

6. Money, time and effort.

Does financial aid improve university performance?

by Loris Vergolini, Nadir Zanini

There is a wide debate about the effectiveness of financial incentives on university performances (i.e., drop-out risk, credits, grade point average grade, and timely graduation) and on possible mediators like time use (i.e., time allocation between study and work). This paper investigates the impact of a generous need- and merit-based financial aid made available to students from low-income families introduced in the province of Trento (North-East of Italy). Exploiting data from a unique dataset resulting from administrative data and a longitudinal survey, we implement a Regression Discontinuity Design in order to disentangle the causal effect of the financial aid from other confounding factors. We provide evidence that different students react very differently to monetary transfers, thus reconciling different theories. For some students need- and merit-based financial aid can have a positive impact on students' performance at university, especially in terms of timely graduation. Students undertaking more demanding degree courses, however, appeared to be performing less well, despite spending more hours studying rather than working.

Esiste un ampio dibattito sull'efficacia degli incentivi finanziari sui risultati universitari (rischio di abbandono, crediti, media dei voti e laurea tempestiva) e su possibili mediatori come l'uso del tempo (allocazione del tempo tra studio e lavoro). Il presente lavoro indaga l'impatto di un generoso strumento di aiuto finanziario basato sul bisogno e sul merito, messo a disposizione degli studenti provenienti da famiglie a basso reddito, introdotto nella provincia di Trento (Italia Nord-orientale). Sfruttando i dati di una serie unica di dati amministrativi e di un'indagine longitudinale, implementiamo un Regression discontinuity design per stimare l'effetto dell'aiuto finanziario. I risultati mostrano evidenza di come studenti diversi siano influenzati

in maniera diversa dall'incentivo finanziario. Per studenti dei corsi di laurea triennale sembra esserci un impatto positivo, specialmente in termini di completamento del percorso universitario dentro ai tempi previsti. Studenti che intraprendono corsi di studio più lunghi, tuttavia, sembrano ottenere risultati meno positivi, nonostante trascorrono più tempo studiando.

1. Introduction

The disadvantage of students from low-income families does not only affect their chances of progressing to Higher Education (HE), it also affects their experience while at university. Students from low-income families are at greater risk of not completing their studies (Argentin and Triventi, 2011; OECD, 2019), and they typically perform worse than their better-off counterparts (Credé *et al.*, 2010; Vidal Rodeiro and Zanini, 2015). One possible reason for the lower achievements of socio-economically disadvantaged students is that they have to devote time and effort to paid employment in order to support themselves during their studies (Triventi, 2014).

In an attempt to level the playing field, policy makers have introduced various forms of support for undergraduate students from less privileged backgrounds, such as financial aid, loans, tax deductions and tuition fee waivers (for a review, see Page and Scott-Clayton, 2016). The underlying idea of these measures is that these students and their families face liquidity constraints that prevent them from investing in HE and, for those who progress to university, from fully focussing on their studies. According to this premise, any kind of policy aimed at reducing the direct and indirect costs associated with university participation could be successful in reducing the inequality of educational opportunities and outcomes (Dynarski *et al.*, 2023). Whereas there is a vast literature on the impact of financial aid on university participation (for a systematic review, see Herbaut and Geven, 2020), much less is known about the effect of these programmes on academic performance, especially in Europe (among the few studies available, see, for Italy, Facchini *et al.*, 2020; for England, Murphy and Wyness, 2023).

The aim of this paper is to provide evidence on the impact of financial aid to undergraduates by studying the case of the Grant 5B, a generous scholarship available in the province of Trento (Northeast of Italy) from 2009 to 2012. Our main focus is to consider its effects on students' university performance, measured by drop-out probability, grade point average (GPA), number of credits, and timely graduation. In addition, we study its impact on students' use of time while at university, both in terms of hours of study and work.

The prior evaluation of this programme, which focused on the first cohort of recipients (Vergolini and Zanini, 2015), found that the Grant 5B had no effect on university enrolment but redirected students outside the province of Trento, to take degree courses not offered by the local University of Trento (such as Medicine or Veterinary Science). Whilst this means that the Grant 5B was not linked to a change in the composition of students going to university, it does suggest that the recipients of the Grant 5B might have been somewhat affected by the financial aid.

Building on previous findings and exploiting a unique combination of administrative and longitudinal survey data, we evaluate the effect of this scholarship on how students spend their time at university and on their academic performance. The paper, therefore, does not only provide policy-relevant empirical results on the impact of a need- and merit-based financial aid. It also contributes to the scant literature on the role of financial aid on undergraduates' academic performance, using information on their use of time while at university to interpret these results.

