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The role of information in the take-up of student loans[1]

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Abstract

We study student loan behavior in the Netherlands where i) higher education students know little about the conditions of the government's financial aid program and ii) take-up rates are low. In a field experiment we manipulated the amount of information students have about these conditions. The treatment has no impact on loan take-up, which is not due to students already having decided to take a loan or students not absorbing the information. We conclude that a lack of knowledge about specific policy parameters does not necessarily imply a binding information constraint.

1 Introduction

When individuals seek to finance their education they will find it difficult to take out a commercial loan because of the absence of collateral and the presence of moral hazard. Subsidized financial aid in the form of grants or loans are aimed at lifting these credit constraints. Policies need however not only to be well designed to effectively address market failures, but their parameters also need to be part of agents' information sets so that they can act on them.

There is ample evidence that students underutilize the available financial aid possibilities. For example in the U.S. and in the U.K. it has been found that a large fraction of students eligible for (means-tested) bursaries do not use them (King, 2006; Callender, 2009). Similarly, financial aid take-up in the form of loans is low in the Netherlands where all students enrolled in higher education institutions are eligible for inexpensive, government provided, credit. Of the available credit, which depends on calculated need, only 35% is taken out, and – as we will detail below – students tend to work while at the same time taking substantially longer to complete their studies than the nominal duration.

Some have suggested that students do not make use of available funding possibilities because they are unaware they exist (Callender, 2003), or because of excessive transaction costs arising for example because of complexity of the application process. Dynarski and Scott-Clayton (2008) for instance show that applying for federal grants in the U.S. is difficult and consists of no less than 127 questions. They argue this is unnecessary and prohibitive for take-up. Not only does complexity create a practical barrier, it also creates an informational problem by obscuring eligibility.

Eligibility and transaction costs are the focus of a recent study by Bettinger et al. (2009) who show, in the context of U.S federal grants, that providing information about eligibility is not enough to induce students to apply for grants when the application is complex (i.e. high transaction costs). Applications increase only when students receive direct help in the application process.

In this paper we investigate whether information constraints that relate to the price of credit reduce loan-take up. Using Dutch data we are able to assess the role of price related information, while ruling out confounding barriers related to transaction costs and eligibility. Government provided loans are – and have long been – universally available to students in the Netherlands to supplement their income, and students are generally aware of this (Van den Broek and Van de Wiel, 2005). Eligibility is therefore common knowledge. The application for the loans is simple and directly tied to the university registration process and the application for grants, for which all students are eligible. Transaction costs are therefore minimal.

Figure 1 shows that price related information may be an important barrier to loan
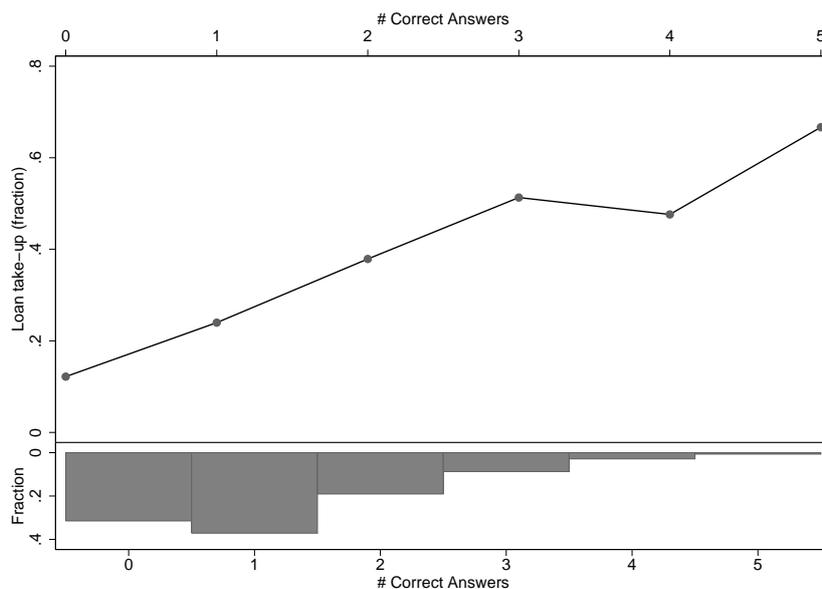
Figure 1. Knowledge about loan conditions and loan take-up rates

take-up. The top panel displays the strong relation between informedness about loan conditions and borrowing based on the data used in this paper. For every correct answer about the loan conditions the take-up rate increases by roughly ten percentage points. At the same time the histogram in the bottom panel shows that many students are poorly informed about the loan conditions: less than 30% is able to answer more than one out of five questions on loan conditions correctly. These results suggest that by better informing students the overall take-up rate may increase by a large margin.[1]

To test whether there is a causal relation between the provision of information and students' borrowing decisions, we conducted a randomized experiment where we manipulated the information Dutch higher education students have about the financial conditions of the government's aid program. Randomly fifty percent of the students who responded to an Internet questionnaire received factual information about loan conditions, whereas the other half did not receive this information. Half a year later, the respondents were interviewed again and were asked about their borrowing decisions during the previous months.

