Student loans, spending, and parental transfers: Insights from a nudge in student loan policy in the Netherlands☆

Jim Been [a],[*], Marike Knoef [b]

[a] *Department of Economics, Leiden University, Leiden, NL and Netspar, Tilburg, NL.*
[b] *Department of Econometrics & OR, Tilburg University, Tilburg, NL and Netspar, Tilburg, NL*

A R T I C L E   I N F O

A B S T R A C T

This paper investigates the effect of student loans on students' (financial) behavior. For causal identification, we exploit quasi-experimental evidence using a nudge in the take-up of student loans in higher education in the Netherlands. We estimate an instrumental variable (IV) model with a first-stage Difference-in-Differences design. We find that a decline in the default student loan reduced monthly student borrowing by 141 euros. A one-euro decline in student loans reduced students' expenditures by 61 cents, but also led to a substantial increase of parental financial contributions (43 cents). Especially expenditures on leisure activities were affected. There is no evidence for increased labor earnings among students, on average. Self-reported indicators of academic performance do not worsen in response to the reform; students' GPA even improves.

1. Introduction

In many Western countries, the demand for student loans has increased considerably (Lochner & Monge-Naranjo, 2015) and has become a top policy concern (Barr et al., 2021). The increased demand can be explained by the rising costs and returns to college, but also because of public spending cuts in response to the Great Recession. While the shift from grants to loans started in the mid-1970s in the US (Gross et al., 2009), the governments in the UK and the Netherlands recently decided to replace student grants with student loans. As student loans are rising rapidly, it becomes increasingly important to understand the interaction between student borrowing and other financial decisions (Lochner & Monge-Naranjo, 2011). In response to rising debt among young adults, the Dutch government decided to make students more aware of their debt behavior by changing the default setting of student loans without affecting their actual credit constraint in 2009. Using this exogenous change in debt behavior of students in higher education, this

paper studies the consequences of the default change on student loans, and consequently, the effect of student loans on students' spending, employment, and intergenerational private transfers from parents.

Student loans may affect the financial behavior of students now and in the future. The seminal work of Modigliani and Brumberg (1954) argues that rational and forward-looking agents smooth consumption over the life-cycle. This suggests borrowing early in life, saving later in life, and dissaving in old age. However, private borrowing possibilities are often constrained (e.g., Cocco et al., 2005), especially early in life as a student (Carneiro & Heckman, 2002). Therefore, changes in early-life borrowing constraints are likely to affect labor supply and spending behavior. Recent analyses have shown that student loans, which alleviate early-life borrowing constraints, have important positive long-term consequences for later-life earnings (Black et al., 2020) and household formation (Goodman et al., 2021). The existence of early life borrowing constraints can also affect *inter vivos* intergenerational transfers from parents to their children, as parents can ease borrowing

---

constraints (Cox, 1990) and compensate income (Hochguertel & Ohlsson, 2009) of their children. Analyzing parental contributions (both in-cash and in-kind) to alleviate borrowing constraints in response to changes in student loans is the prime interest of this paper.

Early interest in student loans was primarily involved with testing the effectiveness of governmental student loan programs to justify the magnitude of these programs. Literature based on (quasi-)randomized changes in policies suggests that student loan and aid policies have large impacts on college enrollment and completion,[1] especially among students from low-income families (Linsenmeier et al., 2006; Belley & Lochner, 2007; Winter, 2014, Angrist et al., 2021).[2] Student loans, however, also crowd out intergenerational transfers (e.g. Belley & Lochner, 2007; Hanushek et al., 2014; Abbott et al., 2019; Colas et al., 2020), in the same way as other government transfers crowd out private transfers.[3] Therefore, changes in student loan policies may not only affect the students' financial behavior, but also the parents' financial behavior.

In this paper, we aim to provide more insight into 1) the consequences of decreased student loans in a context where student loans are primarily used for living expenses, with a specific focus on the consequences for students' consumption behavior and 2) *inter vivo* transfers from parents, and, hence, the connection between public and private support for students. In particular, we estimate the causal effect of student loans on students' financial behavior and, especially, how student loans affect consumption patterns and parental transfers. Additionally, we analyze how student loans influence earnings and academic performance to get a better understanding on the mechanisms of student's financial behavior. For example, student loans might have consequences for students' time use in work versus studying.

Using a quasi-experimental approach, this study explores an exogenous change in the take-up of student loans in the Netherlands, following a reform in 2009 that changed the government's default student loan. In short, students have the right to claim a government allowance and, on top of that, can borrow money from the government to finance their education. However, the right to receive an allowance is discontinued after four years of studying. Before 2009, students who started their fifth academic year automatically borrowed the maximum student loan from the government.[4] As of 2009, the default student loan of students starting their fifth academic year was automatically lowered to the sum of the fourth-year allowance and loan. Using this period-cohort-based exogenous variation, we first estimate a Difference-in-Differences model and find that students respond to the default student loan. The reduced default resulted in substantially lower student loans. Second, we use the exogenous reduction in the default student loan as an instrument to assess the causal effects of student loans on financial behavior. We estimate an instrumental variable (IV) model with a first-stage Difference-in-Differences design, using the 'Student monitor' survey, which contains detailed information about the financial situation of students and their parents.

This study provides new evidence on financial behavior early in the life-cycle and on the extent to which student loans from the government are crowding out private *inter vivos* income transfers from parents to their children. Earlier evidence only exists for parental transfers in relation to bequests (McGarry, 1999; 2016; Poterba, 2001; Page, 2003; Joulfian, 2005) and the substitution between *inter vivos* parental transfers and children's labor supply (Dustmann et al., 2009). The contribution of this paper to the literature is twofold. First, as far as we know, we are the first to investigate the extent to which governmental student loans are crowding out financial support from parents (both in cash and in kind). This gives new insights into the role of *inter vivos* intergenerational transfers, which may help to smooth consumption over the life-cycle. Second, unique and detailed data allow us to analyze how student loans affect earnings and spending patterns of students (among which include study-related expenses). Similar to Marx and Turner (2019) and Barr et al. (2021), who exploit a randomized controlled experiment (RCT), we exploit activation in student loan decisions to analyze the effect on student's borrowing behavior, but use quasi-experimental evidence similar to Black et al., 2020.

Such intergenerational effects of student loan policies have only been analyzed by structural models before without any (quasi-)experimental evidence (e.g. Belley & Lochner, 2007; Hanushek et al., 2014; Abbott et al., 2019; Colas et al., 2020). Compared to the structural models of parental transfers and educational outcomes in Belley and Lochner (2007), Hanushek et al. (2014), Abbott et al. (2019) and Colas et al. (2020), our quasi-experimental results confirm the substantial crowding out of parental transfers by government programs. Our results confirm that *inter vivo* transfers from parents to children are important to reduce children's credit constraints (Altonji et al., 1997; Engelhardt & Mayer, 1998).

In particular, the results show that student loans crowd out financial support from parents. A one-euro reduction in student loan increases financial parental support with 43 eurocents. A one euro decline in student loan reduces student's spending by 61 eurocents. Especially leisure-related spending is affected by student loans (39 eurocents per one-euro decrease in student loans). Earnings are not significantly affected (in line with Wolff, 2006 and Kalenkoski & Pabilonia, 2010). Extended models show that decreasing student loans do not have negative consequences for study outcomes: students even earned a higher GPA because of the decrease in student loans. This result contradicts prior conclusions by Barr et al. (2021), who find that decreased borrowing negatively affected academic performance, and Marx and Turner (2019) and Black et al. (2020), who find that increased borrowing possibilities positively affected academic performance. We provide suggestions to reconcile these results using the particular institutional context of the Netherlands and the importance of parental monitoring (Affusso et al., 2022).

The remainder of the paper is organized as follows. Section 2 describes the institutional setting including some background on the Dutch study system and detailed information regarding the reform. Section 3 explains the methodology, after which Section 4 describes the data and presents summary statistics. Baseline estimation results and robustness checks are shown in Section 5. Section 6 concludes the paper.

2. Institutions

2.1. Financing of tuition

The Dutch university system mainly consists of public universities.[5] where tuition fees are highly subsidized. Tuition fees are typically around 2000 euros per year and can be paid in monthly installments by the student. Public support in the form of government loans and allowances are generally available and are the main source of financial support for students to (partially) cover tuition fees and living expense. The combination of low tuition fees, high public support, and favorable

---

[1] Dynarski, 2003; Kane, 2003; Cornwell et al., 2006; Abraham & Clark, 2006; Lochner & Monge-Naranjo, 2011; Dynarski & Scott-Clayton, 2013; Johnson, 2013; Castleman & Long, 2016; Ionescu & Simpson, 2016; Barr et al., 2021. Similar to student loans, parental transfers are important for college decisions (Keane & Wolpin, 2001).

[2] This is also confirmed by exogenous heterogeneity in tuition fees (Garibaldi et al., 2011). More generally, Dahl and Lochner (2012) find that parental income is important for children's educational achievements.

[3] E.g. Rosenzweig & Wolpin, 1994; Cox et al. 1998; Di Tella & MacCulloch, 2002; Schoeni, 2002; Cox et al., 2004; Jensen, 2004; Reil-Held, 2006, Juarez, 2009.

[4] In this way the government aimed to prevent a negative income shock after losing the right to claim study allowances after four years.

[5] Only one of the in total 14 traditional universities is private in the Netherlands (Nyenrode Business University).

Table 1
Sources of financial support from the government (euros per month).