The rest of the paper is organised as follows. The next section outlines the main features of the programme under scrutiny and the system within which it was introduced. Section 3 introduces some hypotheses about its possible effects. In Section 4 we describe the data used in the analyses, while in Section 5 we discuss the identification strategy adopted in order to estimate the causal effect of the grant on academic performance. We report our main findings in Section 6 and discuss their implications and limitations in Section 7.

2. The introduction of the Grant 5B

2.1. Contextual facts and figures

In the Italian educational system, to progress to HE students have to pass the secondary school leaving exam (*esame di maturità*), usually taken when they are 19. Regardless of the secondary school track chosen¹, the *esame di maturità* is scored out of 100, with 60 being the pass score. Most university courses in Italy comprise a 3-year Bachelor's (*laurea*) degree and a 2-year

¹ At the age of 14, when entering the upper secondary school, students have to choose which track to attend: academic (*liceo*), technical (*istituto tecnico*), or vocational (*istituto professionale*). Each track lasts five years. In addition to these three tracks, students can enrol also in some vocational training programs that are managed by local governments. These programmes, however, are shorter, usually last no more than three years, and they do not allow access to university.

Master’s (*laurea magistrale*) degree. The exceptions are degrees that still follow a single-cycle 5/6-year course. These are: Medicine, Veterinary Science, Dentistry, Pharmacy, Architecture and Law.

The main programme designed to provide financial aid to students in HE is *diritto allo studio* (Right to Education), a national scheme co-financed by local governments. Students can apply for this programme once enrolled at university and it is awarded based on family income for the first year and on the basis of merit and income for the following years. It offers support up to a complete tuition fee waiver, a scholarship whose amount depends on family income, and privileged access and discounts for university accommodation and subsistence.

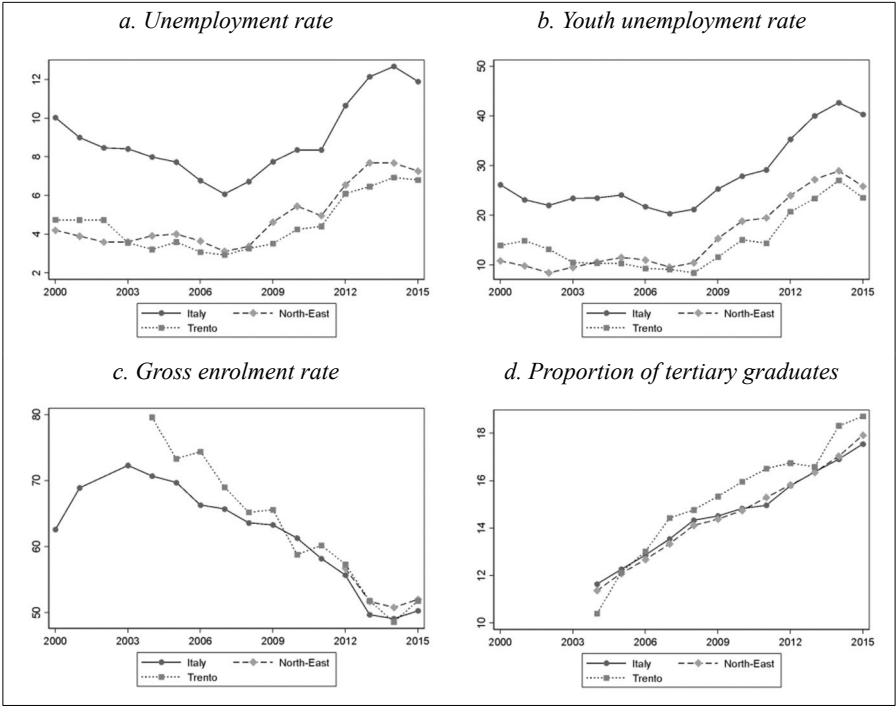


Fig. 1 – Italy, North-East and province of Trento at a glance

Note: Panel a reports the general unemployment rate; panel b shows the unemployment rates for people aged 15-24; in panel c, gross enrolment rates are calculated as the ratio between students enrolled at the university in year $t/t+1$ – independently of the year in which they obtained a high-school diploma – and high school graduates in year $t-1/t$. Panel d reports the proportion of tertiary graduates for people aged 25-64.

Source: unemployment rate, youth unemployment rate and the proportion of tertiary graduates have been retrieved using the ISTAT data warehouse supplied by the Italian Statistical Office. The gross enrolment rate comes from the *Annuario statistico italiano* (Italian Statistical Yearbook).

