Literature Review on Financial Aid to University Students

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Abstract: How does financial aid affect students' behaviour and outcomes? This literature review highlights the documented effects of financial aid to university students on short-term and long-term outcomes, with a particular focus on the difference between grants and loans, and the role of students labour market participation.

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1 Introduction

High school graduates do not enrol in higher education for two main reasons: (i) the cost of college, both monetary – tuition fees, books, foregone earnings – and non-pecuniary, is higher than the expected returns; (ii) the cost of college is lower than the expected returns, but the potential student faces liquidity constraints that make it impossible for her to cover the monetary cost. Hence, financial aid can increase academic enrolment and achievement by (i) lowering the price of college and making in worthwhile for students who would not have enrolled otherwise, (ii) lifting credit constraints for people who want to enrol but are not financially able to. While most governments would point to the credit constrained group as the obvious reason to have financial aid, as long as an educated population produces positive externalities, lowering the price of college can be worth doing also when credit constraints are not important. The economic literature on financial aid is very aware of the difference between credit constraints and price effect, and many of the papers in this review also provide evidence on whether students are credit constrained. Earlier literature finds that borrowing constraints in the US exists and are large, but they do not matter for college attendance decisions (Cameron and Heckman, 1998; Cameron and Taber, 2004), or college graduation (Keane and Wolpin, 2001). Johnson (2013) confirms that estimated borrowing limits for students are large, but that eliminating them would increase college completion rate only by 8%. Belley and Lochner (2007) and Lochner and Monge-Naranjo (2012) argue that the increase in college costs and returns to higher education over the past two decades have pushed more youth against their borrowing limits, and that American youth is more constrained now than in the 1980s. In many cases it is difficult to assess which students respond to financial aid because of credit constraints, and which respond to the price effect. Brown et al. (2012) implement a novel method to test for borrowing constraints, and find evidence for borrowing constraints. Stinebrickner and Stinebrickner (2008) ask directly about credit constraints the students of Berea College in a survey questionnaire, and report that 20% of the surveyed students would like to borrow more; many other papers use the socioeconomic status of the family, or the asset owned by the student or their families, as proxies. In Denmark, Humlum and Vejlin (2013) estimate the effect of a conditional cash transfer to high school students and find that, when students receive a higher transfer, they reduce labour market work, and that this effect is higher for low-income families. This means that high school work is, at least in part, motivated by consumption, and that some young Danes are credit

constrained. Nielsen et al. (2010) find that an increase in grants to university students has a small but significant effect on enrolment due to credit constraints. The effect is smaller than found in the literature, which points to borrowing constraints not being important in Denmark, due in large part to the substantial subsidies to education already in place.

The overwhelming majority of studies on financial aid are US-based¹. The US higher education system is, however, extremely different from the Danish one. In the US there are many types of institutions – universities, 2- and 4- years colleges, for profit and non for profit – and a high variance of prices. Most students in US institutions do not pay the advertised sticker price, but benefit from a large variety of financial aid opportunities that can be either need-based or merit-based: grants, scholarships, tuition waivers, and more or less subsidised loans. Financial aid programs can be federal and apply to every student in the country conditional on need, they can be state specific, or even institution specific: universities themselves run aid programs for their students². The majority of these aid programs are conditional on the student having filled a financial aid form (FAFSA) together with their applications, that has been shown is a relevant fixed cost to enrolment (Hoxby et al., 2013; Bettinger et al., 2012; Dynarski and Scott-Clayton, 2013).

Many of the issues and questions important for the US system do not apply in the Danish context. In Denmark all universities are public and tuition costs are fully subsidised by the government, financial aid is available to all students with little need- and merit- requirements, and is almost completely covered by one government-run program. In the following literature review I will go through all the main strands of the financial aid literature, but I will highlight topics and papers that are most relevant for the Danish context. I will also have a bias toward the few European studies, since most European higher education systems are closer to the Danish one than the most widely studied US one. Moreover, clean identification strategies

¹See Dynarski and Scott-Clayton (2013) for an overview of the US financial aid system and economic literature that studies it.

²Examples of state specific aid programs are the need- and merit-based California CalGrant (Kane, 2003; Bettinger et al., 2016), the DC Tuition Assistance Grant, granted to all DC residents to attend institutions in DC, Maryland and Virginia (Kane, 2007; Abraham and Clark, 2006), the need-based Florida Student Access Grant (Castleman and Long, 2016), and the merit-basedFlorida Bright Futures scholarship (Castleman, 2014), the merit-based Georgia HOPE program (Dynarski, 2000, 2008; Sjoquist and Winters, 2012, 2015; Cornwell et al., 2006, 2005), the merit-based John and Abigail Adams Scholarship Program in Massachussetts (Goodman, 2008; Cohodes and Goodman, 2014), the Tennessee State merit aid program (Pallais, 2009; Ness and Noland, 2007), the Texas merit aid program (Jackson, 2010), the Buffett Scholarship in Nebraska (Angrist et al., 2017), the Wisconsin Scholars Grant (Goldrick-Rab et al., 2011), the West Virginia PROMISE Scholarship (Scott-Clayton, 2011b; Scott-Clayton and Zafar, 2016). Other studies exploit University specific grants such as the Harvard Financial Aid Initiative (Avery et al., 2006), and the AccessUVa (Tebbs and Turner, 2006), or other anonymous universities (Van der Klaauw, 2002; Deming and Walters, 2017).

are uncommon in studies of financial aid, as well as truly representative samples. Local effect or studies with homogeneous samples are common. In the following sections, I will highlight studies that have the most convincing identification strategies or the populations and financial instruments more interesting for Denmark.