	Living away from parents	Living with parents
Basic allowance	291	104
Supplementary allowance[a]	275	253
Maximum loan for tuition fees	165	165
Maximum regular loan	302	302
Total	1033	825

[a] Only for students whose parents' total gross income is below 46,000 euros per year, although the maximum total income allowed for supplementary allowances increases depending on the number of children studying.

borrowing rules causes the students' dependence on private borrowing and grants to be very low. For a complete overview of students' public support in our period of analysis, we refer to Table 1. Public support depends on 1) parental income and 2) whether the student lives at home or away from their parents. In addition to these allowances, students could opt for a loan for tuition fees (165 euros per month) and borrow additional money up to about 300 euros per month.

Altogether, the extensive public financial support aims to give students a cement standard-of-living instead of solely financing the ability to pay for tuition fees (which are already highly subsidized). In case students only receive a basic allowance and make no use of student loans, they receive 3492 euros per year (Table 1: 12 * 291 euros) which already exceeds the yearly tuition fee. As a consequence, student loans are likely to be used to bring consumption forward, as suggested to be optimal by the Life-Cycle Hypothesis, instead of providing the bare minimum to be able to pay tuition fees. Similarly, topping up students' income with earning from work is typically less necessary than in an educational system in which students' allowances and loans to not fully cover tuition fees.

2.2. Study programs

For comparison of groups and identification of causal effects (explained in Section 3.1), we solely focus on fourth and fifth-year students enrolled in a bachelor's program at a university in the Netherlands. Regular bachelor's programs typically have a curriculum that spans three years,[6] Only special dual degree programs offer a curriculum that covers four years. At the bachelor's level, no programs offer a curriculum of less than three or four years, respectively. By focusing on fourth and fifth-year students, we therefore analyze students who take a little longer than the nominal duration of their studies. However, this is fairly common in the Netherlands: only 26.4% of all university students graduated within the nominal three years in 2009 (prior to the reform we study).[7]

2.3. Reform in student loans

In this paper, we exploit a reform in student loan policy that was introduced in 2009. From 2009 to 2012, there were no other substantial reforms that affected the groups of students that were affected by the 2009-reform. The reform was particularly introduced to make students more aware of their debt decisions as debt was increasing among youngsters in the Netherlands and was not explicitly meant to be a budget cut during the Financial Crisis.

Students receive study allowances for four years, which means most students start borrowing more in their fifth-year. Before the reform in 2009, when students started their fifth-year of their bachelor's program, DUO automatically converted the allowance into the maximum student loan to prevent a sudden income loss. About 70% of these students

entering their fifth-year did not change the default of borrowing and, hence, automatically borrowed the maximum amount (Van der Steeg & Waterreus, 2015). After the reform in 2009, the default student loans as of the fifth-year of the bachelor's program was lowered to the former allowance plus the most recent loan. In sum, this amount is lower on average than the maximum borrowing amount because about 75% of students did not borrow at all prior to their fifth-year. Nonetheless, students could still easily opt for a maximum loan via the website of the public student loan administration (DUO), but had to actively login and change the amount of student loans.[8]

The change in the default student loans as of 2009 resulted in substantially lower student loans. This change in default gives exogenous variation in student loan claiming. The change in default student loans in 2009 is a matter of choice architecture rather than a borrowing constraint, since students can adjust the amount of the student loan on a monthly basis by logging in at the DUO website. The persistent lower average student loan can therefore be attributed to a behavioral adjustment in response to the change in default. Descriptive evidence based on administrative records of DUO, Van der Steeg and Waterreus (2015) find that the change in defaults decreased the percentage of students with a maximum student loan from 68% to 11% (minus 57 %-points). The average student loan decreased from 666 to 537 euros per month (minus 129 euros).

3. Method

This study exploits the 2009-reform, described in Section 2.3. First, in Section 3.1, we investigate the effect of the decline in the default student loan on actual student loan debt. Second, Section 3.2 explains how we use the exogenous variation in student loan debt to analyze the causal effect of student loans on intergenerational transfers, employment and spending (reported in Section 5.1), spending patterns (reported in Section 5.3), and academic performance (reported in Section 5.4).

3.1. Student loan claiming

To analyze the causal effect of a decline in the default student loan on actual student loan debts we use a Difference-in-Differences (DD) approach. The treated group in our DD approach consists of all university students aged over 21 who are entering their fifth academic year of their bachelor's program and, hence, no longer receive a basic allowance. The control group consists of all fourth-year university students aged over 21 who are not subject to the reform.[9] These two groups should be comparable since both groups take longer than the nominal three years of their bachelor's program. The treatment period starts in the academic year 2009/2010.

We estimate

$$L_i = \alpha_0 + \alpha_t + \beta G_i + \gamma DD_i + X_i' \mu + \in_i \qquad (1)$$

where L_i is the monthly loan (in euros) taken out by student i in period t. α_0 is the intercept and α_t a set of year fixed effects. G equals 1 for the treated group and 0 for the control group, DD_i is a dummy variable indicating whether individual i is in the treatment group during the treatment period, and X_i is a vector of control variables with coefficients μ. We assume the error term $\in_i$ to follow a normal distribution with

---

[6] In our data, three-year programs are about 85% of all university programs.
[7] https://www.cbs.nl/nl-nl/longread/statistische-trends/2021/hoe-ver gaat-het-studenten-in-het-leenstelsel-/3-resultaten.

[8] All higher education students receive extensive information from DUO at the start of their studies about how to log in and receive/change monthly student loans. Also, the basic and supplementary allowance are registered through the DUO website. Hence, all student are aware of the DUO website in the Netherlands.
[9] We present robustness checks with a smaller age window for those aged 22-23 in Table A6 in the Appendix.

Table 2
Summary statistics of characteristics by treatment and control group.

	Control period				Treatment period				DD
	Control group		Treatment group		Control group		Treatment group		
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	
Control variables									
Age	22.97	1.32	24.13	1.02	22.41	1.44	23.68	0.92	0.11
Male (0–1)	0.48	0.50	0.50	0.50	0.41	0.49	0.41	0.49	0.02
Immigrant (0–1)	0.10	0.30	0.10	0.31	0.10	0.30	0.08	0.26	−0.02
Other sample characteristics									
Low inc. parents (0–1) [a]	0.10	0.30	0.10	0.30	0.04	0.19	0.07	0.26	0.03
High inc. parents (0–1) [b]	0.51	0.50	0.51	0.50	0.56	0.50	0.49	0.50	−0.07
Observations	3887		1101		1144		212		

*denotes significance at the 10% level.

**at the 5% level.

***at the 1% level.

[a] Lower than 1400 euros net per month.

[b] Higher than 3499 euros net per month.

mean zero and variance σ_L^2. The control variables are age, sex, immigrant, and a dummy for university education (versus higher vocational training).

The coefficient of primary interest is the treatment effect (γ). If γ is not significantly different from zero, we conclude that students are not sensitive to the changed default in student loans. If γ is significantly negative we conclude that students are responsive to the default setting in student loans. γ should be interpreted as a Local Average Treatment Effect (LATE). Students targeted by the reform (i.e. students entering their fifth-year of the bachelor) can be compliers and non-compliers. Compliers are the fifth-year students who were affected by setting the default of their loan to zero and who did not actively change this by logging into their DUO account. Non-compliers are those fifth-year students affected by the reform who either actively logged in their DUO account and changed their student loan to pre-reform levels or who maximized their borrowing prior to their fifth-year. Such non-compliers can be considered more financially constraint than compliers.

The parallel trend assumption is crucial in to identify γ. We provide descriptive evidence for the parallel trend assumption in Section 4.2. Furthermore, we test the parallel trends assumption more formally using placebos in the empirical analysis in Section 5.2.1.

Although the reform falls right within the period of the Great Recession, we believe this is not a threat to our identification. We provide empirical evidence for this in Section 5.2.2.

3.2. Earnings, spending, and parental contributions

We investigate how student loans affect earnings, consumption spending, and parental transfers. Estimating the effect of student loans on such behavior using OLS, however, would lead to biased results because of possible endogeneity. For example, debt aversion of parents may influence both parental contributions and student loan take-up (third factor), and earnings may lower student loans (reverse causality). We use an instrumental variable to address the issue of endogeneity. As an instrument we use the reform described in Section 2.3, as it is likely to explain student loans claims (relevant instrument), but does not affect earnings, spending, and parental contribution decisions other than through student loans (valid instrument). We estimate Eq. (1) simultaneously with Eqs. (2), (3) and (4) using Full Information Maximum Likelihood (FIML)

$$T_i = \theta_{T0} + \theta_{Tt} + \delta_T L_i + \rho_T G_i + X_i' \varphi_{TX} + u_{Ti} \tag{2}$$

$$E_i = \theta_{E0} + \theta_{Et} + \delta_E L_i + \rho_E G_i + X_i' \varphi_{EX} + u_{Ei} \tag{3}$$

$$C_i = \theta_{C0} + \theta_{Ct} + \delta_C L_i + \rho_C G_i + X_i' \varphi_{CX} + u_{Ci} \tag{4}$$

Where T_i represents the parental contribution in euros received by student i, E_i are the earnings in euros, and C_i consumption spending in euros of student i. θ_{T0}, θ_{E0} and θ_{C0} are the intercepts, and θ_{Tt}, θ_{Et} and θ_{Ct} represent year fixed effects. The error terms u_{Ti}, u_{Ei}, and u_{Ci} together with $\in_i$ are assumed to follow a multivariate normal distribution with mean zero and variances σ_E^2, σ_C^2, and σ_T^2 for earnings, consumption, and parental transfers, respectively.[10] The FIML allows for arbitrary correlation between the error terms.