We do not find differences in borrowing decisions between students in the treatment group and students in the control group. At the same time, half a year after the treatment, treated students are still better informed about the borrowing conditions than students that were assigned to the control group. These results suggest that the low take-up rate

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[1]This was in fact the position of the Dutch vice-minister responsible for higher education. He based this view on a recent study (Van den Broek and Van de Wiel, 2005) showing that students who are well-informed about the loan conditions are also significantly more likely to have a student loan.

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reported above is not due to lack of information about objective parameters of the loan. We discuss further implications of our results in the concluding section of the paper.

We proceed by providing more details of the student financial aid scheme in the Netherlands and the recent policy discussion related to that in the next section. In Section 3 we then describe the experimental design and the empirical approach based on it, after which Section 4 introduces the data. Section 5 presents and discusses the empirical results. Section 6 summarizes and concludes.

2   Background

The student financial aid system run by the Dutch government consists of three components that are directly targeted at the student[2]: (i) a basic grant provided to all students; (ii) an additional grant for students from low income families; and (iii) a student loan scheme with a mortgage type repayment. The repayment of the loan is income contingent as to provide basic income protection. Every student who enrolls before the age of 30 in a Dutch higher education institution is eligible for financial aid. Although the system changed several times after its introduction in 1986 (Belot et al., 2007), these three components have been part of the financial aid scheme since the start.

All the aid components are administered by a single government organization (IB-Group). Applications are managed by the student through a personalized web-page that contains their university registration details and their grant and loan status. Before graduating from high school in June students receive a brochure informing them how to set-up their personal profile, which requires sending their high school diploma, a passport copy, their social security number and that of their parents. The application for universities, grants, and loans, can then be done by a single mouse-click on the website. The students are informed that they should register before the 1st of September, the start of the academic year.

In 2007, the year in which we conducted the experiment reported in this paper, the basic grant equaled € 250 per month, with an additional means-tested supplementary grant of € 225 per month at maximum. Additionally, all students were allowed to borrow an additional amount until their total financial aid from the government equaled € 750

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[2]An important indirect source of student aid is channeled through subsidized tuition. Public higher education institutions in the Netherlands obtain most of their budget through direct funding from the government. Tuition charges form only a small fraction of the total budget of public higher eduction institutions, and tuition is insufficient to cover the cost of providing higher education to students (tuition is fixed at about € 1500 per year, regardless of the field of study). Barr (1993) points out that such systems are highly digressive and makes the case for charging flexible, non-subsidized, tuition fees. The existing (income contingent) student loans could in principle accommodate a gradual shift in the Netherlands towards higher and variable tuition fees as is observed for example in Australia and the U.K. (Chapman, 1997; Greenaway and Haynes, 2003).

euros per month at maximum. Hence, for students that do not receive the supplementary grant, the maximum loan amount was € 500 per month. The basic and supplementary grants are given for 4 or for 5 years, depending on the length of the curriculum. After this period there is an extended loan period of three years in which students can borrow up to € 790 per month. All payments are made per month and the borrowing amount can be changed on a monthly basis through the students' personalized web-page. Hence, a student can opt to borrow € 100 in one month and € 200 in the next if he wishes to do so, with a maximum of € 500 in any given month.

If the student does not obtain a diploma within ten years, the received grants are transformed into a loan. The interest rate on the loan is equal to that of long term government bonds (3.7% in 2007), which is well below commercial borrowing rates in the Netherlands. Repayment of the total debt starts after a grace period of 2 years. The monthly repayment amount is calculated as an annuity such that the total debt is repaid in exactly 15 years, with a € 45 minimum. If during a month, however, monthly income is below a certain threshold the installment is forgiven. This implies that students with low future incomes will not repay their entire debt. Students are informed about these conditions through the brochure that they receive just before graduating from high school. Also, information about loans has a prominent place on the website of the IB-Group.

Compared to financial aid schemes in other countries, the Dutch scheme is rather generous. Few other countries provide basic grants to all students, and the amounts are smaller if they do so (Usher and Cervenan, 2005). Also, only about half of the governments of OECD countries offer loan schemes to students, most of which contain no provision in case of low future incomes (Usher, 2005). Not surprisingly, the Dutch higher education system was ranked in the top three in terms of affordability in an international comparative study of 16 countries conducted by Usher and Cervenan (2005).

While the grant given to students in the Netherlands is generous in comparison with grants given elsewhere, it is insufficient to cover living costs and education expenditures. On average students received € 285 in grants and an estimated € 208 in parental support (Van den Broek et al., 2007), a total of only € 493. For 2007, the Dutch government determined however that students needed at least € 750 to cover food, housing and educational costs (the legal minimum). Hence it could be expected that students make use of the loan scheme to supplement their income, as is observed in other countries. In Sweden for example, where the government offers a basic grant of similar magnitude in an environment with similar living cost as in the Netherlands, more than 85% of students take a loan.[3] Similar take-up rates are observed in other countries (Norway: 78%, U.K.: 85%,

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[3]Usher and Cervenan (2005) calculate the living costs (food and rent) in Sweden to be about € 400 per year higher than in the Netherlands. The lack of tuition fees, however, make higher education in Sweden slightly more affordable compared to the Netherlands.