In Europe, the Nordic countries have the most similarities in terms of financial support to university students, with free college and government-run universal grants and subsidised loans. The details of the programs differ country to country, but the main structure is very similar. Because of that reason, studies that are based in the Nordic countries are of particular interest for policymakers in Denmark. I will list here the studies that I am aware of for ease, and I will go into more detail in the relevant sections. For Denmark, two studies exploit the financial aid reform of 1988 with the goal of estimating the effect of student aid on enrolment – and presence of credit constraints – (Nielsen et al., 2010), and on dropout and completion (Arendt, 2013). The structural models in Joensen (2013a,b) study the dynamics of university-to-work transitions, Joensen (2013b) studies the impact of study aid on timing-to-graduation, and Joensen (2013a) studies the impact of student employment, abilities, and preferences on academic and labour market success. In Finland, Häkkinen and Uusitalo (2003) study the 1992 Finnish reform of financial aid, but their identification strategy doesn't allow them to disentangle the effects of the various reform pieces and of the strong increase in the unemployment rate in $1991-95^3$. Häkkinen (2006) studies the effect of student employment on earnings and employment rates after college. In Norway, Gunnes et al. (2013) study the impact of financial aid on time-to-graduation. Finally, in Sweden, Fredriksson (1997) and Reuterberg and Svensson (1994) study the determinants of enrolment in higher education and the impact of financial aid design. Avdic and Gartell (2015) study the effect of a substantial change to the incentive of working while studying introduced by the 2001 reform of Swedish financial aid. Joensen and Mattana (2017) use the same reform as quasi-experimental variation to estimate a rich model of student enrolment, work and student loan take-up in a stochastic dynamic environment. This last paper – together with Joensen

³Häkkinen and Uusitalo (2003) is limited by an identification strategy that cannot separate the effect of the reform from an increase in unemployment rate that happened around the same time. Most of the decline in time to degree can in fact be explained by the increase in unemployment rate that reduced students employment opportunities. Moreover the reform did not only reduce the duration of aid from 7 to 6 years, but also shifted the grant-loan composition. Before 1992 financial aid in Finland was composed by larger subsidised loans (€303 per month) and small grant (€108 per month) and housing supplement (€131 per month). The aid was awarded with small merit requirements of 15 credits in the first year and 20 in following years, and maximum student earnings of €504/m. In 1992 subsidised loans were abolished, and substituted by a state guarantee on market loans up to €202 per month. The grant was doubled to €264 per month and the housing supplement was increased to €149 per month.

 $(2013a,b)^4$ – overcomes the limitations inherent to very complicated financial aid systems, by using a structural model to disentangle the impact of different policy instruments on students' behaviour, allowing for policy simulations to predict the effect of future policy changes.

The rest of this paper is organised as follows: in Sections 2 and 3, I present evidence on the effects of financial aid on, respectively, college enrolment and academic achievement, highlighting the differences between need- and merit-based aid, turning to the evidence on performance based aid in Subsection 3.1, and, in Section 3.2, focusing on the allocation of time of students between studying and working and the incentives that are ofter present in financial aid; in Section 4 I highlight the main differences between grants and loans, focusing on the long term effects of graduating with student debt in Section 4.1; in Section 5, I conclude.

2 The effect of financial aid on enrolment

It is an established result in the financial aid literature that the availability of need-based financial aid increases college enrolment. Pre 1987 studies for the US, reviewed in Leslie and Brinkman (1988) suggest that a \$1,000 decrease in the net price of college is associated with a 3 to 5 percentage points increase in college attendance. McPherson and Schapiro (1991) confirm that most US studies find statistically and economically significant positive effects of cost reductions on college enrolment. The post 1987 literature largely confirms these results, as noted in Deming and Dynarski (2009): studies conducted using a variety of quasi-experimental identification strategies on various US need-based programs find that \$1,000 increase in grant increases the probability of attending college between 2 and 5 percentage points. These studies also tend to find that the higher responsiveness to financial aid is for students of low-socioeconomic status.