We are particularly interested in the coefficients δ_T, δ_E, and δ_C, which measure the response in parental transfers, earnings, and consumption spending, respectively, to a one euro change in student loan. For example, $\delta_T = 1$ would suggest full substitution between student loans and parental transfers. δ_T between zero and one would suggest partial substitution between student loans and parental transfers. The coefficients δ_E, δ_C, δ_T are identified by the policy reform modeled in Eq. (1). In addition to the baseline estimates, we decompose T_i and C_i into several categories, such as cash and in-kind transfers from parents to their children, and students' spending on housing, leisure, and study materials. Furthermore, we show results for extended five-equation models, in which we analyze the effects of student loans on students' academic performance.

The models in this paper are estimated with FIML, which assumes normal errors. We also estimate Eq. (1)-(4) using 2SLS which does not assume normal errors. However, this does not alter our main conclusions as we empirically show in Section 5.2.

4. Data

4.1. Student monitor

To analyze the impact of student loans on financial behavior, earnings, and parental contribution of students, we use the Student Monitor for Higher Education 2005–2015 (in Dutch: "*Studentenmonitor*").[11] This is a yearly online survey that is fielded at the request of the Ministry of Education, Culture and Science by ResearchNed. The survey was initiated in 2000 in light of the Eurostudent Project which aims to keep track of the socioeconomic traits of students.[12] In 2010, the survey was not fielded. The survey covers approximately 15 topics, and the most relevant ones for this research are: current education, study progress, personal traits, socioeconomic background, characteristics of parents, income and expenses, earnings, and time allocation. Topics and

---

[10] Our main conclusions do not alter if we assume a log-normal distribution, except that we find stronger effects on earnings (not reported here).

[11] See http://www.studentenmonitor.nl/over/over1.htm.

[12] See http://www.eurostudent.eu/about/intentions.

Table 3
Summary statistics of dependent variables by treatment and control group.

	Control period				Treatment period				DD
	Control group		Treatment group		Control group		Treatment group		
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	
Financial variables (euros/m)									
Student loan	142.13	222.44	327.07	332.21	157.86	210.86	217.58	273.39	−125.23***
Spending									
- Total	881.92	505.17	906.67	356.74	706.04	375.72	694.71	402.60	−36.08
- Housing	241.91	272.01	216.09	145.01	220.69	175.14	205.94	181.21	11.07
- Living	259.85	185.81	274.16	168.13	154.17	102.26	149.57	102.76	−18.90
- Leisure	82.76	82.68	95.92	83.20	68.60	56.60	70.01	59.83	−11.76*
- Cellphone	33.74	34.09	37.98	32.38	28.49	18.70	29.37	18.22	−3.31
- Commuting	23.46	45.06	24.00	46.37	17.83	31.18	19.02	34.93	0.66
- Other	28.96	58.45	36.95	62.12	47.71	71.61	37.38	65.17	−18.32***
- Tuition	47.64	61.02	54.94	62.18	62.55	69.29	69.65	69.26	−0.20
- Study materials	28.95	19.92	31.16	21.72	17.29	18.34	20.18	18.58	0.67
- Insurances	58.05	45.44	56.06	44.25	34.80	50.78	37.54	52.93	4.73
- Other large	76.55	75.29	79.41	79.89	42.74	54.05	32.02	44.31	−13.59***
Earnings	222.70	278.94	320.64	335.26	222.73	223.09	316.87	319.73	−3.79
Parental contributions									
- In-cash	164.22	180.41	146.67	186.02	153.29	179.34	191.22	239.27	55.48***
- In-kind									
- Total	417.37	166.74	397.33	148.86	262.32	269.61	278.05	280.09	35.78
- Housing	179.90	119.28	161.09	113.03	87.59	163.05	109.38	164.18	40.60**
- Living	34.71	34.03	33.94	32.62	22.13	63.77	31.69	74.37	10.32*
- Tuition	123.02	17.66	120.20	24.02	75.35	69.56	65.30	69.19	−7.24
- Study mat.	27.26	19.58	25.64	19.95	8.12	15.72	5.97	13.37	−0.53
- Insurances	52.14	36.70	46.75	36.40	21.61	38.84	19.30	37.37	3.09
Academic performance									
Duration (months)[1]	54.20	5.12	57.52	3.19	53.41	5.18	56.56	4.31	−0.17
GPA (1–10)	6.96	0.64	6.93	0.61	7.01	0.59	7.18	0.59	0.21***
Time studying[2]	25.10	14.12	21.40	13.10	31.68	13.65	31.16	12.93	3.19***
Subj. prob. diploma (1–11)[3]	10.48	1.31	10.41	1.44	10.62	1.00	10.62	1.18	0.06
Observations	3887		1101		1144		212		

* denotes significance at the 10% level.
** at the 5% level.
*** at the 1% level.

[1] "How many months have you been enrolled in higher education in total excluding the months you unenrolled?"

[2] Time studying includes both contact hours and hours of self-studying: "How much time do you spend on contact hours and self-study during college weeks per week, on average?"

[3] "What probability do you give yourself to achieve the final degree of your educational program?" The data set organizes the answer to this question in to 11 categories: (0 thru 4 = 0) (5 thru 14 = 10) (15 thru 24 = 20) (25 thru 34 = 30) (35 thru 44 = 40) (45 thru 54 = 50) (55 thru 64 = 60) (65 thru 74 = 70) (75 thru 84 = 80) (85 thru 94 = 90) (95 thru 100 = 100).

questions have been subject to some changes over the years due to changes in the college system and student loan system. The most prominent change was due to the introduction of the Bachelor-Master structure in higher education in 2002. Although the survey provides many detailed subcategories of income and consumption it should be noted that values are self-reported. It is trustworthy that the average total consumption spending that is reported in our data is fairly comparable to the average reported expenditures reported by the Dutch Institute for Budget Analysis, Nibud (2015), based on a different survey.

Data collection occurs yearly around spring (May/June). Students are selected based on stratified sample selection. The data set runs from 2001 to 2015, totaling a number of 186,665 respondents. For comparison of treatment and control groups we only keep fourth and fifth-year students enrolled in a bachelor's program at a university in the sample for whom our dependent variables are observed, as those are most comparable. This particular information if only available from 2005–2012. Hence, we use our selected sample in the years 2005–2012 which gives us a final sample of 5569 students.

The response rate varies substantially by year, but is at least 26% and at most 50%. According to ResearchNed, the size of the response is sufficiently reliable to draw generalized conclusions for the Dutch student population. Conclusions from the Student Monitor have been used in official government statistics and reports from the Ministry of Education (Ministerie OCW, Onderwijs, Cultuur en Wetenschap). The most important use of the Student Monitor is OCW's yearly Monitor Policy

Measures (Monitor Beleidsmaatregelen) which provides information on the development and dynamics of Dutch higher education, including the students' perspectives.[13]

4.2. Summary statistics

In Table 2, we show the mean and standard deviations of observed characteristics in the control and treatment groups, both before and after the reform. In this way, Table 2 describes the composition of the sample. In the final column we present a simple Difference-in-Differences analysis (DD) on the observed characteristics thereby performing a balancing test. In the final column of Table 2 none of the variables are statistically significant. For the sake of completeness, in Figs. A6-A10 in the Appendix we show the trends in observed characteristics for both the control and treatment groups. In line with Table 2, these figures do not suggest differential trends after the reform, compared to the situation before the reform.

Similar to Table 2, Table 3 presents summary statistics of variables by control period, treatment period, control group, and treatment group, but focuses on the dependent variables of our analysis. This allows us to do a simple DD for the dependent variables which are presented in the
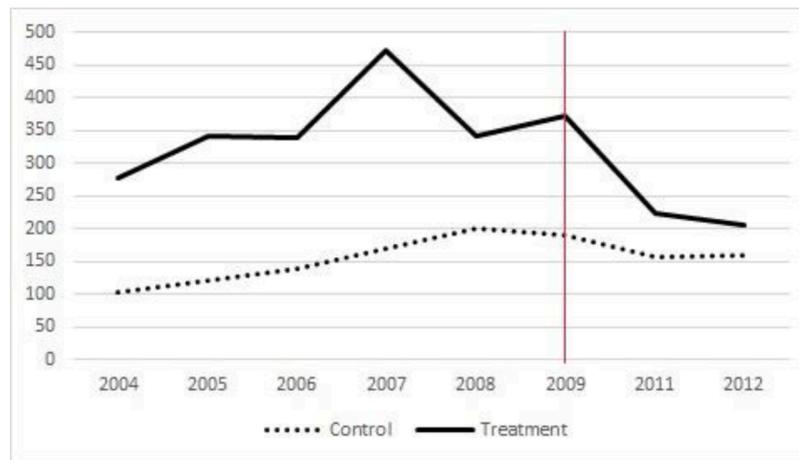
Fig. 1. Average student loans for the treatment and control group over 2004–2012 (euros per month).
Source: Studentenmonitor 2004–2012. The survey was not fielded in 2010.

Table 4
Estimation results of the Simultaneous Equation Model.

	Student loan		Parental transfers (in-cash)		Earnings		Spending	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Student loan (δ_T, δ_E, and δ_C)			−0.43 ***	0.14	0.20	0.20	0.61 *	0.32
Change in default (γ)	−141.25 ***	23.46						
Observations	5569		5569		5569		5569	
F-stat. excl. instrument	33.37							

**at the 5% level.
 * denotes significance at the 10% level.
 *** at the 1% level. Year dummies and control variables are included. Control variables include age, sex, immigrant, group that is subject to the change in default.
Extended estimation results, including the correlation matrix of the error terms, can be found in the appendix (Table A2).

final column of Table 3. The results suggest that student loans decreased by about 125 euros per month because of the reform. Descriptive evidence shows that student loans are an important source of income for our treatment group prior to the reform, together with parental transfers and labor earnings (see Fig. A1 in the Appendix). As a consequence of the lower student loan, students spent about 12 and 18 euros per month less on leisure-related and 'other' (i.e. also related to leisure) expenses, and received about 55 euros per month more from their parents (in-cash), but also received in-kind transfers for their parents related to housing (41 euros) and living (10 euros). There is no significant DD for earnings.