U.S.: 50%; see Vossensteyn, 2004; Usher, 2005). This figure has consistently been much lower in the Netherlands with a take-up rate around 35% (Biermans et al., 2003; Van den Broek and Van de Wiel, 2005).

The low take-up rate is viewed as a problem in the Netherlands because students work next to their study to avoid debt. In the study of Van den Broek and Van de Wiel (2005) a 90% majority of students states to "prefer working over borrowing". Also, Van den Broek et al. (2007) document that of the students that do not borrow 60% report that they work to avoid debt. About 75% of Dutch students have a job on the side for about 10 hours per week earning on average about € 330 per month to supplement their basic income (grants and parental transfers) (Biermans et al., 2003; Van den Broek et al., 2007). Indeed, Dutch students work more often compared to students in other European countries (Sweden: 43%, 6 hours; U.K.: 60%, 9 hours), and in more than 45% of cases their work is unrelated to the subject of study (Callender, 2008; EuroStudent, 2008). This is not desirable from the government's perspective because it is likely to lead to an increased study length. While there is no careful study that establishes this link in the Dutch context, there is international evidence showing that working during college has detrimental effects on study performance Kalenkoski and Pabilonia (2009); Oettinger (2005); Stinebrickner and Stinebrickner (2003); Callender (2008). Indeed the Netherlands has a poor record in this respect, with an average study duration of 6 years (excluding drop-outs, CBS 2007) whereas the nominal duration of most higher education programs is 4 years. Since each student-year is heavily subsidized (Jongbloed et al., 2003), this is costly for the government.

To investigate the observed reluctance to borrow, the Dutch vice-minister of education called for research into students' attitudes and knowledge with respect to the loan scheme. A subsequent study found that, not only did students work rather than borrow to supplement their income, they also appeared to be poorly informed about the loan scheme (Van den Broek and Van de Wiel, 2005). Moreover, students who were borrowing appeared to be better informed about the borrowing conditions than students who were not taking a loan. The same pattern was found in a similar study on borrowing of students in the U.K. (Callender, 2003). The policy recommendation in the Dutch report, that increasing student awareness of the loan conditions may increase borrowing, was soon taken over by the Dutch education authorities (Ministry of Education, 2006). However, it is not a priori clear that this association reflects the causal link implied by this recommendation. It may well be that taking a loan increases students' knowledge about the conditions but not vice versa.

3 Experimental design and empirical strategy

We conducted a randomized experiment to test whether information about loan conditions has an impact on the loan take-up rate. We consulted a marketing expert about how to inform students, and our approach is based on his advice. A representative sample of Dutch higher education students was invited by E-mail to take part in two consecutive Internet surveys, with half a year in between (the first invitation did not announce the second questionnaire). The E-mail addresses were obtained from the IB-Group, which also provided background information on variables such as age, gender and social background.

The first Internet questionnaire, for which the invitation was sent out in February 2007, came in two versions. The entire sample of students received questions about their opinions concerning student loans and past borrowing. In addition, half of the sample received the randomly assigned treatment which consisted of receiving factual information about five loan conditions. This information was presented in the form of questions that asked respondents how favorable they thought each condition was. More specifically, these students were asked how favorable they perceived the following conditions:

1. The maximum loan amount during the grant period (€ 500)

2. The maximum loan period after the grant period (36 months)

3. The grace period (2 years)

4. The maximum length of the repay period (15 years)

5. The interest rate on student loans (3.7%)

Presenting the factual information in the form of questions gives respondents a reason to read and think about the information.

If higher education students in the Netherlands face an information constraint, we expect it to have been lifted by the treatment. Although one would expect that constrained students would not wait too long to act on the new information, we nevertheless wanted to allow for a sufficiently long horizon to measure an impact on loan take-up. For this reason we administered a follow up survey six months later in August 2007. The questionnaire was identical for all students (both the treated and controls). Respondents provided their current study situation, their perceptions on job prospects, their attitudes towards borrowing and risk, and it collected information on loan take-up in each of the months following the first survey.

We test for the impact of providing information on loan take-up by estimating the following regression

$$y_i = \delta T_i + \mathbf{x}_i'\beta + e_i \qquad (1)$$

where y_i equals one if student i took out a loan following the first survey and is zero otherwise. T_i is the treatment indicator variable and x_i a vector of controls.

To measure respondents' knowledge about the loan conditions the follow-up questionnaire also asked students the value of each of the five loan conditions listed above. It was explicitly stated that they should not search for this information on the Internet or elsewhere, stressing that giving a wrong answer would be without any consequence and that we were only interested in getting a correct picture of students' overall awareness of these loan conditions (only a handful of respondents answered all five questions correctly – 3 in the control and 2 in the treatment group – which we take as evidence that (almost) no one searched for the correct answers).