The most relevant paper on the effect of student aid on college attendance in the Danish setting is Nielsen et al. (2010). The 1988 reform in Denmark eliminated means-testing on parents and raised the level of grants by 25% for all students above 19 years of age. Nielsen et al. (2010) use the quasi-experimental variation caused by the reform, and a regression discontinuity design that compares students around the kinks in the means-testing formula, to estimate that the equivalent of a \$1,000 increase in grants increases enrolment by 1.35 percentage points. This is definitely in the lower end of the results found in the US literature, which is probably due to

⁴Other structural models of college education and financial aid not based on Nordic countries are Chatterjee and Ionescu (2012); Ionescu (2011, 2009); Heckman et al. (1998); Abbott et al. (2013); Lee (2005); Johnson (2013); Keane and Wolpin (2001); Caucutt and Kumar (2003).

the fact that Danish students are credit constrained at a lower extent than US students, and to the fact that Danish students are more likely to enrol in college than US students, which means that less students are at the margin of enrolment. Moreover Denmark – and in various degrees all of Europe – has much larger subsidies to education: tuition is free and all financial aid is set to cover living expenses and consumption.

Another interesting setting within Europe is the UK, where in the past 20 years there has been a major overhaul of the financial aid system. The 2004 Higher Education Act, in particular, introduced an increase in tuition fees that went from £1,200 to £3,000 per year, abolished the means-testing on tuition fee, and introduced the possibility of deferring payment of tuition transforming it in a subsidised loan. These substantial changes were phased in in the 2006/07 academic year, while in 2004/05 they introduced maintenance grants of up to £1,050 per year, awarded to students with parental income below £22,5000. The maintenance grant amount was then increased to a max of £2,700 per year from the academic year 2006/07. On top of the grant, students have access to income contingent maintenance loans, that went from £4,000 to £6,000 in 2006/07. Dearden et al. (2014) compare students above and below the eligibility threshold, before and after the implementation of the 2004/05 reform in maintenance grants (but before the rest of the changes were phased in). They find that a £1,000 increase in grant led to a 3.95 percentage points in enrolment of low-income eligible students compared to the non eligible students.

In Germany, Baumgartner and Steiner (2005) finds that student grants have not significant effect on enrolment of low-income families⁵.

As noted in the introduction, the US financial aid landscape presents a wide variety of programs, both need-based and merit-based. Since the financial aid system in Denmark is universal and applies to all students, it is interesting to look at the results of US studies that have looked at nation-wide programs. The most important nation-wide need-based programs are the Pell Grants, and, until 1982, the Social Security Student Benefit (SSSB) program. Run from 1965 to 1982, the SSSB program paid for millions of students to go to college. Dynarski (2003) reports that, at the program's peak, 12% of young full-time college students were receiving these benefits. 18 to 22 year old children of retired, disabled, or deceased social security beneficiaries received monthly payments when enrolled full time in college. The average annual payment

⁵Using a different estimation strategy, Lauer (2000) finds positive effects of the federal students' financial assistance scheme (BAfoeG) on enrolment rates.

to the child of a deceased parent was \$6700 in 1980. When Congress voted to eliminate the program in 1981, this became one of the largest changes in grant aid for college ever to occur in the US. Dynarski (2003) examines the effects of aid on enrolment using the elimination of the SSSB program and a difference-in-difference analysis. She finds that college attendance among the affected group fell by more than a third after the grant program ended, suggesting that the availability of grant aid does in fact increase college enrolment rates above what they would be otherwise for students of lower socio-economic status. This result implies that \$1,000 of additional grant aid increases the probability of attending college by 3.6 percentage points.

The Pell Grants, introduced in 1972, are need-based grants are awarded to eligible students who are below a threshold of financial need. The effects of the introduction of Pell Grants are mixed: Hansen (1983), Kane (1994, 1995) exploit between state differences in tuition levels and financial aid, and changes in the Pell grant amounts and eligibility over the years, and find that while \$1,000 increase in tuition results in a decrease in enrolment of at least 5 percentage points, an equivalent increase in Pell Grants has no effect on college attendance. Marx and Turner (2015) confirm that Pell Grants have small effects on educational attainment. Turner (1998) suggests that Pell Grants might have crowded out school aid to low-income students, offsetting the effect on enrolment. Seftor and Turner (2002) look at the effect of Pell Grants on independent students, older students who are means-tested on their own income as well as their spouse's. They compare eligible and non eligible students before and after the introduction of Pell Grants and find that a \$1,000 in grant aid increases a 0.7 percentage points increase in the college attendance of older students. While the students in this analysis are older than the average Danish student (25 to 30 years old), this is one of the only instances outside of Scandinavia of a need-based aid program means tested on the student's own income and not on parental income.

Many papers look at the effect of financial aid on enrolment by using quasi-experimental variation given by the introduction of state-specific financial aid. This allows to compare eligible and non eligible students before and after the reform and across similar US states, as well as many clean regression discontinuity approaches that exploit eligibility rules. While many of these programs maintain more or less strong need-based characteristics, US state financial aid is increasingly merit-based. Moreover, state financial aid has also the goal of preventing brain-drain and encouraging high-skilled students to enrol at in-state institutions. Evidence from these programs is mixed and it depends on the specific design of the aid: while most programs

succeed in increasing the enrolment share, the do so by retaining in-state students who would have enrolled anyways, with no effects on the overall enrolment rate.