For the development of student earnings, spending, and parental contributions over 2005–2012 we refer to Figs. A3-A6 in the Appendix. The crucial assumption in the identification of the DD is the Parallel Trend Assumption, i.e. the treatment group and control group should follow the same trend in absence of the treatment. Since the counterfactual is not observed we can analyze the trends of both groups prior to the reform. In Fig. 1 we present graphical evidence on the Parallel Trend Assumption. Although students in the treatment group have substantially higher student loans, trends are fairly similar. Visually, it looks as if there is a small deviation in trends in 2007. However, our formal placebo test in Section 5.2.1 rejects a statistically significant different trend as of 2007. After 2009, as expected, we see a substantial drop in student loans in the treatment group.

This means that those who were affected by the change in the choice architecture of borrowing (fifth year students) largely complied by lowering their student loans, i.e. students who were affected by setting

the default of their loan to zero and who did not actively change this by logging into their DUO account. Potential non-compliers consists of 1) those students affected by the change who actively logged in their DUO account and changed their student loan to pre-reform levels and 2) students who borrowed the maximum amount prior to entering their fifth-year. The second group of non-compliers is likely to be small as only a quarter of all students borrow before entering their fifth-year (Van der Steeg & Waterreus, 2015). Non-compliers are more likely to be financially constrained.

Compared to the treatment group, we also see a drop in student loans among the control group (fourth-year students), albeit smaller than for the treatment group. According the reform, these students should be largely unaffected. However, it is not unthinkable that that the control group may have learned about the change through information of fellow students and interpreted the change as a negative connotation to student debt. As a consequence, they may have decided to actively login to their DUO account and lower their student loans. In the presence of such spillover effects, our estimated effects of the reform on student loans (γ in Eq. (1)) should be interpreted as a lower-bound of the effect.

5. Estimation results

5.1. Baseline results

Table 4 presents the estimation results. We find that the change in the student loan default reduced student loans on average by (γ =) 141 euros per month. Although non-compliance to the reform is possible (see

Table 5

Estimation results using 2SLS.

	Student loan		Parental transfers (in-cash)		Earnings		Spending	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Student loan			−0.44 ***	0.13	0.33 *	0.18	0.61 **	0.27
Change in default	−166.59 ***	26.33						
Observations	5569		5569		5569		5569	
F-stat. excl. instrument	40.01							

* denotes significance at the 10% level.
** at the 5% level.
*** at the 1% level. Year dummies and control variables are included. Control variables include age, sex, immigrant, group that is subject to the change in default.

Table 6

Estimation results of the Simultaneous Equation Model including in-kind transfers from parents.

	Student loan		Parental transfers (in-cash + in-kind)		Earnings		Spending	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Student loan (δ_T, δ_E, and δ_C)			−0.52	0.34	0.20	0.20	0.58*	0.32
Change in default (γ)	−141.23***	23.47						
Observations	5569		5569		5569		5569	
F-stat. excl. instrument	36.24							

**at the 5% level.
* denotes significance at the 10% level.
*** at the 1% level. Year dummies and control variables are included. Control variables include age, sex, immigrant, group that is subject to the change in default.
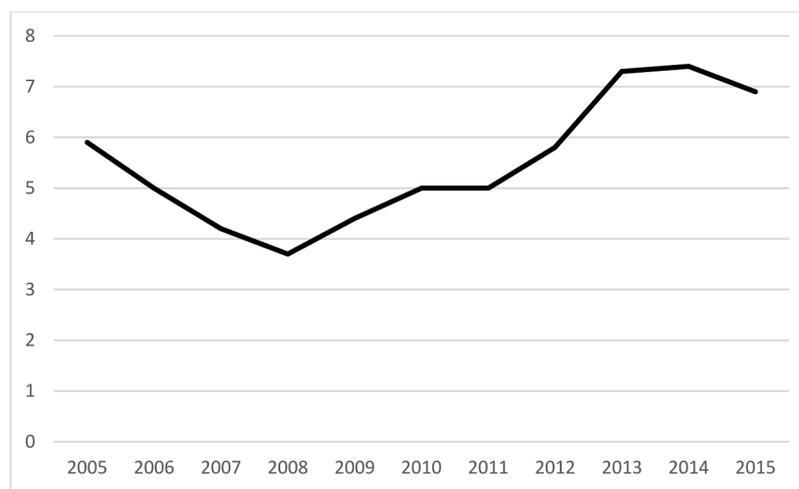
Fig. 2. Development of the unemployment rate, 2005–2015 (in %).
Source: Statline, Statistics Netherlands.

Section 2.3: by either actively logging in their DUO account and changing the loan to pre-reform levels or by maximizing loans prior to the reform), our negative estimate of 141 euro's per month suggests that most students complied to the reform by accepting (and not actively logging in their DUO account and changing their loan) the new default loan. Compared to the average student loan in the treatment group prior to the treatment (Table 3:327 euros per month), this decrease of 141 euros is relatively substantial.

Students' parental contributions increased by 43 eurocents for each euro reduction in student loan. Hence, students received about 61 euros per month extra from their parents (141 × 0.43) on top of the average of about 147 euros per month in the treatment group prior to the treatment. Therefore, the relatively increase in parental contributions is fairly substantial. We do not find such substitution effects between student loans and student earnings. Students spending, however, decreased; for each euro decline in student loans, students reduced their consumption spending by 61 eurocents. On average, the decline in

student loans implied a decline of 86 euros of spending (141 × 0.61) compared to the average spending in the treatment group prior to the treatment of about 907 euros per month. This means that the total decrease in spending is less than 10%.[14]

Our estimation results, estimated by FIML, are comparable to estimates using 2SLS, which does not assume the equation errors to have a multivariate normal distribution. In Table 5, we present the estimation results using 2SLS and find that FIML estimates tend to be a bit smaller than 2SLS. According to 2SLS, the reform reduced student loans by 166 euros per month. Every euro of reduced student loan is replaced by 44

[14] In Table A3 in the Appendix, we show that these estimation results are robust to narrowing the age-window of the sample to 22-23. This age-window ensures that the sample consists of students who do not have a highly deviant career path. Similarly, we restrict the sample to students without a migration background in Table A4.

Table 7

Testing for differential recessionary effects of the reform on student loans.

	Student loan		
	Coeff.		S.E.
ΔUnemployment rate	−5.56		10.63
Treatment group (β)	163.59	***	14.97
Interaction	−29.77		21.64
Treatment effect (γ)	−129.71	***	28.78
Observations	4302		
F-stat. excl. instrument	39.93		

*denotes significance at the 10% level.

**at the 5% level.

*** at the 1% level. Year dummies and control variables are included. `Interaction' means the interaction between ΔUnemployment rate and Treatment effect.

Table 8

Testing for differential recessionary effects of the reform on sample composition.

	Age		Gender		Migrant	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
ΔUnemployment rate	−0.09*	0.05	0.01	0.02	0.09***	0.02
Treatment group (β)	1.36***	0.05	0.00	0.02	−0.01	0.02
Interaction	0.38***	0.07	0.00	0.03	0.00	0.02
Treatment effect (γ)	−0.77***	0.07	0.06	0.05	−0.05*	0.03
Observations	5004		5004		5004	
F-stat. excl. instrument	228.97		0.54		12.20	

* denotes significance at the 10% level, ** at the 5% level and *** at the 1% level. Year dummies and control variables are included. `Interaction" means the interaction between ΔUnemployment rate and Treatment effect.

	Low inc. parents (0–1)			High inc. parents (0–1)		
	Coeff.		S.E.	Coeff.		S.E.
ΔUnemployment rate	0.07	***	0.02	−0.17	***	0.03
Treatment group (β)	−0.02		0.03	0.01		0.04
Interaction	0.02		0.03	0.01		0.06
Treatment effect (γ)	0.04		0.05	−0.04		0.10
Observations	1519			1519		
F-stat. excl. instrument	3.86			7.54		

Table 9

Effect of student loans on several consumption spending categories, paid by students and their parents.

	Paid by student		Paid by parents	
Dependent variables	Coeff.	S.E.	Coeff.	S.E.
Monthly spending (euros)				
Housing	0.10	0.18	−0.26 *	0.14
Living	0.16	0.12	0.01	0.04
Leisure	0.07	0.06	n/a	n/a
Cellphone	0.01	0.02	n/a	n/a
Commuting	0.02	0.03	n/a	n/a
Other expenditures	0.15 ***	0.05	n/a	n/a
Yearly spending normalized to monthly (euros)				
Tuition fee	0.02	0.05	−0.03	0.04
Study material	0.01	0.01	−0.01	0.01
Insurances (ex. health insurance)	0.06	0.03	−0.02	0.03
Other large expenditures	−0.01	0.01	0.05	0.04

Earnings and parental transfers are not reported here. Control variables include age, sex, immigrant, group that is subject to the change in default. Living paid by parents includes clothing. We omitted expenditures on children as this category is only important to a few students.

**at the 5% level.

* denotes significance at the 10% level.

*** at the 1% level.

Table 10

Effect of student loans on academic performance.

	Academic performance		
Dependent variables	Coeff.		S.E.
Time studying (h/w)(/100)[1]	0.38		0.96
Duration (months)[2]	0.03		0.32
GPA (1–10)(/100)	−0.13	***	0.05
Subjective probability diploma (1–11)(/100)[3]	−0.10		0.09

Year dummies and control variables are included. Control variables include age, sex, immigrant, university, group that is subject to the change in default, and field of study dummies. Errors are allowed to be correlated with student loans, parental transfers, earnings, and spending.