4   Data

A total of 3,812 students responded to the first questionnaire in which they were asked about their field and level of study, and about their attitudes towards borrowing. As explained above, about half of this sample (N=1,914), which was randomly selected, received information about the properties of student loans provided by the government. All students that completed the first survey were contacted again for the follow-up survey. The response rate for this second survey was 61%, which is comparable to other studies that target this sample and also good considering that it was conducted at the end of the summer holiday. Response rates were virtually identical for the treatment and control groups (61% and 60% respectively). Moreover, using a Chow test we find no indication of differential attrition between the treated and controls with respect to the covariates ($\chi^2_{(20)} = 13.66$, p-value = 0.8471).

Table 1 reports descriptive statistics of the background variables that will be used as control variables. These descriptives are reported separately for the treatment and control groups. We do not find significant differences between the groups for most of the variables, confirming that the randomization worked. The treated have on average been in higher education a month longer however, which is controlled for in the regressions.

The mean values for age, social background (SES), ethnicity and study duration are comparable to those in the population of higher education students. Social background (which is based on the principal component of a factor analysis of parental education, income and job-level) takes values from 1 until 5. The ethnicity variable takes value 1 if the student considers himself a foreigner. Both females (66%) and students in the academic track (61%) are overrepresented in the sample (the population fractions are

Table 1. Descriptive Statistics

	Controls		Treated			
	Mean	s.d.	Mean	s.d.	Difference	*p*-value
Female	0.67	0.47	0.65	0.48	−0.018	0.386
Age	21.07	1.81	21.04	1.72	−0.031	0.684
Ethnic minority	0.05	0.21	0.04	0.20	−0.004	0.653
SES	2.52	1.39	2.53	1.38	0.004	0.941
Discount rate	0.21	0.19	0.21	0.19	−0.002	0.824
Risk tolerance	5.67	2.05	5.65	2.10	−0.016	0.859
Academic track	0.60	0.49	0.62	0.49	0.014	0.508
Study duration (years)	2.70	1.10	2.80	1.14	0.099	0.039
Loan experience	0.30	0.46	0.30	0.46	−0.004	0.838
N	1,090		1,098			

Note: Mean values with standard deviations in parentheses. *p*-values are based on *t*-tests.

51% and 37% respectively, CBS 2006). [4]

Two preference parameters that play a central role in economic models of investment decisions under uncertainty are risk aversion and the subjective discount rate. Risk attitudes are measured by a subjective self evaluating measure of risk tolerance on a 1 to 10 scale that runs from very risk intolerant to very risk tolerant. A series of hypothetical intertemporal choices pin down individuals' subjective discount rate. The students are, on average, moderately risk tolerant (6/10) and also moderately impatient (20%). The average value for risk tolerance is comparable to what Dohmen et al. (2006) report for Germany; who find an average of 5/10. Similarly, the average value for the subjective discount rate is close to the average value of 28% that Harrison et al. (2002) report for a representative sample of the Danish population.

The variable "loan experience" indicates whether the student had taken up a student loan prior to the first survey. In both groups this fraction equals 30%, which is similar to what is reported in other studies (Biermans et al., 2003; Van den Broek et al., 2006), and confirms the observation that loan take-up is low in the Netherlands compared to other western countries (Usher, 2005).

As discussed above, we operationalized students' knowledge about the loan conditions by the number of questions the student answered correctly. To compare the answers to the true value, we rounded them to the unit which seemed to match the response scale for most respondents. The maximum loan amount (€ 500) was rounded to hundreds of

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[4]As these differences are not related to the treatment, they do not affect the internal validity of the estimates.

Table 2. Student characteristics, loan experience and loan knowledge (OLS)

	Loan Experience		Loan Knowledge	
	(1)		(2)	
Female	0.003	(0.021)	-0.010	(0.049)
Age	0.040	(0.007)***	0.031	(0.015)*
Ethnic minority	-0.006	(0.047)	-0.113	(0.101)
Socio-Economic Status				
- Level 2	0.026	(0.025)	-0.047	(0.059)
- Level 3	-0.034	(0.031)	-0.058	(0.079)
- Level 4	0.072	(0.033)**	0.009	(0.077)
- Level 5	-0.004	(0.032)	0.078	(0.077)
Discount rate	0.194	(0.054)***	0.145	(0.126)
Risk tolerance	0.016	(0.005)***	0.019	(0.011)*
Academic track	0.049	(0.021)**	0.286	(0.049)***
Study duration (years)	0.011	(0.011)	0.123	(0.027)***
Intercept	-0.710	(0.128)***	-0.058	(0.304)
N	2,186		1,089	

Note: Robust standard errors in parentheses. */**/*** denote significance at a 10/5/1% confidence level.

euros, and the other questions were rounded to appropriate scales in a similar way.[5] This rounding clarifies our graphical analysis (below) and does not affect the results since the correlation between the true and the rounded value is never below 0.99.