Overall this literature highlights the paradox of merit-aid: awards based on past achievement are likely to generate smaller gains in enrolment than awards made to applicants who appear to be less college-ready, merit-aid is in fact targeted to a high-skill, and ofter automatically high-income, population. Aid programs that are more selective might incur into upper bounds in the effect on enrolment because the ceiling has already been reached by that population. The evidence points to need-based grants having a larger effect on enrolment.

Fewer papers look at the effect of access to student loans on enrolment, and find strong effects. Solis (2017) estimates the causal impact of loan access on college enrolment using Chilean data and a discontinuity in eligibility for subsidised student loans. Student loans⁶ are available to students belonging to one of the four poorest income quintiles, and who score above a certain threshold in the national college admission test. Solis (2017) finds that access to student loans eliminate the large gap in enrolment rates between students from different family income quintiles: access to student loans results in a 100% increase in probability of college enrolment relative to the group with test scores just below the eligibility threshold. Gains are largest for students from the lowest family income quintile: access to loans leads to a 140% increase in the probability of immediate enrolment, relative to a 15% baseline enrolment rate just below the cutoff. Gurgand et al. (2011) exploit the eligibility threshold of a South African program that provides short- and medium-term loans (12-24 months) to cover university tuition for middle to upper-middle income household who are not eligible to means-tested state loans, and have a high credit score. Despite these not being very good loans – they are not subsidised and need to be repaid while studying, they require a guarantor or a monthly salary at least 4 times the size of the instalments – Gurgand et al. (2011) find that access to them increases enrolment 20-25 percentage points, equivalent to 50% of baseline enrolment. Canton and Blom (2004) study a student loan program implemented at private universities in Mexico since 1997 for low-income

⁶Two types of loans are available with the same eligibility criteria: the Traditional University Loan Program covers 25 universities, while the State Guaranteed Loans cover all 44 higher education institutions. TULP loans cover up to reference tuition cost, i.e. 90% of actual tuition, on average \$3,600, while the median family income is \$9,000. For the TULP, the real interest rate is 2% and students have a maximum of 15 year for repayment after which the debt is written off. Repayment starts 2 years after graduation and it is income contingent with an income rate of 5%. The SGL are additional state guaranteed loans provided by banks, and can cover the excess tuition not covered by the TULP. They consist in standard market loans with a 6% interest rate, a more serious repayment collection that includes payroll extraction, and annuity repayments that start 18 months after graduation and lasts 20 years. In case of drop-out the SGL are guaranteed by the higher institution or the government.

high-skill students. Loan eligibility and amount depends on the student's economic need factor and on the availability of collateral. Using a regression discontinuity approach, they estimate that access to loans increases enrolment by 24%.

In the United States, Dynarski (2002) finds that an increase of \$1,000 in Stafford loans, federal subsidised loans available to students in need, increases college attainment by 1.7 percentage points for students from households who own housing equity. This can be interpreted as evidence of a price effect, since families who own equity are by definition not credit constrained.

3 The effect of aid on academic achievement and beyond

We don't only expect access to financial aid to increase enrolment into college, but also to improve academic achievement – in terms of persistence, grades, courses completed, graduations and time-to-graduation – and outcomes beyond college – i.e. income, welfare, happiness. Overall, the evidence points to aid having positive effects on achievement, but the design is important.

Scott-Clayton and Zafar (2016) find that recipients of the merit-based West Virginia PROMISE scholarship are more likely to earn a graduate degree, more likely to own a home and live in higher-income neighbourhoods, less likely to have adverse credit outcomes, and are more likely to be in better financial health than similar students who did not receive the scholarships. This effect comes from reductions in time-to-degree rather than reduced debt upon graduation. Brodaty et al. (2013) provide evidence that French individuals with longer than average time-to-graduation have significantly lower wages and employment rates in their early career. In Denmark, Arendt (2013) analyses the 1988 reform that eliminated means-testing on parents and raised the level of grants by 25% for all students above 19. He focuses on students enrolling no more than 2 years after graduating high school, and finds that the reform decreased dropout rates in the third and fourth year of study by 45%, especially for low-socioeconomic status students, but he finds no increase in early completion rates. His results suggests that students reacted to the cost reduction by staying enrolled longer, but not necessarily by graduating more: aid can increase time-to-graduation if consumption value is a dominant factor in the choice of study duration. Garibaldi et al. (2012) exploit discontinuity thresholds in parental income in the tuition schedule at Bocconi University in Italy and find that an increase of \pounds 1,000 in tuition decreases the probability of late graduation by 5.2 percentage points.