Prompted by the Great Recession, in autumn 2009 the local government of the autonomous Province of Trento (*Provincia autonoma di Trento*, PaT henceforth), a small area in the North-East of Italy, took a more active role in encouraging students from low-income families to complete a university degree course. Although PaT can rely on a relatively good economic situation, with lower unemployment rate than the rest of the country², in the years after the Great Recession it experienced a large decline in university enrolment even though the proportion of tertiary graduates follows a substantially linear growth (Fig. 1).

2.2. The Grant 5B

To reverse this negative trend, a generous financial incentive known as the Grant 5B was introduced to assign need- and merit-based monetary aid to students from low-income families. Specifically, this scholarship was awarded to those students who successfully completed the last year of secondary school (*diploma di maturità*) obtaining a final score greater than or equal to 93/100, and whose family income was below a predetermined income threshold. It is worth noting that the 93/100 threshold was set to allow the best 10 percent (approximately) of students to be eligible for merit. The financial need of students and their families is measured by a mixture of family income and assets. The threshold was set at € 30,000 of equivalent income³.

The annual amount of the scholarship varies between € 1,200 and € 6,000, depending on family income and the geographic location of the chosen university. However, more than 80% of Grant 5B recipients received at least € 4,500 per year, which corresponds to a monthly scholarship in the range of € 375-500. This monetary transfer must be considered a top-up to the coverage of the direct costs of university attendance provided by the Right to Education. It should be noted, in fact, that the merit and income thresholds for the Grant 5B are different, resulting in the Grant 5B eligible population being a subset of those eligible for the Right to Education.

² Our main results would reasonably generalise to most of Northern and Central Italy, which shows similar economic conditions and educational levels.

³ The financial need is measured by an *ad hoc* index called ICEF (Indicator of the Family Economic Condition) which summarises the income and assets of each family using a scale of equivalence that is similar to that used by the OECD. However, since it considers family members' assets as well as income, the interpretation of this indicator is far from straightforward. Since sixty percent of the median income in the Province of Trento is around € 8,300. A family with an ICEF of € 30,000 is therefore well above the poverty line.

The underlying idea of policymakers in setting the Grant 5B was to provide financial support to deserving students who are willing to attend university but unable to do so because of liquidity constraints. Therefore, the Grant 5B was aimed at covering the opportunity cost of going to university (i.e., what they would have earned if they worked instead of studying), rather than the direct costs (i.e., accommodation, tuition fees) that were meant to be covered by the Right to Education.

Once awarded for the first year, the scholarship can be renewed for the two subsequent years for Bachelor's, or five in the case of single-cycle courses, thus covering the entire expected duration of the course, but no longer than that. To be eligible for each renewal, students must demonstrate that family income is still below the threshold and that they have achieved a minimum of ECTS credits⁴, usually at least 85% of those expected for that course, amounting to more than 50 credits per year. In terms of renewal, there is no requirement regarding the grades achieved by students during the course.

3. Prior research and implications for the impact of the Grant 5B

3.1. Theoretical framework

The classical theoretical framework for analysing the impact of financial aid on university participation and performance is the model of human capital investment (Becker, 1964). According to this theory, students decide to invest in themselves through education which can generate future returns. This leads students to enrol at university if the perceived benefit of HE participation is greater than the associated (direct and indirect) costs. By reducing these costs, financial aid should, therefore, boost university participation.

To ensure the returns on the investment made in education, students may also put more time and effort into their studies throughout the duration of their degrees. If this is the case, financial aid should have a positive effect on students' time allocation, especially for those from low-income families. The monetary transfer could save them from financing their studies through

⁴ A credit system is in place in Italy to facilitate mutual recognition of degrees. The credits represent the student's total workload (class time, individual study, exam preparation, practical work, etc.) and are earned once the student has passed each individual exam, assignment, or activity required by their programme of study. The average full-time workload for one academic year is usually 60 credits, which is equivalent to 1,500 hours of work. However, the teaching regulations of each university can provide for regular reassessment of credit allocation and indicate the minimum number of credits that must be achieved each year.

occasional or part-time jobs and allow them to spend more time studying (Broton *et al.*, 2016). Hence, they could perform better at university: reducing the risk of drop-out (particularly high during the first year), improving their grades, and progressing smoothly towards graduation.

As stressed by Castleman and Long (2016), however, there is also another potential mechanism through which a reduction in the costs associated with university attendance could impact academic performance. According to the dynamics of capital accumulation (Heckman, 2006), financial aid may incentivise progression to university for students with lower academic readiness. These students may not be well-suited to pursue a university education, resulting in lower average university performance, such as higher drop-out rates, lower performance throughout the course, and delays in completing their studies.