To better understand which students make use of student loans, the first column of Table 2 presents estimates from a linear probability model where prior loan experience is regressed on student characteristics. There are no differences between boys and girls, and older students are more likely to borrow. Interestingly, students who are more at risk of being liquidity constrained, that is students with an ethnic minority background and students from lower socio-economic backgrounds, are not more likely to have taken out a student loan. One explanation is that the means tested component of the Dutch grant scheme adequately compensates students for their financial background. Finally, the most important determinants of loan experience seem to be students' discount rate and risk attitude.

It is also useful to consider how well different students are informed about the loan conditions. In the second column of Table 2 we report the results from a regression of the number of correct answers on the same student characteristics as in column (1). This

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[5]The maximum loan period after the grant period (36 months) was rounded to years, the maximum length of the repay period (15 years) was rounded to 5 years, and the interest rate (3.7 percent) was rounded to half a percentage point around the true value. The grace period was not rounded since all respondents answered in whole years.

regression is based on the subsample of students that were assigned to the control group. Students in the academic track are better informed, as are older and more experienced students. Risk averse students are also better informed. Again there is no relation between both socio-economic status and ethnicity, and loan knowledge.

Table 2 shows that the most important determinants of borrowing are students' discount rates and risk attitudes. There is no indication that liquidity constrained students (i..e. those from more disadvantaged backgrounds) are more likely to borrow. The results in the table suggest that this could be due to the fact that these students are not better informed about the loan conditions in the Netherlands than students from more favorable backgrounds, an explanation we will investigate in the next section.

5   Results

5.1   Impact of the information treatment on loan take-up

The first column of Table 3 reports the estimation results of equation (1), which regresses loan take-up between the first and the second interview on an indicator for exposure to the information treatment and our set of control variables. It shows that the information treatment did not lead to a higher level of subsequent loan take-up. The point estimate is half a percentage point, which is negligible if we compare it to the average take-up rate between the first and second interview, which is about 0.26. Also, with a standard error of 0.016 the effect is not statistically significant. Note that the factors that explain prior loan experience at the first interview such as the discount rate and risk tolerance also explain loan take-up between the two interviews. This finding shows that the strong positive relationship between knowledge and loan take-up in the population (Figure 1) is completely due to omitted variables and that there is no causal link between the two.

A possible explanation for a zero impact of the information treatment is that the treatment came too late and that respondents already made their choices with regard to taking out a student loan. It could for instance be the case that students make these decisions before they enroll into higher education (in September). To examine this possibility, we split the sample into two groups: those without prior loan experience and those with prior loan experience.

If students already made their decisions regarding borrowing before or shortly after they enroll in higher education, we would expect those with prior loan experience to continue to take out loans between the first and second interview, and those without prior loan experience not to take out any loans. This is not confirmed by the data: of the 1,536 students in our data with no prior loan experience 14% takes out a loan between the first and the second interview, while for the 652 students with loan experience this take up rate

is 56%. This means that loan take-up is not a static decision taken at the beginning of the academic year.

The second and third columns present results of separate regressions for the two sub-groups. For those without loan experience the point estimate equals -0.015 (s.e. 0.017), while for those with prior loan experience it equals 0.041 (s.e. 0.038). Hence, although a substantial fraction of 14% of those without prior loan experience takes out a loan for the first time after the first interview, this borrowing decision is not affected by receipt of the information treatment.

A second explanation for the invariance of loan take-up with respect to the treatment could be heterogeneity in the treatment response. It may be that only students at the beginning of their studies are information constrained and that the effect of the treatment on this group is masked by the larger group of students that have advanced further in their studies. These latter students have had more opportunities to learn about the loans conditions, reducing the potential impact of additional information. Table 2 indeed shows that there is a strong positive relation between study duration and knowledge about the loan conditions. The final two columns of Table 3 however show that the information treatment does not affect loan take-up both for students at the beginning and at the end of their curriculum. Also, we do not find any differences in the treatment effect with respect to gender or academic track (not reported here). This means that our estimates are likely to carry over to the full population of students that, compared to our sample, consists of relatively more male students and students in the non-academic track.

A third potential explanation for a zero impact of the information treatment on the take-up rate is that the treatment did not have any impact on students' knowledge about the loan conditions. That would be true if everyone was already perfectly informed, but as shown in the bottom panel of Figure 1 this is clearly not the case. It can also be that treated students read but did not absorb the information to which they were exposed. The next subsection explores this possibility.

5.2 *Impact of the information treatment on knowledge about loan conditions*

One way to test whether treated students absorbed the information to which they were exposed is to measure their knowledge about loan conditions just before the information is given to them and again shortly afterward. We did not implement such a before-after design to measure the absorption of the information given in the treatment, because we suspected that such an approach might pressure respondents (asking questions, giving the answers and asking the same questions again) and could reduce response rates. A second reason for not asking questions about the loan conditions directly after the treatment is that this could prime the controls and in addition can be possibly confounded with the