Arendt (2013) and Garibaldi et al. (2012) among others find that a reduction in the cost of college increases time-to-graduation, however the timing of the cost reduction can help reduce this effect. Gunnes et al. (2013) find that a reduction in cost conditional on graduation (in terms of a conversion into grants of approximately \$3,000 in loans in Norway) decreased time-to-graduation by 0.8-1.5 semesters and increased on-time graduations by 3.8 percentage points. Between 1998 and 2005 several German states introduced a tuition of \in 500 to \notin 900 for students who delayed graduation beyond 4 semesters after the standard period, while everybody else paid no fee. Kifmann et al. (2006) show preliminary results that find ambiguous effects but seem to point to a reduction in time-to-graduation. Similarly, Häkkinen and Uusitalo (2003) show suggestive results that a reduction in the maximum number of months of student aid in Finland in 1992 reduced time-to-graduation. Joensen (2013b) finds that increasing grants increases the duration of enrolment. She runs policy simulations aimed to decrease time-to-graduation without decreasing the grant, and she finds that providing timely graduation bonuses, and backloading of student aid would have the desired effect.

In the US, Bettinger (2004) provides suggestive evidence that the availability of Pell Grants reduces drop-out and improves college persistence and completion. In her study on the SSSB program, Dynarski (2003) finds that \$1,000 in grant aid increases by 0.16 years the completed schooling of high school graduates attending college. Additional papers offer evidence of positive effects on persistence and credits completed of state specific need-based financial aid (Castleman and Long, 2016; Goldrick-Rab et al., 2011). Evidence is mixed on the effect of merit-based aid: Dynarski (2008)⁷, Castleman (2014), Scott-Clayton (2011b); Scott-Clayton and Zafar (2016), and Bettinger et al. (2016) find positive effects of merit-based scholarship on academic achievement; while DesJardins and McCall (2014); DesJardins et al. (2010), Sjoquist and Winters (2012, 2015) find no effect⁸.

Turning to loans, Solis (2017) finds that access to student loans not only substantially increases enrolment into university, but also increases persistence and eliminates the income gradient in enrolment in the second and third years of college. For each student who enrols in the second(third) year of college without access to credit, 3.1(5.5) enrol when access to loans

⁷More recently, Sjoquist and Winters (2012, 2015) argue that the results in Dynarski (2008) are sensitive to choice of sample and calculation of standard errors, and in fact there is no effect of Georgia and Arkansas merit-based scholarship on college completion.

⁸Cohodes and Goodman (2014) even find negative effects of attainment of a scholarship waiving tuition at in-state public colleges for students at the top quartile of Math and English proficiency statewide. They find that students forgo college quality for a price decrease, to a degree that is not rational according to cost benefit analysis that suggests a lack of understanding of how much college quality affects college completion.

is available. In their study about student loans in Mexico, Canton and Blom (2004) find that students eligible to the loan program perform better: their GPA goes up by 0.17 on a 10 points scale.

Despite the evidence of positive effects of aid on academic achievement, however, financial aid alone will not keep the bulk of dropouts from leaving college, as the overall effects are small. Stinebrickner and Stinebrickner (2008) use novel survey data and find that, while half of the attrition for borrowing constrained students is attributable to credit constraints, only 20% of the students at Berea College reports to be constrained, which accounts for up to one fourth of the overall dropout rate. Berea college has a financial aid settings that make it more comparable to Scandinavia: direct costs of college attendance are zero, as the college offers a tuition subsidy and subsidies for room and board for all matriculating students.

3.1 Performance based aid

Much of the heterogeneity found in the effects of scholarships on attainment is explained by design differences in the target population, the eligibility requirements, and the requirements to keep the scholarship after the first year. For example, Cornwell et al. (2005) find that reception of the Georgia HOPE scholarship reduces the fraction of freshmen completing the full course load by 6 percentage points, while Scott-Clayton (2011b) finds that reception of the West Virginia PROMISE scholarship increased credits completed in the first three years of college. This is because the Georgia HOPE program has built-in an incentive to reduce the course load in order to increase the grade point average since scholarship retention is based only on GPA with no requirements for course load, while the West Virginia program links scholarship retention to both GPA and course load. This observation that students respond to incentives is explored in the literature of conditional cash transfers and performance based aid. I will not explore the general literature on conditional cash transfers here but focus on the papers that analyse the effect of performance-based incentives to college students. Performance-based incentives are found to be important in the design of financial aid systems.

A number of randomised experiments offer cash transfers or scholarships conditional to performance. The design of the experiments sheds some light on the incentives that are at play when scholarship eligibility or retention is tied to grades or course-load in college. De Paola et al. (2012) find that a cash transfer given to the best students at the University of Calabria has positive effects on achievement of high-ability students, and no effects on achievement of low-ability students, who might be discouraged by the requirements. Leuven et al. (2010) run a similar experiment at the University of Amsterdam but with absolute requirements instead of relative, the cash transfers in their experiment are conditional on passing all the first year courses. They find small and significant effect on pass rates and course credit points overall with positive effects only for high ability students. The requirement in this experiment was very strong (on average only 20% of the students would pass all the first year courses) and might have discouraged most students. Barrow et al. (2014) do a randomised evaluation of a performance-based incentive program in the New Orleans area that awarded payments of up to \$2,000 to low-income (below 200% of federal poverty line) first-year community college students who were also parents who enrolled at least half-time and maintained a GPA of C and above. The program also provided supplemental counselling services⁹. Treated students showed improvement in grades and courses completed, as well as persistence: eligible students were 15-18 percentage points more likely to stay enrolled in the second semester. There is evidence that performance-based aid has effects on the way students approach their work, and hence their attainment beyond the scope of the program: both De Paola et al. (2012) and Leuven et al. (2010) find evidence of dynamic spillovers for high ability students, who show better performance in subsequent years. Barrow et al. (2014) finds that treated students earned 37% more credit hours one year after the intervention.