*denotes significance at the 10% level.

**at the 5% level.

*** at the 1% level.

[1] Time studying includes both contact hours and hours of self-studying: "How much time do you spend on contact hours and self-study during college weeks per week, on average?"

[2] "How many months have you been enrolled in higher education in total excluding the months you unenrolled?"

[3] "What probability do you give yourself to achieve the final degree of your educational program?" The data set organizes the answer to this question in to 11 categories: (0 thru 4 = 0) (5 thru 14 = 10) (15 thru 24 = 20) (25 thru 34 = 30) (35 thru 44 = 40) (45 thru 54 = 50) (55 thru 64 = 60) (65 thru 74 = 70) (75 thru 84 = 80) (85 thru 94 = 90) (95 thru 100 = 100).

Table 11

Estimation results for different definitions of total leisure-related spending.

		Spending		
		Coeff.		S.E.
Leisure + Other	Student loan	0.24	***	0.09
Living + Leisure + Other	Student loan	0.39	**	0.18

Year dummies and control variables are included. Control variables include age, sex, immigrant, group that is subject to the change in default, and sector of study dummies. Errors are allowed to be correlated.

*denotes significance at the 10% level.

** at the 5% level.

*** at the 1% level.

eurocents parental contributions and reduces spending by 61 eurocents. Using 2SLS, our results also suggest that students slightly increase earnings by 33 eurocents to compensate for every euro of student loans less. This effect is just-significant.

Next, in Table 6, parental contributions not only include in-cash transfers, but also include consumption spending directly paid by the parents. Including such in-kind transfers increases the substitution between student loans and parental contribution from 0.43 to 0.52. However, standard errors are much larger when taking into account in-cash and in-kind transfers jointly, rendering the total of parental transfers statistically insignificant.

5.2. Identification checks

5.2.1. Placebo test

In Section 4.2 we presented descriptive evidence regarding the parallel trends assumption. In this section, we test the parallel trend assumption more formally by estimating a 'placebo-treatment' for years prior to the actual treatment. Although Fig. 1 largely shows similar trends between control and treatment groups, the trends seem to differ somewhat in 2007. Therefore, we perform a placebo test for the years 2005–2009 in which we assume that the treatment was introduced in 2007. The coefficient of this placebo is much smaller than in the baseline regression (−27 instead of −141), and is not significant (p-value of 0.29). Therefore, we conclude that the parallel trend assumption cannot

Table A2

Full estimation results of the baseline regression model.

	Student loan			Parental transfers (in-cash)			Earnings			Spending		
	Coeff.		S.E.	Coeff.		S.E.	Coeff.		S.E.	Coeff.		S.E.
Student loan				−0.43	***	0.14	0.20		0.20	0.61	*	0.32
Change in default	−141.25	***	23.46									
Age	19.25	***	2.89	0.16		3.64	2.30		5.22	37.62	***	9.06
Male (0–1)	−9.25		6.62	−7.83		5.60	−17.74	**	8.04	−11.30		14.53
Immigrant (0–1)	33.47	***	11.45	−32.47	***	10.53	−15.40		15.13	−47.24	*	24.92
Group (0–1)	166.59	***	9.06	69.86	***	21.48	64.83	**	30.85	−128.82	***	49.33
Year 2006 (0–1)	30.69	***	9.58	30.83	***	8.89	11.63		12.76	40.13	*	23.84
Year 2007 (0–1)	77.30	***	12.26	49.34	***	14.34	0.83		20.59	38.00		35.53
Year 2008 (0–1)	99.36	***	14.62	49.88	***	17.94	24.81		25.76	74.30	*	43.48
Year 2009 (0–1)	97.37	***	13.11	73.17	***	16.86	33.87		24.21	118.37	***	41.19
Year 2011 (0–1)	52.35	***	10.89	26.25	***	9.97	13.24		14.33	−85.71	***	25.89
Year 2012 (0–1)	59.84	***	13.85	10.93		12.16	7.54		17.47	−124.82	*	30.50
Constant	−321.77	***	68.29	210.91	***	72.61	160.95		104.30	−98.70		183.49
	245.07	***	2.32									
	−0.20		0.16									
	−0.10		0.18									
	0.43	***	0.14									
	289.11	***	10.09									
	0.17	***	0.04									
	−0.17	**	0.07									
	427.99	***	9.08									
	0.03		0.08									
	206.19	***	5.09									
Observations	5569			5569			5569			5569		
F−stat. excl. instrument	33.37											

* denotes significance at the 10% level.

** at the 5% level.

*** at the 1% level.

Table A3

Estimation results for students aged 22–23 only.

|	Student loan		Parental transfers (in-cash)			Earnings		Spending	
	Coeff.	S.E.	Coeff.		S.E.	Coeff.	S.E.	Coeff.	S.E.
Student loan			−0.33	**	0.17	0.30	0.26	0.61	0.43
Change in default	−124.71 ***	26.76							
Observations	3616		3616			3616		3616	
F-stat. excl. instrument	21.72								

*denotes significance at the 10% level.

** at the 5% level.

*** at the 1% level. Year dummies and control variables are included. Control variables include age, sex, immigrant, group that is subject to the change in default, and sector of study dummies. Errors are allowed to be correlated.

Table A4

Estimation results for students without a migration background only.

	Student loan		Parental transfers (in-cash)			Earnings		Spending		
	Coeff.	S.E.	Coeff.		S.E.	Coeff.	S.E.	Coeff.		S.E.
Student loan			−0.43	***	0.15	0.20	0.21	0.77	**	0.35
Change in default	−135.81 ***	24.15								
Observations	5060		5060			5060		5060		
F-stat. excl. instrument	31.58									

*denotes significance at the 10% level.

** at the 5% level.

*** at the 1% level. Year dummies and control variables are included. Control variables include age, sex, immigrant, group that is subject to the change in default, and sector of study dummies. Errors are allowed to be correlated.

be rejected based on this placebo-test.