Table 3. The effects of treatment on borrowing behavior

| | All (1) | Loan Experience | | Phase | |
		Without (2)	With (3)	Begin (4)	Later (5)
Treatment	0.005	−0.015	0.041	−0.052	0.012
	(0.016)	(0.017)	(0.038)	(0.041)	(0.018)
Female	0.013	0.016	0.016	0.016	0.012
	(0.019)	(0.020)	(0.044)	(0.044)	(0.021)
Age	0.029	0.038	0.022	0.037	0.028
	(0.007)∗∗∗	(0.008)∗∗∗	(0.012)∗	(0.018)∗∗	(0.008)∗∗∗
Ethnic Minority	0.092	0.107	0.008	0.216	0.073
	(0.047)∗	(0.055)∗	(0.092)	(0.125)∗	(0.051)
Socio-Economic Status					
- Level 2	−0.031	−0.013	−0.070	−0.045	−0.030
	(0.021)	(0.022)	(0.049)	(0.053)	(0.023)
- Level 3	−0.003	0.012	−0.035	0.011	−0.007
	(0.028)	(0.029)	(0.069)	(0.073)	(0.030)
- Level 4	0.007	0.009	0.003	0.168	−0.021
	(0.028)	(0.030)	(0.059)	(0.075)∗∗	(0.030)
- Level 5	−0.000	0.021	−0.030	0.064	−0.012
	(0.028)	(0.030)	(0.066)	(0.076)	(0.031)
Discount rate	0.186	0.190	0.137	0.122	0.188
	(0.049)∗∗∗	(0.054)∗∗∗	(0.102)	(0.125)	(0.054)∗∗∗
Risk Tolerance	0.022	0.011	0.047	0.014	0.024
	(0.004)∗∗∗	(0.004)∗∗	(0.009)∗∗∗	(0.010)	(0.004)∗∗∗
Academic Track	0.077	0.031	0.182	0.103	0.074
	(0.020)∗∗∗	(0.020)	(0.047)∗∗∗	(0.055)∗	(0.022)∗∗∗
Study duration (years)	0.003	−0.013	0.019	0.016	−0.000
	(0.010)	(0.011)	(0.020)	(0.049)	(0.011)
Prior Loan Experience	0.383			0.305	0.400
	(0.022)∗∗∗			(0.054)∗∗∗	(0.024)∗∗∗
Intercept	−0.735	−0.795	−0.427	−0.894	−0.717
	(0.145)∗∗∗	(0.157)∗∗∗	(0.267)	(0.383)∗∗	(0.159)∗∗∗
N	2,186	1,535	651	358	1,828

Note: Robust standard errors in parentheses. */**/*** denote significance at a 10/5/1% confidence level.

Table 4. Mean responses to questions about loan conditions, by treatment status

	Controls		Treated			
	Mean	s.d.	Mean	s.d.	Difference	*p*-value
Max loan	422.8	213.6	448.2	210.8	25.4	0.005
Max loan period	21.2	19.4	23.3	18.8	2.1	0.012
Grace period	4.9	3.4	5.0	3.4	0.1	0.597
Repay period	14.5	10.5	13.8	7.5	−0.7	0.057
Interest rate	2.6	1.8	2.7	1.8	0.1	0.083
N	1,090		1,098			

Note: Mean values with standard deviations in parentheses. *p*-values are based on *t*-tests. A join test of no difference between the treatments is rejected with p-value 0.001.

treatment.

Instead we asked (both treated and control) respondents questions about the loan conditions six months after the information treatment was given. Clearly, comparison of knowledge of the treatment and control groups six months after the intervention will underestimate the immediate impact of the intervention on respondents' knowledge if people tend to forget the information that is given to them.

Table 4 reports for each condition the mean responses of the students in the treatment and control groups, and their differences. The results confirm that Dutch higher education students (represented by the control group) are indeed poorly informed about the loan conditions. Considering the controls, we see that they underestimate the size of the maximum loan by over 75 euros (by more than 15%), underestimate the maximum loan period by over one year (by more than a third), overestimate the maximum grace period by almost 3 years (150%), underestimate the maximum repayment period by less than half a year (less than 4%), and underestimate the interest rate by more than 1 percentage point (almost 30%).

The poor informedness of students in the control group is not always in the direction of regarding the loan conditions as less generous than they actually are: they overestimate the grace period and underestimate the interest rate. Hence it is *a priori* unclear whether the information treatment will increase or decrease the perceived favorability of the loans. We will discuss this in more detail in section 5.3. First we will investigate whether the treatment had an effect on students' perceptions.

When comparing the results for the controls to those for the treated six months after the intervention, we see that the *average perception* of the treated students is more accurate with respect to the size of the maximum loan, the maximum loan period and the interest rate than students in the control group. Average perceptions for students in the

Table 5. Effect of information on knowledge

| Correct perception	Baseline	Effect	s.e.	F-stat
Maximum Loan	0.31	0.035	(0.020)*	3.13
Maximum Loan Period	0.17	0.032	(0.017)*	3.84
Grace Period	0.20	0.052	(0.018)***	8.35
Maximum Repay Period	0.24	0.036	(0.018)**	3.87
Interest Rate	0.15	0.024	(0.016)	2.35
Correct Answers	1.07	0.180	(0.045)***	15.61

Note: Each estimate comes from a separate regression that includes controls for age, gender, ethnicity, SES, discount rate, risk attitude, academic track, field of study and (in the top panel) loan experience. There are 2,188 observations per regressions. Robust standard errors in parentheses. */**/*** denote significance at a 10/5/1% confidence level.

control group are, however, more accurate regarding the maximum grace period and the maximum repayment period. Hence at first glance the effect of the treatment on informedness of the students appears mixed.