3.2. Empirical studies

The empirical literature does not provide a definitive answer on which of these contrasting theories on the impact of financial aid on performance at university prevails. Most of the literature is, in fact, aimed at evaluating the effect of financial aid on university participation (Herbaut and Geven, 2020). It is only in recent years that, as Bettinger (2015) notes, the increase in drop-out rates has shifted policymakers' and researchers' attention, from participation to performance and completion. The road to completion is, indeed, paved with many challenges. For example, the transition from upper secondary school to university implies a substantial change in workload, in the organisation of study and in relationships with peers and lecturers that may lead to poor performance and drop-out.

The first generation studies assessing the role played by financial aid in shaping academic performance date back to the early 2000s. In the US context, there is a wider consensus about the positive and remarkable effects of financial aid on academic performance. Using data from thirteen US states, Dynarski (2005) found that merit programmes increase college completion by 3 to 4 percentage points. This result is quite remarkable, given that the share of the affected population with a college degree was about 26%. Cornwell *et al.* (2003) analysed the case of the HOPE programme in Georgia (US) and found that the shift from need- to merit-based aid increased the probability of withdrawing and reduced the average completed credits. Richburg-Hayes *et al.* (2009) studied a programme implemented in the New Orleans area showing how financial aid increases both the number of credits

earned and reduces the drop-out. A similar result was found by Miller *et al.* (2011) who showed preliminary results from a new programme established by the University of New Mexico. More precisely, they found that the intervention encouraged students to earn more credits, and that they were nearly 9 percentage points more likely to have gained 30 or more credits by the end of the first year. Using data from West Virginia, Scott-Clayton (2011) stressed how financial aid can also have a slight effect on GPA, but she did not find any influence on drop-out rates. These positive effects are confirmed by more recent findings focusing on the cases of Ohio (Bettinger, 2015) and Florida (Castleman and Long, 2016).

A different and more complex picture emerges from the empirical literature on European countries. Analysing the case of the University of Amsterdam, Leuven *et al.* (2010) found that financial aid had no effect on the number of credits earned or on the drop-out rate. Belot *et al.* (2007) exploited a major reform in the Dutch HE system to identify the effect of student support on academic performance and students' time allocation. They found that there is a small positive effect on grades (1.3%), but drop-out and time allocation (hours spent studying and working, and incidence of jobs on the side) remain basically unchanged. More recent papers argue that need-based scholarships exert a positive effect on reducing drop-out rates and on timely graduation in various European countries such as Germany (Glocker, 2011), France (Fack and Grenet, 2015) and Italy (Mealli and Rampichini, 2012; Facchini *et al.*, 2020; Modena, Rettore and Tanzi, 2020). A recent study on nine universities in England (Murphy and Wyness, 2023) also found a positive impact of financial aid on the probability of graduating with a good degree outcome.

3.3. Implications for our study

From the theoretical and empirical literature, it is, therefore, difficult to anticipate whether financial aid and, more specifically, the Grant 5B can impact university performance and timely completion and, if so, how.

Following the human capital investment theory (Becker, 1964; Castleman and Long, 2016) it could be argued that generous financial aid aimed at covering indirect costs of studying rather than working could make students less likely to do occasional and part-time jobs during their degrees, so that they would have more time devote to studying. In turn, this would translate into better performance and, especially, greater likelihood of graduating within the expected duration of the course, beyond which the monetary aid would

no longer be provided. Hence, a potential scenario is that the leading effect of the Grant 5B is timely progression towards the completion of the course, translating into a larger number of credits earned throughout the course to ensure timely graduation. This would not necessarily lead to an impact on students' grade point average throughout the course, given that this is not linked to eligibility, but it may reduce the risk of drop-out. An effect could also be found on the number of hours worked if most students eligible for the Grant 5B were from low-income families, but this is not obvious given that not only very low-income families are eligible.

Previous findings on the impact of the Grant 5B showed that it had no effect on boosting enrolment rates, but it crucially had an impact on changing students' choices regarding the chosen field of study and its location (Vergolini and Zanini, 2015). Students tended to move further away from home and to enrol in degrees such as Medicine, Dentistry, Veterinary Science, and Architecture. These are usually connected to higher labour market outcomes and considered more demanding courses, some of which are single-cycle and last 5 or 6 years. As per the dynamic of capital accumulation (Heckman, 2006), an alternative potential scenario could, therefore, be that generous financial aid prompts students to take higher risks. This would translate into choosing fields of study for which they could be potentially less suited, leading them to struggle academically. This would possibly force them to study longer hours, thus reducing the need to have an occasional or part-time job, whose earnings could be covered by the scholarship anyway. The additional effort may, in any case, not be enough to compensate for the higher risk associated with studying for a more demanding degree, leading them to perform less well throughout the course and to achieve lower academic results. In turn, this could lead to a higher risk of drop-out, as well as to taking longer to graduate.