5.2.2. Great recession

Since the identification of the reform depends on pre-2009 and post-2009 information, it is likely that the reform has coincided with changes due to the Great Recession. In Fig. 2, we present the unemployment rate in the 2005–2015 period and observe a relatively marginal increase in the unemployment rate of 0.6%-points from 2009 to 2010 (developments in real GDP are shown in Fig. A11 in the Appendix). Although the Great Recession affected both students in principal similarly in the control and treatment group, students may responded differently to a recessionary period compared to normal periods. For
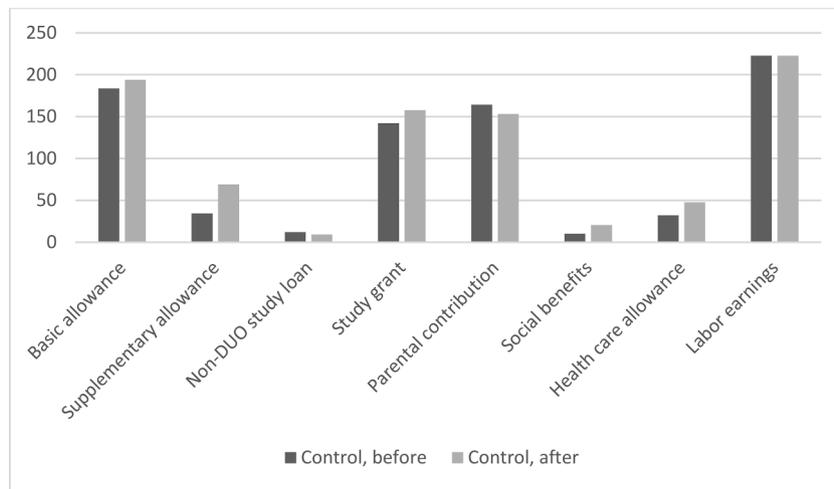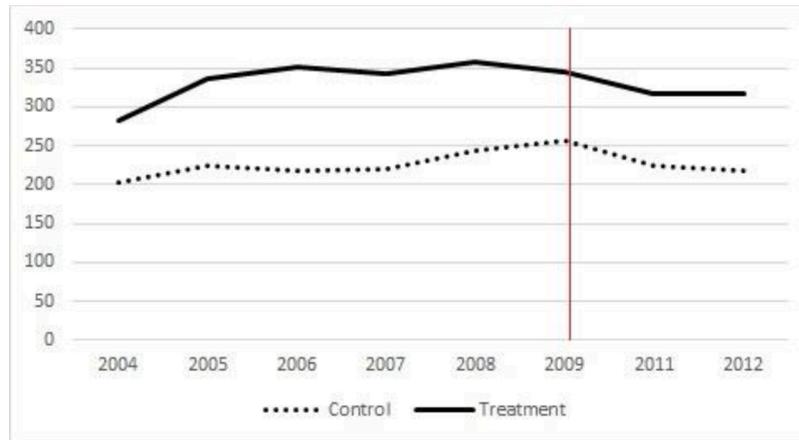
Fig. A1a. Averages of most important income sources for the control group (euros per month).
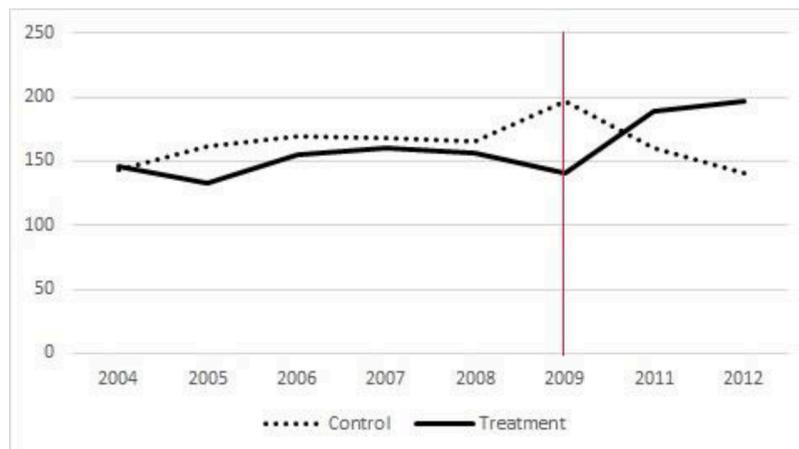Source: Studentenmonitor 2004–2012. The survey was not fielded in 2010.
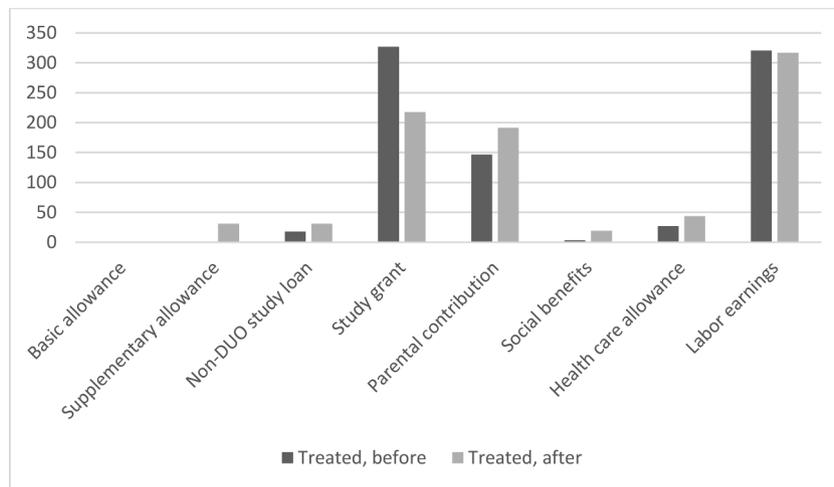
Fig. A1b. Averages of most important income sources for the treatment group (euros per month).
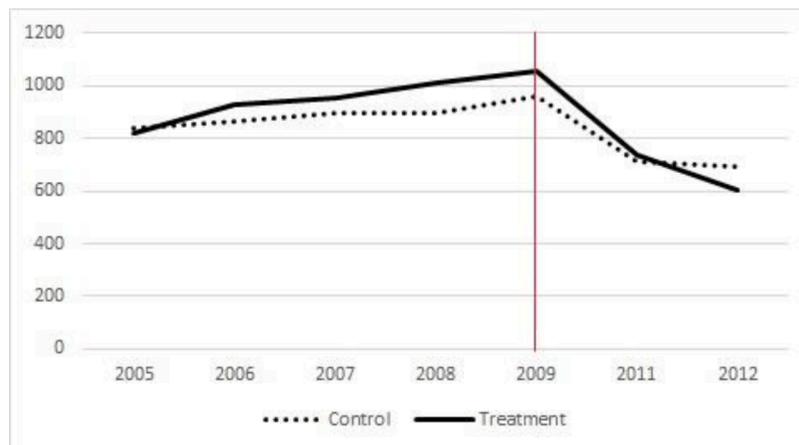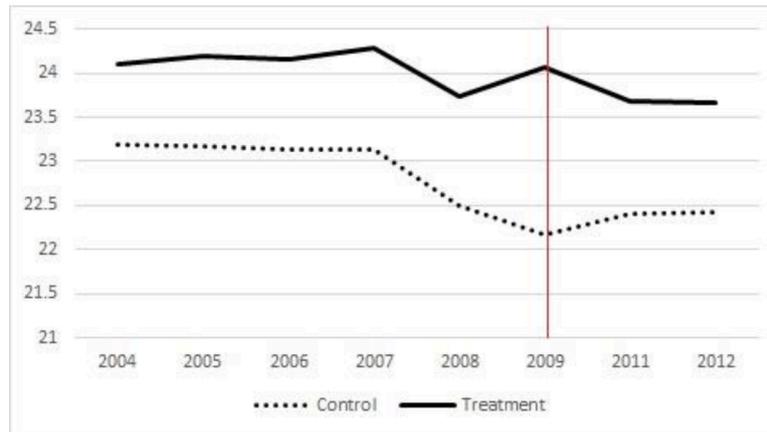Source: Studentenmonitor 2004–2012. The survey was not fielded in 2010.
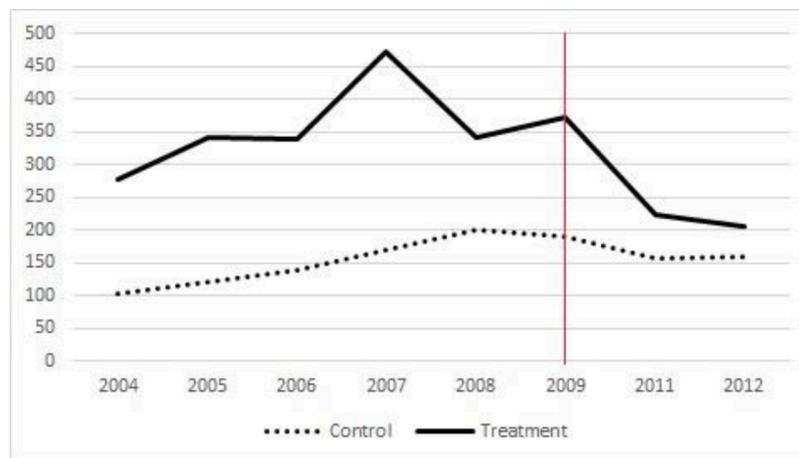
Fig. A2. Average student loans for the treatment and control group over 2004–2012 (euros per month).
Source: Studentenmonitor 2004–2012. The survey was not fielded in 2010.

Fig. A3. Average student earnings for the treatment and control group over 2004–2012 (euros per month).
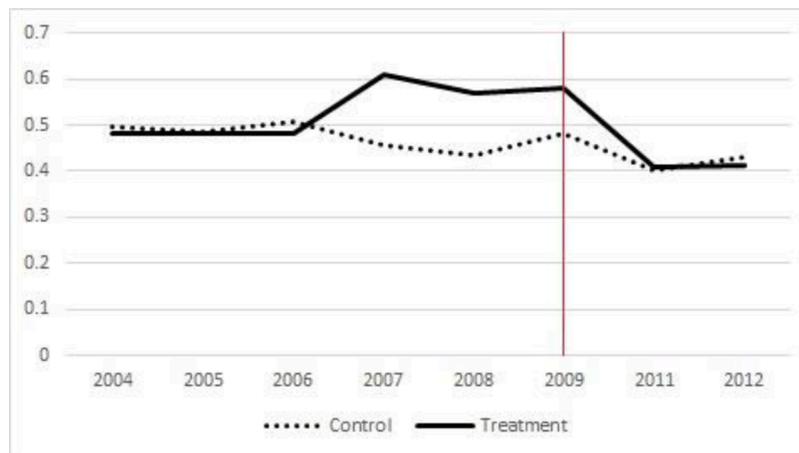Source: Studentenmonitor 2004–2012. The survey was not fielded in 2010.

Fig. A4. Average parental contribution for the treatment and control group over 2004–2012 (euros per month).
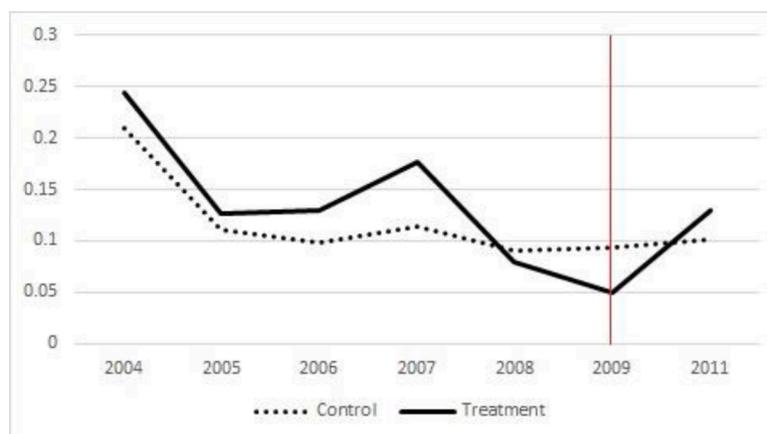Source: Studentenmonitor 2004–2012. The survey was not fielded in 2010.

Fig. A5. Average student spending for the treatment and control group over 2005–2015 (euros per month).
Source: Studentenmonitor 2004–2012. The survey was not fielded in 2010. Spending is only available as of 2005.
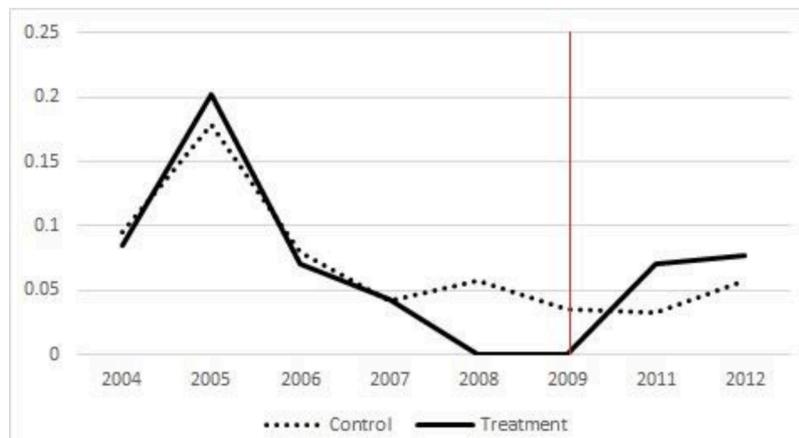
Fig. A6. Average age for the treatment and control group over 2004–2012.
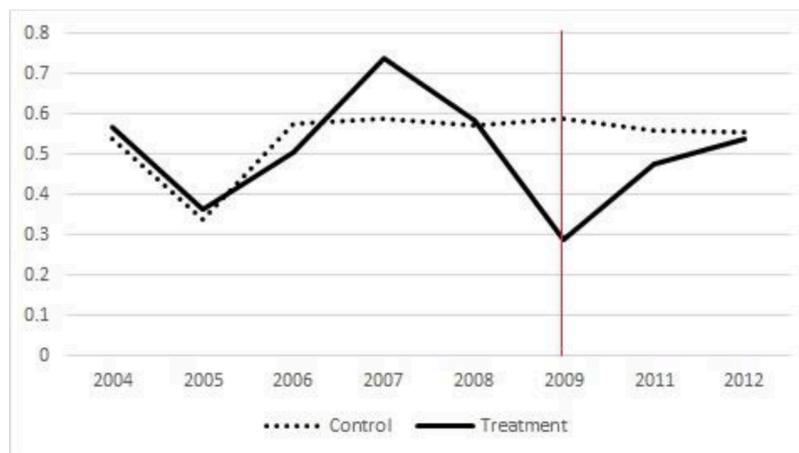Source: Studentenmonitor 2004–2012. The survey was not fielded in 2010.