3.2 Student employment

Overall, large amounts of hours worked by students seem to have a negative effect on persistence, graduation, and grades (Ehrenberg and Sherman, 1987; Kalenkoski and Pabilonia, 2010; Scott-Clayton, 2011a). Darolia (2014) implements different strategies to control for endogeneity in the relationship between working and academic achievement, and confirms that, while student grades are not harmed by marginal work hours, their credit accumulation decreases as they increase hours worked. Stinebrickner and Stinebrickner (2003) use a feature of the financial aid

⁹Academic support is important. In one example, Angrist et al. (2009) evaluate a randomised offer of academic services and incentives at one of the satellite campuses of a large Canadian university. All first year students starting with GPA below the upper quartile were randomly assigned to three treatments and one control groups: the treatment consist of (i) support services, (ii) cash incentives up to full year tuition conditional to improving the GPA over a threshold, and (iii) a combination of (i) and (ii). They find positive effects only for women assigned to the third group: students are more likely to use services when offered in combination with cash incentives, and women are more likely to use the services. In a similar – but better designed – experiment, Angrist et al. (2014) offer randomly selected students \$100 for every class passed with a grade above 70%, and additional \$20 for each additional percentage point. Treated students had also the option to interact with randomly assigned peer advisors from later years. While treated students increased their grades in the covered courses, it was not enough to improve significantly their overall GPA.

at Berea college to estimate the effect of working on academic achievement. Using variation in the student jobs assigned to Berea college first-year students as part of their aid packages, they show that students assigned to jobs that have higher average hours have worse academic achievement than students assigned to jobs that have lower average hours¹⁰.

There is some evidence that the effect of working in college on academic achievement is not linear. Joensen and Mattana (2017) find that working during the academic year is detrimental to completing courses, but working only during the summer months has a positive effect, relative to not working at all. Similarly, Joensen (2013a) finds that working the equivalent of 10 hours per week significantly increases the number of course credits completed per year, while working the equivalent of 19 hours per week has a large negative impact on academic achievement. Selection into working can in part explain this result, as students who are more motivated might want to have a job, and work less hours.

In their model, Joensen and Mattana (2017) allow for labour market experience accumulated in college to increase wages after college. Häkkinen (2006) confirms that this experience is important for initial wages after college. She uses average local unemployment rate during university enrolment as instrument for acquired work experience during university and finds that student employment increases earnings and employment rates one year after graduation, but the effect does not seem to be persistent.

Given this evidence, how does financial aid affect how much students work while in college? In general, increasing financial aid induces students to allocate less hours to work. DesJardins and McCall (2014) and DesJardins et al. (2010) exploit merit- and need-based eligibility thresholds in the assignment of the Gates Millennium Scholarship on the budget set of students and find that an increase in grant availability reduces loan take-up and hours worked. Students did not increase time spent studying, but increased voluntary and cultural activities. In Denmark, Arendt (2013) finds that students reacted to the cost reduction generated by the 1988 reform by staying enrolled longer, but not necessarily by graduating more. Students readjusted their budget sets by working less and taking up more grant. In Mexico, Canton and Blom (2004) find that loan aid recipients tend to work more: working on the side increases by 8% or 30% for students eligible to taking-up the loans.

One way to affect student work hours is by means-testing the aid on student income. Joensen

¹⁰The jobs offered to first-year students at Berea college are service jobs not related to their studies, and students work a minimum of 10 hours per week.

and Mattana (2017) find that changing the means-testing on the financial aid has ambiguous effects on human capital accumulation. Since in their model both labour market experience and academic achievements increase wages, but offset each other since working during the academic year is detrimental to completing courses, an intermediate amount of means-testing, that encourages students to work only during the summer, generates the highest graduation rates and income at exit. The model also predicts that tighter(looser) means-testing hurts those who acquire less(more) human capital and increases(decreases) income inequality. Overall, they find that students are more likely to adjust their budget set changing their work earnings rather than the amount of loan they take-up. Avdic and Gartell (2015) use the quasi-experimental variation generated by the 2001 student aid reform also used in Joensen and Mattana (2017). The reform various changes overall increased the incentive for working while studying, by almost doubling the income threshold of aid eligibility. They find that students from a lower socio-economic background, this was accompanied by a 10% decrease in relative study pace for more disadvantaged students.