4. Empirical strategy

To identify and estimate the impact of the Grant 5B on university performance it is possible to exploit its eligibility criteria. The Grant 5B is awarded on the basis of merit and financial need. The ICEF indicator of financial need is not available for all students, but only for those who applied for some form of means-tested benefits. This means that well-off students tend to be under-represented among those with an available ICEF. We therefore condition the analysis on the subpopulation of students falling below the income threshold. This allows us to exploit the discontinuity around the merit threshold using a *Regression Discontinuity Design* (RDD).

The assumption underlying RDD is that, since small changes in the assignment variable (i.e., final score in this case) do not have any significant impact on students' behaviour, it is possible to compare those immediately below and just above a given threshold. Those with a final score of 93/100 are essentially the same as those with a final score of 92, except for being eligible for the Grant 5B. In this sense, RDD can be considered a local randomised experiment.

To estimate the effect of the grant, we adopt a flexible specification of OLS regression (Lee and Lemieux, 2010):

$$E(Y|Z, X) = \alpha + \beta \cdot Z + f(\gamma \cdot X + \delta \cdot [Z \cdot X])$$

where Y represents the outcomes (drop-out status, GPA, etc.); Z is the eligibility status; X is the final score at the *esame di maturità* that has been centred around the threshold (to set the threshold at 0); and f is a polynomial function of X .

Although adding covariates could improve the precision of the estimates, we decided not to include other covariates in the specification to avoid losing cases due to listwise selection. It should be stressed that, although potentially useful to capture variability in the observed data, in a RDD setting covariates are not needed for the identification of the causal impact. We opted for a second-degree polynomial after an inspection of the relationship between the final score and the various outcomes. We also restricted the window of observation to consider only those students with a final score above 85 to have a symmetric observation window around the threshold.

In the sharp RDD set out above, the policy parameter of interest is given by β , which represents the intention-to-treat effect (ITT). In the case at hand, however, β is not the true effect we are after, namely, being a recipient of the Grant 5B. This is because there is a sizeable fraction of eligible students who did not apply for the Grant 5B. The proportion of students eligible for the Grant 5B who we were not in receipt of it was nearly 25% for the first cohort and 16% for the second. To take this into account, the true effect of the Grant 5B on the recipients can be estimated via instrumental variables. Here we use a two-stage least-squares which returns an estimate for the so-called local average treatment effect (LATE), which is the average impact of the treatment on the compliers. In the case at hand, LATE is the impact of being a recipient of the Grant 5B for at least one year and can be interpreted as the ratio between ITT and the proportion of eligible students who were actually in receipt of the Grant 5B:

$$LATE = \frac{E(Y|Z = 1, X) - E(Y|Z = 0, X)}{E(D|Z = 1, X) - E(D|Z = 0, X)}$$

where D is a dummy variable denoting the recipient status indicator ($D = 1$ for recipients of the Grant 5B for at least one year, and $D = 0$ otherwise). LATE is estimated via instrumental variables, using Z as an instrument for D .

The underlying assumption for the RDD estimates to be valid is that the final score was not manipulated, that is, students being awarded a final score of 93 to allow them to become eligible. We implemented the so-called McCrary test (McCrary 2008) and found that the grade distribution is smooth around the merit threshold, without any discontinuity at 93. This suggests that there is no manipulation of the final score (results are available upon request).

It is worth mentioning that a possible threat to the identification strategy arises when the Grant 5B affects the probability of enrolment at university. Indeed, as pointed out by Bettinger (2004) relying on outcomes conditional on enrolment would lead to a parameter that combines two different effects: i) the effect of the Grant 5B on the performance of students who would have attended university in the absence of the Grant 5b and ii) the effect of the Grant 5B on the performance of students who would not have attended university without the Grant 5B. This is not a threat to our identification strategy, given that it was shown that there was no impact on enrolment rates for the first cohorts eligible for the Grant 5B (Vergolini and Zanini, 2015).

5. Data and descriptive evidence

The data used in this paper is the result of the linkage between administrative records and survey data. The information about the eligibility criteria of the Grant 5B's recipients comes from administrative archives. More precisely, the final mark at the *esame di maturità* has been supplied by the local school authority; the income and asset indicator (ICEF) comes from Clesius, the agency in charge of the computation of this index for all means-tested programmes implemented by the local government; information about Grant 5B's recipients has been supplied by the Opera universitaria, the agency in charge of the administration of the programme⁵. We rely on survey data to collect information about the outcomes and socio-demographic characteristics.

⁵ Unfortunately, we do not have access to information regarding the renewal of the grant. This means that we do not know whether some students lose the grant during their studies. For this reason, we analyse the impact of having received the grant at least for one year.

