrolled students according to final grade and parental social class.

Figure C2. The effect of Grant 5B on redirecting enrolled students according to final grade and family income.

Table C1. Parametric estimates for the effects of Grant 5B.

	Effect	Std. error
General models		
Enrolment	0.065	0.049
Enrolment outside Trento	0.282***	0.077
Enrolment in faculties absent from Trento	0.239***	0.072
Prestige	-0.026***	0.009
Distance from Trento	22.945	25.409
Models stratified by parental education		
Outside Trento (high)	0.330***	0.124
Outside Trento (low)	0.147	0.100
In faculties absent from Trento (high)	0.361***	0.121
In faculties absent from Trento (low)	0.160*	0.092
Models stratified by upper secondary school		
Outside Trento (academic)	0.324***	0.109
Outside Trento (non-academic)	0.153	0.113
In faculties absent from Trento (academic)	0.329***	0.105
In faculties absent from Trento (non-academic)	0.172	0.098
Models stratified by grades at lower secondary school		
Outside Trento (high)	0.267***	0.098
Outside Trento (low)	0.088	0.221
In faculties absent from Trento (high)	0.256***	0.092
In faculties absent from Trento (low)	0.275	0.199
Models stratified by enrolment cohort		
Enrolment in 2009	-0.019	0.111
Enrolment in 2010	-0.015	0.110
Enrolment in 2011	0.141	0.089
Enrolment in 2012	0.122	0.089
Outside Trento in 2009	0.423***	0.144
Outside Trento in 2010	0.390**	0.166
Outside Trento in 2011	0.222	0.141
Outside Trento in 2012	0.204	0.161
In faculties absent from Trento in 2009	0.433***	0.133
In faculties absent from Trento in 2010	0.396**	0.159
In faculties absent from Trento in 2011	0.130	0.141
In faculties absent from Trento in 2012	0.012	0.143

Legend: * $p<0.10$; ** $p<0.05$; *** $p<0.01$.

Note: the parametric models are estimated using OLS regression with robust standard error.

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