4 Grants vs loans

The evidence on the effect of student loans on enrolment and on persistence points in the direction that student grants and loans have similar effects on students by reducing credit constraints and the price of college. If the price effect is important, we should however see that the effect of grants is higher than the effect of loans, since loans are costlier than grants. Various recent papers find evidence that the price effect is small.

Joensen and Mattana (2017) run simulations that change the proportion of grant and subsidised loan in the financial aid package given to Swedish students, and find that turning grants into loans or vice-versa does not have an economically significant effect on academic capital while, as expected, shifting the burden to fund the consumption of college students from the state to the students and vice-versa.

Solis (2017) uses the eligibility threshold for the Bicentenario grant, a merit scholarship for highly achieving Chilean students who have a national college admission score well above the score necessary to get access to student loans, that cuts tuition cost by 90%. He finds that access to the scholarship and to the 90% tuition reduction has no effects on enrolment. This result suggests that students don't change behaviour when subsidised loans are converted into grants.

Linsenmeier et al. (2006) studies the effect of a shift from loans to grants at an anonymous US institution. Before 1998 aid packages to low-income students were grants, subsidised loans and jobs. Students would first get a job up to a certain amount, then loans up to a limit and finally grants. The grant component was by far the highest, 70% on average, with 20% loans (approx \$4000) and 10% labor income. After 1998, the loan was converted into grants. The paper finds positive but not significant increase in enrolment of low-income students versus the others in the aggregate, but marginally significant results for low-income minorities for which enrolment increases by 8-10 percentage points. This difference might be due to higher uncertainty among minorities about college returns and ability of repaying the loan. A similar change was implemented in Finland in 1992, Häkkinen and Uusitalo (2003).

Marx and Turner (2015) exploit non-linearities in Pell grant formula and find that needbased aid crowds out loans: \$1 in grant decreases loans by \$1.8 – this can be explained by the presence of fixed cost of incurring debt. To the extent that this cost is reflecting time cost to apply to an extra financial aid source, this result would suggest that a streamlined application process – for example loans and grants administered by the same institution –would eliminate the crowd out effect. However, Field (2009) reports evidence of psychological factors (specifically debt aversion) in decisions of loan take-up. Admitted students at NYU School of Law were randomly assigned to receive either a public service scholarship that would convert to a loan if students did not pursue public service after graduation, or a loan that would be forgiven if students decided to pursue public service after graduation. The two treatments were financially equivalent in present value but different in the length of time the student would consider herself indebted, yet framing the program as a "loan that would be forgiven if you pursue public service" was much less effective in inducing students to public service." Moreover the "grant" induced more students to apply and enrol in NYU Law.

4.1 Student debt: repayment and outcomes after university

Intuitively, since receiving financial aid improves academic outcomes, and the return to a college education is high, we expect recipients of aid to have better outcomes after exiting college (Scott-Clayton and Zafar, 2016). The interesting question here is whether the type of financial

aid received matters. While grants and scholarship are basically a conditional cash transfer and do not need to be repaid, student loans do. We learned in Section 4 that substituting grants with loans does not have strong effects on enrolment or academic achievement, but what is the effect on outcomes after college exit, when the loan needs to be repaid? Do students who graduate with loans perform better or worse than students who funded their education without borrowing?

The literature on the effects of graduating with debt is quite recent, US based, and generated by the very publicised increase in debt of US students in the last decades. Many of these papers look at employment outcomes, and, to the best of my knowledge, there is no good evidence yet on the effect of graduating with debt on financial health, homeownership rates, and wealth. Finally, many papers have strong limitations in their identification strategy because they are not able to control for the fact that student debt is endogenous to, as a minimum, ability and parental wealth. There is some suggestive evidence that students who graduate with debt delay purchasing major assets like homes or cars, delay marriage, have less net worth, and are less likely to start a business (Elliott et al., 2013; Cooper and Wang, 2014; Abel et al., 2014; Thompson and Bricker, 2014; Gicheva and Thompson, 2015; Gicheva, 2016; Sieg and Wang, 2017). Zhang (2013) uses financial aid policies at the college the student attended as instrument for student debt, and does not find any effect of student debt on salary, sector of occupation, or home ownership, but she only looks at a short horizon after graduation (1-2 years, and 4-5 years). Mezza et al. (2016) instrument student debt changes with the in-state tuition rates at public 4-year colleges in the student's home state. They find that a \$1,000 increase in student debt lowers the homeownership rate of individuals who attended public 4-year colleges by about 1.5 percentage points during their mid 20s, equivalent in a 2.5 months delay.