We administered a baseline survey in November to all students who had successfully completed high school in July of the same year: the prospective freshmen in the following academic year. Since in Italy the deadline for university enrolment is in late September, we were able to know whether each student was enrolled at university or not, as well as collect information about socio-demographic characteristics, social origins, and prior schooling.

Tab. 1 – Data collection plan, sample size and response rates

	2009	2010	2011	2012	2013
First cohort	Baseline survey	1 st FUS	2 nd FUS	3 rd FUS	
	2,733 (84%)	1,784 (93%)	1,657 (87%)	1,575 (82%)	
Second cohort		Baseline survey	1 st FUS	2 nd FUS	3 rd FUS
		2,656 (81%)	1,790 (94%)	1,714 (90%)	1,627 (86%)

After the end of the first, second and third academic years, in October, we contacted all respondents who had enrolled at university for three follow-up surveys (FUS). This allowed us to collect information on time allocation, whether they were still attending university (meaning that only for those studying for a three-year degrees it was possible to know if they had completed their course), their GPA, and the number of credits earned. Table 1 displays the data collection plan and reports the number of respondents in each survey and the corresponding response rate.

In this way we built a rich panel dataset that allows us to study the effects of the Grant 5B on self-reported drop-out rates, GPA⁶ and number of credits earned at the end of the first, second, and third years as well as the number of hours dedicated to study and work, and timely graduation (for Bachelor’s only). Descriptive statistics for the outcome variables are reported in Table 2, for students with an equivalent income below € 30,000.

In reflecting on the potential impact of the Grant 5B (section 3), we discussed how eligibility for the financial aid may influence some students to take more risks and choose a more demanding course, with potential consequences for their university performance. The data available doesn’t allow us to determine students’ suitability for the degree course chosen, nor its demand. It does, however, allow us to distinguish students studying towards

⁶ GPA in the Italian Higher Education system ranges from 18 to 30; scores below 18 indicate a failed exam. Different exams may earn students a different number of credits. GPA has been weighted by the number of credits awarded by each passed exam.

a 3-year degree (Bachelor’s) from those enrolled in a single-cycle degree (duration of 5/6 years). We conduct the evaluation analysis separately by degree duration to try and capture (some of the) differences between the two groups of students. It should be noted that the number of students enrolled in a single-cycle degree is relatively small (155 in 2009 and 129 in 2010), limiting the statistical power of our analysis. This also means that in interpreting the findings of our study, we have to carefully consider the size of the effect and not only its statistical significance.

Tab. 2 – Descriptive statistics for outcome variable, by group of students

	<i>Below income & below grade</i>		<i>Below income & above grade (eligible non-compliers)</i>		<i>Below income & above grade (treated)</i>	
	<i>Mean</i>	<i>SE</i>	<i>Mean</i>	<i>SE</i>	<i>Mean</i>	<i>SE</i>
Drop-out (1 st year)	0.176	0.010	0.158	0.049	0.086	0.020
Drop-out (2 nd year)	0.145	0.009	0.076	0.037	0.045	0.017
Drop-out (3 rd year)	0.249	0.013	0.159	0.056	0.122	0.030
Credits (1 st year)	35.300	0.551	43.180	2.739	48.780	1.213
Credits (2 nd year)	82.430	1.021	93.740	4.910	104.900	2.032
Credits (3 rd year)	134.40	1.415	151.400	6.195	161.300	2.643
GPA (1 st year)	24.140	0.102	25.720	0.590	25.840	0.311
GPA (2 nd year)	24.620	0.083	26.650	0.264	26.800	0.169
GPA (3 rd year)	24.900	0.082	26.360	0.613	26.960	0.158
Avg. hours studied	32.000	0.408	36.320	2.321	36.820	1.161
Avg. hours worked	5.100	0.277	3.000	1.203	2.270	0.520
Timely graduation*	0.190	0.013	0.240	0.072	0.440	0.048

* Timely graduation is only available for Bachelor’s students.

6. Empirical results

The main results of our study are summarised in Tables 3 and 4, for Bachelor’s and single-cycle degrees respectively. The impact of the Grant 5B on the two groups of students is presented in turn, reporting both ITT and LATE, although focusing on the latter.

Starting from Bachelor’s students, the most striking finding pertains the positive, fairly large, and statistically significant (at the 0.10 level) effect on timely graduation. Grant 5B recipients were, on average, 44 percentage points more likely to complete their university course than their counterparts who were not entitled to the financial aid. This result is consistent with the

large, albeit not statistically significant, findings related to the number of credits earned throughout the course. Students in receipt of the Grant 5B earned 12 and 25 additional credits in the first and third years respectively, amounting to 20% and 40% more exams taken.