Fig. A7. Average fraction of males for the treatment and control group over 2004–2012.
Source: Studentenmonitor 2004–2012. The survey was not fielded in 2010.

Fig. A8. Average fraction of students with a migration background for the treatment and control group over 2005–2012.
Source: Studentenmonitor 2004–2012. The survey was not fielded in 2010.

Fig. A9. Average fraction of students low-income parents for the treatment and control group over 2005–2012.
Source: Studentenmonitor 2004–2012. The survey was not fielded in 2010.

Fig. A10. Average fraction of students high-income parents for the treatment and control group over 2005–2012.
Source: Studentenmonitor 2004–2012. The survey was not fielded in 2010.
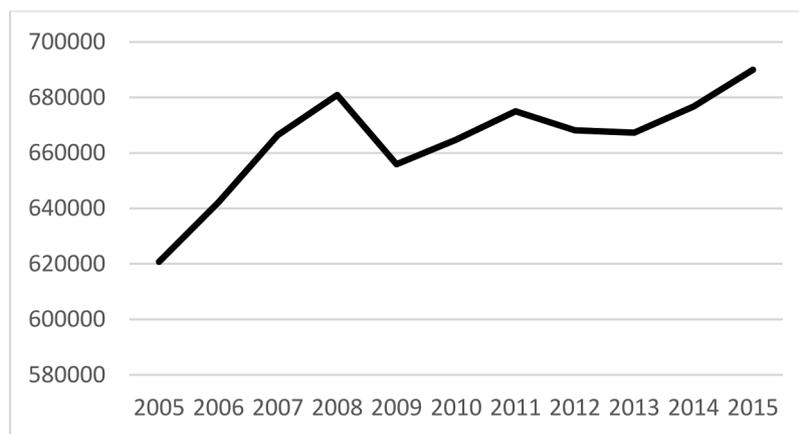
Fig. A11. Development of real GDP, 2005–2015 (in millions).
Source: Statline, Statistics Netherlands.

example, those treated later-year students who can afford it may wait for a better period to enter the labor market and postpone graduation. This may change the composition of control and treatment groups and pose a threat to the identification of our effect. We expect such effects to be small because the sample consists of bachelor's students, who are un-likely to worry about the labor market in 2009/2010 since in the

Netherlands most students pursue a master's degree immediately after graduating from their bachelor's.[15]

In this section we formally test 1) whether there are differential recessionary effects and 2) whether the sample composition changes due to the recession. In Table 7 we estimate a similar model as in Eqs. (1)-(4), but add the year-to-year change and its interaction with the treatment group indicator as variables. We find no statistically significant recessionary differential effects. Since taking into account such business cycle effects does not soak up the treatment-effect leaves us to believe that the Great Recession does not threaten the identification of our effects. Moreover, including this information of the business cycle does not alter our main conclusion that the reform substantially decreased monthly student loans.

To test for any composition effects of the Great Recession, we estimate similar models as in Table 7 except that we use the observed characteristics as the dependent variable. The estimation results are presented in Table 8. We find no differential effects on the composition of gender, migration background, and parental income in the treatment group due to the Great Recession. We do find a significant interaction between the treatment group and the change in the unemployment rate for age, suggesting that the treatment group is relatively older in times of high unemployment. Performing a robustness check on a sample of 22–23 year olds only (see Table A3) does, however, not alter our main conclusions suggesting that the differential age effects of the recession are not driving our conclusions. Estimates for the age group 22–23 are subject to somewhat larger standard errors due to a reduced number of observations.

5.3. Spending categories

Table 9 breaks down the total amount of spending into several consumption spending categories: housing, living, leisure, cellphone, commuting, tuition fees, study materials, insurances (e.g. health insurance), and other large expenses. The data include information on in-kind parental transfers in all consumption categories, except for leisure, cellphone, commuting, and other expenses. This means that we have information regarding students' and students' parental spending on the most substantial spending categories Total spending (both by the students and directly paid by their parents) from the baseline regressions is based on the pre-constructed variable in the data that asks respondents to sum total spending to the monthly level.[16]

In Table 9, we re-estimate Eq. (2) for each of the consumption spending categories available in the data. The left columns present the average change in students' spending in response to a one euro change in student loan. The right columns present the average change in spending directly paid by students' parents (in-kind transfers).

Table 9 indicates that student loans influence spending patterns of students. Although the effects of student loans on spending is relatively imprecisely estimated, we find a clear positive effect on 'other expenditures'[17] which are largely related to leisure: a one-euro decrease in student loans decreases other expenditures by 15 eurocents. In Table 10, we further investigate the effects of student loans on leisure-related spending by using different definitions of leisure-related spending.

Using the broadest definition of leisure-related spending, which includes spending on living, leisure, and other expenditures, we find that a one-euro decrease in student loans decreases leisure-related spending by 39 cents. We find no effects on study-related spending, implying that the spending cut may not have detrimental effects on students' academic performance (this is consistent with our analysis in Section 5). This is reasonable as students' allowances and loans are primarily targeted to ensure a decent standard of living (Section 2).

The parental in-kind transfers in Table 9 show that parents start paying part of the consumption expenses of their student children next to increasing their in-cash transfers. Monthly housing costs paid by the parents increase by 26 eurocents for a one-euro decrease in student loans. Hence, decreases in student loans not only result in changing consumption patterns of students, but also have consequences for consumption patterns of parents who, next to in-cash *inter vivos* transfers, start paying housing costs of their student children.

5.4. Academic performance

Bachmann and Boes (2014), based on an IV-estimation with lagged private transfers, suggest that when students receive more private transfers, they shift their allocation of time from working to studying. This shift may improve their academic performance, as suggested by evidence from Kalenkoski and Pabilonia (2010). Similar evidence has been found more recently by Marx and Turner (2019) and Barr et al. (2021). In the previous sections, we found that a reduction in student loans increased private transfers from parents, but had no overall effect on student earnings, consistent with prior evidence for the Netherlands from Belot et al. (2007). This likely implies that the number of working hours of the students stayed the same. However, due to the substitution of student loans by private transfers, moral hazard may decline. Parents may exert more monitoring on academic performance which may positively affect academic results (Affuso et al., 2022).

In this section, we extend the baseline model Eqs. (1)-(4). The baseline model defines a four-equation model. Table 11 presents estimation results for a five-equation model where we include additional equations for academic performance (time spend on studying, self-reported duration of studying since starting their studies, self-reported average grades (GPA), and self-reported probability of achieving the final degree of the study program).

Our estimation results suggest that there are no statistically significant effects on the aforementioned indicators of academic performance, except for the self-reported GPA. We find that a one-euro decrease in student loans increases students' GPA by 0.0013 on a 1–10 scale, which is an average increase of the GPA by 0.18 (141 × 0.0013). Compared to the average GPA of 6.93 (Table 3, treatment group prior to reform), this is an increase of about 2.5%. Based on these results, we can conclude that decreasing student loans did not have negative effects on academic performance. If anything, students earned a better GPA on average. This would be consistent with the decreased spending on leisure-related activities we find in Tables 9 and 10, although we do not find that decreased leisure-related spending led to increased time spend on studying in Table 11. However, the effects of student loans on time spend on studying is quite imprecisely estimated.

The effects on academic performance are consistent with the Dutch higher educational system in which students are relatively independent of student loans to pay their tuition fees. Below, we have a more in-depth discussion on the differences with prior research and the influence of the particular educational system in the Netherlands.

Our findings on the impact of decreasing student loans on academic performance of students contradict the conclusions drawn by Marx and Turner (2019) and Barr et al. (2021), whose results suggest that reducing student loans would lead to poorer academic performance among US community college students. We believe this difference can be explained by the strong differences in the (financing of) the educational systems as well as the particular reform we study.

---

[15] In 2015, 82% of the university students who finished their Bachelor, immediately pursued their Master's degree (Statistics Netherlands, 2021).

[16] The different categories do not perfectly add up to the total spending used in the baseline specification due to the fact that we have no information on all spending categories in all survey and because of the set-up of the data set. Total spending is asked as a monthly average. Spending categories can either be asked as a monthly average or an annual average (see Table 8). In the case of an annual average we normalize the spending category to a monthly average by dividing the annual amount by 12.

[17] The survey particularly mentions expenses related to gifts, cigarettes, accessories, apps, gadgets, etc.