Comparing the averages to the true values is misleading however, because it does not show whether the treatment increases the number of students with an accurate perception. To investigate this we look at the binary measure that takes the value 1 if the respondents (rounded) answer is correct and 0 otherwise.[6] Table 5 presents the baseline fraction of students that have accurate perceptions about the loan conditions together with the added effect of the information treatment. From the baseline we see that students perceptions concerning the interest rate of the loans are not accurate (15% correct) while a larger fraction of students know the maximum loan period (31% correct). Baseline knowledge about the other loan conditions is moderate and falls between these two.

For most conditions the treatment increases the group of correctly informed students by about 4 percentage points. The effect is strongest for the grace period (5.2%), and weakest for the interest rate (2.4%). In total the controls answer on average 1.07 questions correctly, while the treated manage 1.26. Hence knowledge measured six months later has increased by about 18%. This is a moderate but significant change. We can only speculate how much better treated students were informed than control students directly after the intervention. In any case, the significant difference in knowledge between treated and controls six months after the intervention rejects the hypothesis that treated students do not have a higher take-up rate than control students because they did not absorb the information that was given to them.

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[6]Using an absolute distance measure yields similar qualitative results.
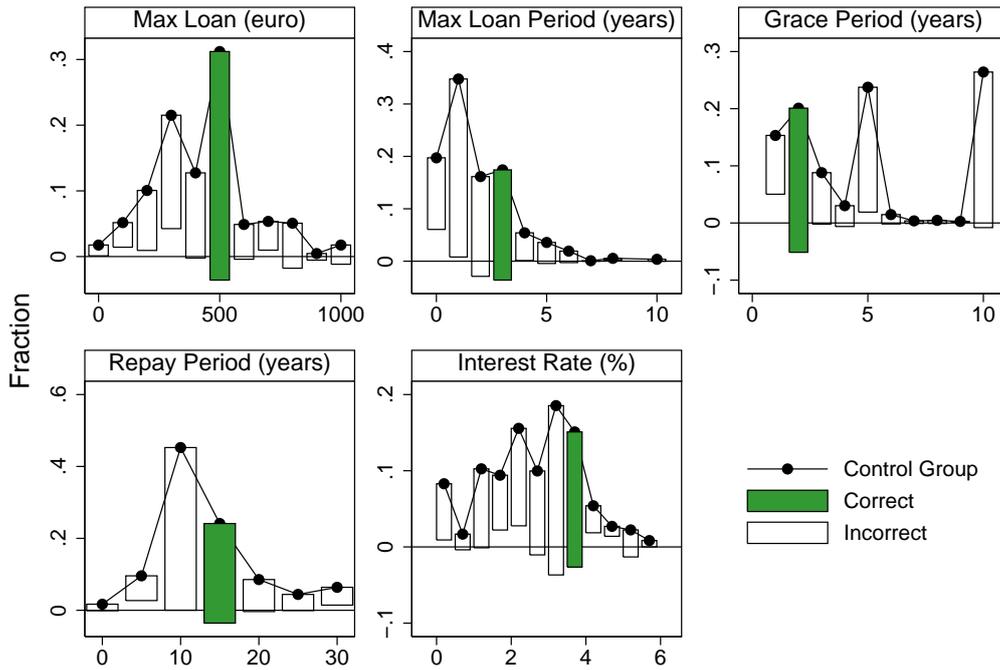
Figure 2. Students' perceptions of loan conditions

5.3 *Non-monotone effects of the information treatment*

The previous sections show that while students who received the information treatment are better informed about the loans available to them, they do not increase their borrowing. A potential reason may be that the information treatment does not enhance the perceived favorability of the loans but rather reduces overly optimistic perceptions with respect to the loan conditions. To investigate this we inspect the distributions of perceptions closer using Tukey Hanging Rootograms (Tukey, 1977). These graphs have been developed to visualize the difference in the distribution of a variable for a treated group compared to a baseline control group. Figure 2 shows the perceptions of both the treated (vertical bars) and controls (connected points) for all conditions. The bars of the treated are suspended from the line spanned by the fraction of answers given by controls. This means that if a bar crosses the x-axis at zero then there is a higher response rate among the treated than the controls at that specific value.