Tab. 3 – Sharp (ITT) and fuzzy (LATE) RDD parametric estimates of the treatment effect on academic performances, time use and timely graduation – Bachelor's degrees

	ITT	SE	LATE	SE	N
Average hours studied	-5.926	(5.591)	-7.681	(7.325)	341
Average hours worked	1.923	(3.842)	2.487	(5.001)	340
Drop-out – 1 st year	-0.234	(0.155)	-0.307	(0.208)	389
Drop-out – 2 nd year	0.0763	(0.132)	0.0961	(0.168)	336
Drop-out – 3 rd year	0.0908	(0.173)	0.0984	(0.186)	247
GPA – 1 st year	-0.171	(1.040)	-0.221	(1.329)	360
GPA – 2 nd year	0.866	(1.156)	1.125	(1.518)	319
GPA – 3 rd year	2.283	(2.564)	2.740	(3.060)	307
Credits – 1 st year	9.144	(8.885)	12.00	(11.641)	387
Credits – 2 nd year	-5.034	(16.777)	-6.526	(21.706)	320
Credits – 3 rd year	20.75	(23.417)	24.81	(27.830)	306
Timely graduation	0.426*	(0.233)	0.440*	(0.241)	212

Note: ITT estimates have been obtained through OLS estimator, while LATE estimates by means of instrumental variables through a 2SLS estimator. All the models have been restricted to the subsample of students with final score ≥ 85 . Levels of significance are reported as follows: * $p < 0.10$.

This is an important finding: it suggests that financial aid may incentivise smooth progress towards the completion of the course. The impact of the Grant 5B started from the beginning of the course and continued throughout, leading Bachelor's students to complete their exams during the third year, as expected. Ultimately, this significantly increased the likelihood of graduating on time, thereby avoiding the possibility of remaining at university after losing entitlement to financial aid.

The findings on credits earned and timely graduation are in line with those on drop-out rates. Table 3 shows that Grant 5B recipients had a 30-percentage-point decrease in the probability of leaving university by the end of the first year, though this was partly compensated by an increase in the second and third years. The findings on GPA are very small and not statistically significant, ranging from -0.2/30 in the first year to 2.7/30 in the third year. This could be interpreted as indicating that the positive impact on progression through the course and its completion does not negatively

affect the quality of learning and, therefore, the exams results achieved throughout the course.

The final set of outcomes on Bachelor's students concerns the time spent studying and working during the course. For both dimensions, the estimates of the ITT and LATE show that there is no significant impact of the Grant 5B.

Moving to single-cycle students, findings are somewhat different from those presented above for Bachelor's. The most relevant result was found for the number of credits earned. The impact of the Grant 5B in this case is negative and fairly large, especially from the second year, although only the ITT is statistically significant. This could be an indication that students eligible for the Grant 5B and taking longer (hence more challenging) degrees might not have been able to cope with the demand of the course they chose.

This could be coherent with the impact on drop-out rate. Despite being not statistically significant, our results show that the financial aid had a negative and sizeable impact on the probability of leaving university for single-cycle students, at least in the third year. Recipients of the Grant 5B were 34 percentage points more likely to drop out than their counterparts who were not eligible. Findings for GPA are not statistically significant and small in size.

Tab. 4 – Sharp (ITT) and fuzzy (LATE) RDD parametric estimates of the treatment effect on academic performances, time use and timely graduation – Single-cycle degrees

	ITT	SE	LATE	SE	N
Average hours studied	8.943	(8.102)	15.77	(15.826)	107
Average hours worked	-5.634	(4.987)	-9.932	(9.306)	107
Drop-out – 1 st year	-0.003	(0.042)	-0.004	(0.071)	125
Drop-out – 2 nd year	-0.038	(0.040)	-0.123	(0.165)	103
Drop-out – 3 rd year	0.129	(0.310)	0.341	(0.762)	99
GPA – 1 st year	1.407	(1.695)	2.432	(2.970)	121
GPA – 2 nd year	0.379	(1.735)	1.170	(5.041)	101
GPA – 3 rd year	-0.615	(1.183)	-1.624	(3.658)	98
Credits – 1 st year	-12.44	(9.054)	-21.73	(15.866)	124
Credits – 2 nd year	-55.60***	(17.324)	-161.9	(105.470)	99
Credits – 3 rd year	-37.22*	(22.058)	-143.9	(172.774)	92

Note: ITT estimates have been obtained through OLS estimator, while LATE estimates by means of instrumental variables through a 2SLS estimator. All the models have been restricted to the subsample of students with final score ≥ 85 . Levels of significance are reported as follows: *** $p < 0.01$; * $p < 0.10$.

Students enrolled in a single-cycle degree (see sub-section 2.1) are excluded from the timely graduation outcome, because graduating in three years is impossible for them.