Choi (2014) provides an overview of the literature on the effect of student debt on employment outcomes, even if her review misses some of the most recent papers. Graduating with debt affects the future careers of students: students who graduate with debt are more likely to take jobs with higher wages and lower job satisfaction (Minicozzi, 2005; Rothstein and Rouse, 2011; Chapman, 2015; Xu, 2017). Graduates, also from from elite universities, may be credit constrained early in the life cycle, and high debt burdens decrease the likelihood of choosing low-paid careers, e.g. as teachers, or of starting graduate school (Millett, 2003; Rothstein and Rouse, 2011; Zhang, 2013; Chapman, 2015). Rothstein and Rouse (2011) exploit the policy of a wealthy and highly selective university to substitute loans with grants as a natural-experiment to identify the causal effect of the amount of student debt on future outcomes. They find that students in cohorts that entered after the policy was fully implemented not only graduated with about \$11,000 less in debt than cohorts that entered before the policy change but also were significantly more likely to take jobs in nonprofit and public service sectors. One consequence of this result is that programs of loan forgiveness can induce graduates to particular sectors or occupations, as suggested by the results in Field (2009). Chapman (2015) use sharp eligibility thresholds in merit aid in 13 US states to identify the causal effect of graduating with debt and finds that merit aid scholarships may provide students with more flexibility to seek out jobs with non-pecuniary rewards. Students with debt are more likely to be employed in business and less likely to be employed in education, and this effect is present also 4 years after graduation. Gervais and Ziebarth (2017) use the same dataset as Chapman (2015) – Baccalaureate & Beyond – and the income eligibility threshold for need-based Federal student loans, and find that student debt leads to lower earnings soon after graduation, decrease driven by hours worked rather than wages. The negative effect dissipates over time. This points to low-income students with debt being less choosy in the labor market and more inclined to accept part time work or jobs that are less related to their degree and offer limited career potential. Overall these results suggest that students with debt need to find a job faster and start paying back the debt: high skilled students go into business and finance jobs instead than public service jobs, and get higher salaries but less job satisfaction – while students who are low-income and are not selected in terms of ability are more likely to get part-time jobs and lower paying jobs at the beginning of their careers.

The nature of the loan is also intuitively important: income contingent loans – loans for which the repayment schedule is calculated as a set fraction of income – are a form of insurance against negative income shocks, as well as negative educational outcomes, and theoretically they have a smaller impact on life-cycle outcomes than standard mortgage-style loans; subsidised loans – loans for which the interest rate is lower than the market rate, interest does not accrue while the borrower is enrolled, or the government provides guarantee against default – should also affect less the behaviour of those who take them up. These are all important but complicated questions to answer in practice, since they require detailed data on debt, as well as on the outcomes of interest, for long periods of time, and identification strategies that allow to separate the effect of student debt from other concurrent characteristics as well as selection into debt.

Joensen and Mattana (2017) exploit a reform in Sweden that, among other things, converted

the student loan from an income contingent loan to an annuity. Simulations show that students respond more to changes in loan amounts and characteristics when the loan is mortgage-style, than when it is income contingent: shortening the annuity increases drop-outs and decreases income at exit much more than increasing the rate at which the income contingent loan is repaid; increasing the interest rate decreases enrolment and increases dropouts faster with a mortgage-style debt than with an income contingent one.

The models in Ionescu (2009, 2011) show that flexibility in the loan repayment increases enrolment significantly, while Chatterjee and Ionescu (2012) look at the effect of an insurance program that extend loan forgiveness to students who quit education voluntarily, finding that the welfare-gains generated by the insurance against college-failure risk are substantially attenuated by the changes in the enrolment cohort, as more marginal students would be attracted. Moreover such a policy would potentially generate a large gain from completing college without graduating, that could be internalised by employers who would have an incentive to hire dropouts with a completed course-load. (Dearden et al., 2008) analyse the reform of the UK financial aid system discussed in Section 2 by simulating lifetime earnings. They find that the new system, that introduces deferred tuition fees payable after graduation via income contingent repayments, results in a reduction in the lifetime cost of higher education for the lowest part of the parental income distribution, and an increase for the middle and highest part. Xu (2017) calibrates a model of job search model and log-term debt using Equifax data. Counterfactual policy analysis shows that lower payment limits and lower interest rates would have improved the outcomes of graduates in terms of job match quality, by allowing them to search longer before accepting a job. In the literature on optimal taxation, Gary-Bobo and Trannoy (2015); Findeisen and Sachs (2016), and Stantcheva (2017) find that income contingent loans are an important ingredient of an optimal financial aid policy.

5 Conclusions

This paper provides an overview of the literature on financial aid to college students. There is convincing evidence that access to aid improves enrolment rates and academic outcomes of students, but that the design of the aid system is important. Aid targeted at students in the lower end of the income distribution seems to be more effective, as they are more likely to be credit constrained. Measures to reduce time-to-graduation – such as performance based

incentives – or to prevent students to work too many hours seem to be optimal. Grants and loans don't seem to have significantly different effects on academic achievement, but a new and growing literature points to student debt as being detrimental for future outcomes of college graduates.

Finally, there is a concern that the effect of financial aid policies might be smaller than estimated because of general equilibrium effects. Heckman et al. (1998) argue that the general equilibrium impact of a cost reduction on college enrolment are an order of magnitude smaller than those reported in the literature on microeconomic treatment effects. Abbott et al. (2013) find that the crowding out effects due to public financing of college education are substantial, they simulate that every additional dollar of government grant crowds out 20-30% of parental transfers, and hours worked by 3-4%.

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