Since the bars of the true values are shaded it is easy to see that there is a higher concentration of answers close to the correct value for the treated than the controls. For all conditions there is positive probability mass below the x-axis for the treated bars, meaning that the treated have more accurate perceptions of the loan conditions as was already shown statistically in Table 5. Further we can see that the shifts in the averages

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Table 6. Effect of information on pessimism

Pessimistic perception	Baseline	Effect	s.e.	F-stat
Maximum Loan (<€ 500)	0.57	-0.056	(0.021)***	7.28
Maximum Loan Period (<36 months)	0.15	-0.057	(0.014)***	17.65
Grace Period (< 2 yrs)	0.15	-0.045	(0.014)***	10.05
Maximum Repay Period (< 15 yrs)	0.55	-0.014	(0.021)	0.42
Interest Rate (> 3.7%)	0.20	0.002	(0.017)	0.02

Note: Each estimate comes from a separate regression that includes controls for age, gender, ethnicity, SES, discount rate, risk attitude, academic track, field of study and (in the top panel) loan experience. There are 2,188 observations per regressions. Robust standard errors in parentheses. */**/*** denote significance at a 10/5/1% confidence level.

in Table 4 are caused by a non-monotonous and asymmetric change in the distribution around the true value. For all but one condition (the maximum loan period) the treated have fewer observations below *and* above the true value. Hence it seems, as one would expect, that some respondents update their perception upward, while others update their perceptions downward. Therefore it is possible for the average to move in the wrong direction while the fraction of informed people, the shaded column, increases.

Unfortunately we do not observe the students perceptions prior to the information treatment. Hence, we cannot relate the loan take-up response to the direction of the shifts in perceptions. Figure 2 suggests, however, that there are at least *some* students who update their beliefs in such a way as to make the loans seem more favorable. These are students who prior to the information treatment either underestimated the maximum loan amount, the maximum loan period, the grace period, or the repay period, or overestimated the interest rate. It is only for this group that we may expect a positive effect of the information treatment on loan take-up.

Table 6 presents the baseline fraction of students with too negative perceptions and the effect of the information treatment. The baseline shows that for most conditions the group of students with an unfavorable perception is no larger than 20%. Hence for these conditions there is only a limited scope for improvement. Most important in this respect is the perceived interest rate, which can be considered the true price of the loan. The table shows that the group of students that think the interest rate is higher than 3.7% is only 20%. Moreover, the treatment does not reduce this group. One might argue however that the treatment group had perfect perceptions immediately after the treatment and their knowledge slowly dissipated over time.

The only conditions that are perceived too pessimistically by a large fraction of students are the maximum loan period and the maximum repay period (about 55%). Arguably, however, the perceived maximum loan should only have an effect on the intensive

margin of borrowing. The repay period on the other hand might affect borrowing on the extensive margin because the possibility to spread the repayment of the loan might benefit students who expect to have a slow wage growth. Our results suggest however that this does not induce any students to start borrowing. Hence we speculate that if a lack of knowledge is deterring some students from borrowing - which we doubt - this group can not be very large because while students are on average uninformed, most think that the loan conditions are more generous than they are in reality.

6 Summary and discussion

Despite favorable loan conditions, take-up rates of student loans in the Netherlands are low. These low take-up rates can neither be explained by a lack of knowledge about eligibility criteria, nor by difficulty of the application process as is for example the case with the Free Application for Federal Student Aid in the United States (see Bettinger et al., 2009). The reason for this is the simplicity of the eligibility and application rules and procedures of the Dutch financial aid scheme.

Since non-experimental evidence suggested there are considerable information constraints related to loan take-up, we conducted a randomized experiment to test this. Half of the students who responded to an Internet questionnaire were given factual information on loan conditions, whereas the other half did not receive such information. The same students were interviewed again six months later. Our results show that information provision does increase factual knowledge about the loans conditions, but does not increase loan take-up. Hence, we find no causal impact of factual knowledge about loan conditions on loan take-up which implies that a lack of information about the specific loan conditions is not a binding constraint. More in general we conclude that a lack of knowledge of government policies does not necessarily indicate an information constraint.

Although we can rule out one explanation, there is still the question why Dutch students do not take out more loans than they do. Financing education through low paid side jobs that not only provide little or no relevant labor market experience but which also delay labor market entry seems inefficient, especially since student loans are available at attractive rates.

We see two remaining possible explanations for the low take-up rate. The first is debt aversion, the second cognitive constraints. Debt aversion occurs when having a debt lowers utility over and above its impact on life-time consumption (e.g. Field 2009; Oosterbeek and Van den Broek 2009). Cognitive constraints occur when people are unable to assess all relevant costs and benefits properly. Some recent studies find large effects of information provision when information is accompanied with advice or other components

that aid cognition in the treatment. Duflo and Saez (2003) for example find strong effects on the use of a tax deferred savings account where the treatment, an information fair, not only provided information, but also also gave individuals personal advice and the possibility to analyze their specific situation using a specially designed computer program.

Little is known however concerning the interaction between information provision and cognitive constraints related to the processing of this information. Since we find that information provision alone is insufficient to trigger a behavioral response, we think that further research that addresses this interaction is an interesting avenue for future research. In relation to student loans one could think of providing additional information about returns to education and future debt burdens in relation to levels of expected lifetime wealth. Providing the interpretation that a five digit debt is worth a six digit increase in expected lifetime wealth with limited downside risk, might aid cognition about returns and maybe also reduce debt aversion.

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