Interesting results are those pertaining to the behaviour of students during their time at university. Even if the estimates are not statistically significant, for single-cycle students there is an increase in the time devoted to study of about 9 hours per week and a reduction in the amount of time spent working of 5.6 hours per week.

This may suggest that students taking single-cycle degrees put more effort into their studies, something that can be facilitated by the monetary transfer that lessens the need for an occasional/part-time job. However, this was not enough to enable them to cope with the additional learning required. It may be that we are observing the misplacement discussed in the theoretical section. Students eligible for the Grant 5B may be more inclined to take risks in relation to the choice of their degree, leading them to take on more demanding and longer courses. As a result, however, those taking this risk may end up struggling academically.

It should be stressed that with our data we were able to observe students only for the first three years of degrees that require five or six years to complete. It is, therefore, possible that these students caught up with their studies later on, although the amount of credits lost at the beginning of their courses might have hindered their eligibility to receive the monetary aid. In any case, it has to be noted how the impact of the Grant 5B may vary, depending on the type of degree undertaken.

7. Conclusions

The aim of our empirical evaluation of the Grant 5B on students' academic performance based on a fuzzy RDD was twofold. On the one hand, to contribute to the literature on the impact of financial aid to students. On the other, to provide evidence-based policy recommendations on the design of this kind of interventions.

There are two main findings from our study. First, the positive and fairly large impact of the Grant 5B on students' progression towards completion of their Bachelor's, ultimately increasing the likelihood of graduating on time. Secondly, among students taking single-cycle degrees, lasting longer and therefore more challenging, Grant 5B recipients earned substantially fewer credits and displayed a higher risk of drop out, despite spending more hours studying rather than working. These results show that need- and merit-based financial aid can have the intended effect, i.e. providing students with the support needed to enable them to focus on their studies rather than working.

For some students, those taking a Bachelor's degree, this translates into better performance at university, at least in terms of progression throughout the course and timely graduation. In Italy, large delays in graduation have been well documented in the past (Aina *et al.*, 2011), therefore the impact of the Grant 5B on timely graduation should be considered a successful result. This is likely because the entitlement to the cash transfer was only set to last for the expected duration of the course. This suggests that aspects of the policy design, in this case its duration, are key in influencing the behaviour of its recipients and in achieving the intended aims.

For students taking a single-cycle degree, however, findings are quite different. Although financial aid may yield an impact on how they spend their time and effort, this does not necessarily lead to better academic results. Rather, these students seem to struggle academically, hence suggesting that the Grant 5B may have had a counterproductive impact. Prior evidence on the impact of the Grant 5B on progression to university (Vergolini and Zanini, 2015) showed that there was no effect on enrolment rate, but that students were more inclined to move away from the local university and enrol in longer and more challenging courses. It is possible that these students who were enabled by the financial aid to take riskier choices when choosing their courses, did so at the expense of their performance at university.

In interpreting these findings, we have to consider the limitations of our study. These are mostly linked to data availability. We have used the duration of the degree course chosen as a proxy for the level of demand and workload placed on students. Although this proved to be a simple yet effective approach, it remains a rough categorisation that may confound some of the findings. Having followed students only for three years, we do not know how students taking single-cycle degrees performed in the last part of their courses and, crucially, whether they graduated on time. Furthermore, the Grant 5B was targeted to a relatively small number of students. This has implications for the statistical power of our analysis, which may result in flagging as statistically significant only very large effects. Finally, the Grant 5B was introduced for the residents of the province of Trento, a relatively small and relatively well-off area in the north-east of Italy. Our findings should, therefore, be interpreted and generalised with a degree of caution.

Although our study does not offer a definitive response on the causal link between financial aid and students' academic performance, it does provide evidence that different students may react very differently to monetary transfers, thus proving that different theories can co-exist. Those students who are not influenced by financial aid in their choice of university course react according to the human capital investment theory (Becker, 1964; Castleman

and Long, 2016). For those students who make riskier choices in terms of course of study, it is the dynamic of capital accumulation (Heckman, 2006) that seems to prevail.

This could explain why previous studies found very mixed results. Crucially, it shows that the study of the impact of financial aid on academic performance cannot be completely disentangled from its impact on enrolment choices. It also points in the direction of a potential trade-off between the positive effects on enrolment choices and on performance, which should be investigated further, both from a policy development and research perspective. To mitigate the risks of negative unintended consequences of financial aid, even if only on some groups of students, controls should be put in place. This may entail pairing interventions like the Grant 5B with other initiatives, such as guidance programmes or clear communication campaigns that explain the intended and unintended consequences of financial aid based on robust empirical evidence.

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