The necessity of student loans to finance tuition costs is only small in the Netherlands (see Section 2). As a consequence, decreasing student loans most likely go at the cost of students' standard of living, but not at their access to studying or related resources. Ancillary questions in our data ask students about their reason to take up student loans. For our sample, we find that "favorable terms of the loans" and "being secured of income" are relatively important reasons to take up student loans. This is largely supported by our estimation results.

The compliers to the reform are those who can afford to choose not to maximize their student loans. Those most financially constrained can login to their DUO account and maximize loans (i.e. non-complier). Also, the results in Table 9 suggest that there are strong responses with respect to housing, both paid by students and their parents. Student housing is for many students considered to be a luxury and not a necessity in the Netherlands, because of relatively short distances, well-connected public transport to student cities, and free use of public transport for students. Since the reform does not actually lower the students' borrowing constraints, but only makes students more aware of their student debt, those students that are constrained can increase their student loan to the before-level. Similarly, despite the fact that the percentage students working is similar to the percentage in the US (OECD, 2012), it is unlikely that earnings from work are necessary to finance tuition costs. Similar to student loans, earnings are most likely only affecting the standard of living. Therefore, a decrease in student loans does not imply a larger necessity to increase earnings (empirically supported in Table 4). Since earnings do not respond to the change in student loans, available time to study is not affected either, which can explain why we find no negative effects. These findings are consistent with Belot et al. (2007) who analyzed a 1996-reform which reduced the maximum duration of allowances in the Netherlands and who did not find an effect on earnings and a positive effect on academic performance.

The positive effects on the GPA we find might be explained by (increased) parental monitoring. Firstly, half of the students in the Netherlands live with their parents.[18] This is only about 1 out of 4 in the US.[19] Parents, therefore, are likely to exert more control over their children's academic progress. The increased funding by parents in response to the reform is likely to further increase this parental monitoring. The literature generally finds that parental monitoring is important for students' academic performance (Affuso et al., 2022).

6. Conclusion

In this study, we aim to provide more insight into 1) the consequences of decreased student loans in a context where student loans are primarily used for living expenses, with a specific focus on the consequences for students' consumption behavior and 2) *inter vivo* transfers from parents, and, hence, the connection between public and private support for students.

To be able to estimate causal effects of student loans on student's financial choices, we exploit an exogenous decrease in default student loans provided by the government which had the main purpose to make students more actively aware of their debt behavior. First, we estimate the effect of the decline in the default student loan on the actual take-up of student loans using a Difference-in-Differences approach. Second, we use the exogenous variation in student loans, arisen from the decline in the default student loan, to identify the degree to which student loans affected students' consumption behavior and *inter vivos* income transfers from their parents. We estimate an instrumental variable (IV) model with the Difference-in-Differences design in the first-stage. By using the

Difference-in-Difference design in the first stage, we take into account period effects that coincide with the decline in the default student loan.

Although the change in default did not change students' credit constraints, we find that the average student loan is reduced on average by 141 euros per month. The results show that *inter vivos* intergenerational financial support contributes significantly in smoothing consumption at the early stage of the life-cycle. A one euro decline in student loan increases parental support with 43 cents.

Similarly, a one-euro decline in student loans decrease leisure-related expenditures by 39 eurocents. Student earnings are not significantly affected by changes in student loans, which is most likely related to the fact that students loans are primarily used to finance living expenses and not instructional expenses in the Netherlands.

This institutional context is also important in interpreting our extended models that show that the decrease in student loans did not negatively affect students' academic performance. Interestingly, decreasing student loans increases the (self-reported) average study grades. This finding contradicts many findings for the US, but is consistent with prior evidence for the Netherlands (Belot et al., 2007). We explain that this is likely a results of 1) the specific role of student loans in the Netherlands which are mainly to give students a decent standard of living and 2) increased monitoring of parents. There is empirical evidence that parental monitoring is important for students' academic performance (Affuso et al., 2022).

Our results have relevant implications for the design of student loan policies. We show that the choice design of student loans is extremely important for students and their parents. Debt behavior of students in higher education is highly responsive to changing defaults in borrowing facilities that do not affect the actual borrowing constraint. Such policy change is especially interesting because in this way, those students in need do not become more constrained, while those students who do not necessarily need the loan for instructional purposes enter the labor market with a smaller debt. This may have large consequences for the students involved, especially since student debt is taken into account when applying for a mortgage. Moreover, decreasing defaults in student loan borrowing reduces debt without having negative effects on academic performance which is explained by the fact that students particularly cut leisure-related expenses and not on instructional expenses. Parents seem to partially cover these decreases in leisure-related expenses, but this may raise inequality between students. Finally, our study shows that not only instructional costs but also non-instructional costs, such as housing, leisure, etc. may be an important motivation for students to take up student loans. If policy's goal is to limit debt among students, it should therefore also consider policy targeted at such expenses. For example, more subsidized housing for students.

Declaration of Competing Interest

None.

Data availability

The authors do not have permission to share data.

Appendix A. Additional Tables and Figures

References

Abbott, B., Gallipoli, G., Meghir, C., & Violante, G. L. (2019). Education Policy and Intergenerational Transfers in Equilibrium. *Journal of Political Economy, 127*(6), 2569–2624.

Abraham, K. G., & Clark, M. A. (2006). Financial aid and students' college decisions – Evidence from the District of Columbia Tuition Assistance Grant Program. *The Journal of Human Resources, XLI*(3), 578–610.

---

[18] https://studentenhuisvesting.incijfers.nl/mosaic/lms/1–huidige-studenten populatie-en-woonsituatie/.

[19] http://collegeaffordability.urban.org/prices-and-expenses/room-and-board /#/room_and_board_by_type_of_institution.

Affuso, G., Zannone, A., Esposito, C., Pannone, M., Miranda, M. C., De Angelis, G., Aquilar, S., Dragone, M., & Bacchini, D. (2022). The effects of teacher support, parental monitoring, motivation and self-efficacy on academic performance over time. *European Journal of Psychology of Education.* https://doi.org/10.1007/s10212-021-00594-6

Altonji, J. G., Hayashi, F., & Kotlikoff, L. (1997). Parental altruism and inter vivos transfers: Theory and evidence. *The Journal of Political Economy, 105*(6), 1121–1166.

Angrist, J., Autor, D., & Pallais, A. (2021). Marginal effects of merit aid for low-income students. *Quarterly Journal of Economics.* forthcoming.

Bachmann, A, & Boes, S. (2014). Private transfers and college students' decision to work. *Economics of Education Review, 42,* 34–42.

Barr, A., Bird, K. A., & Castleman, B. L. (2021). The effect of reduced student loan borrowing on academic performance and default: Evidence from a loan counseling experiment. *Journal of Public Economics.* https://doi.org/10.1016/j.jpubeco.2021.104493

Belley, P., & Lochner, L. (2007). The changing role of family income and ability in determining educational achievement. *Journal of Human Capital, 1*(1), 37–89.

Belot, M., Canton, E., & Webbink, D. (2007). Does reducing student support affect scholastic performance? Evidence from a Dutch reform. *Empirical Economics, 32,* 261–275.

Black, S., Denning, J., Dettling, L., Goodman, S. & Turner, L. (2020) Taking It to the Limit: Effects of Increased Student Loan Availability on Attainment, Earnings, and Financial Well-Being, NBER Working Papers No. 27658.

Carneiro, P., & Heckman, J. J. (2002). The evidence on credit constraints in post-secondary schooling. *The Economic Journal, 112,* 989–1018.

Castleman, B. L., & Long, B. T. (2016). Looking beyond enrollment: The causal effect of need-based grants on college access, persistence, and graduation. *Journal of Labor Economics, 34*(4), 1023–1073.

Cocco, J. F., Gomes, F. J., & Maenhout, P. J. (2005). Consumption and portfolio choice over the life cycle. *The Review of Financial Studies, 18*(2), 491–533.

Colas, M., Findeisen, S., & Sachs, D. (2020). Optimal need-based financial aid. *Journal of Political Economy.* forthcoming.

Cornwell, C., Mustard, D. B., & Sridhar, D. J. (2006). The enrollment effects of merit-based financial aid: Evidence from Georgia's HOPE program. *Journal of Labor Economics, 24*(4), 761–786.

Cox, D., Eser, Z., & Jimenez, E. (1998). Motives for private transfers over the life cycle: An analytical framework and evidence for Peru. *Journal of Development Economics, 55*(1), 57–80.

Cox, D., Hansen, B. E., & Jimenez, E. (2004). How responsive are private transfers to income? Evidence from a laissez-fair economy. *Journal of Public Economics, 88*(9-10), 2193–2219.

Cox, D. (1990). Intergenerational transfers and liquidity constraints. *The Quarterly Journal of Economics, 105*(1), 187–217.

Dahl, G. B., & Lochner, L. (2012). The impact of family income on child achievement: Evidence from the earned income tax credit. *The American Economic Review, 102*(5), 1927–1956.

Di Tella, R., & MacCulloch, R. (2002). Informal family insurance and the design of the welfare state. *The Economic Journal, 112*(481), 481–503.

Dustmann, C., Micklewright, J., & Van Soest, A. (2009). In-school labour supply, parental transfers, and wages. *Empirical Economics, 37*(1), 201–218.

Dynarski, S., & Scott-Clayton, J. (2013). Financial aid policy: Lessons from research. *The Future of Children, 23*(1), 67–91.

Dynarski, S. (2003). Does aid matter? Measuring the effect of student aid on college attendance and completion. *The American Economic Review, 93*(1), 279–288.

Engelhardt, G. V., & Mayer, C. (1998). Intergenerational transfers, borrowing constraints, and savings behavior: Evidence from the housing market. *Journal of Urban Economics, 44*(1), 135–157.

Garibaldi, P., Giavazzi, F., Ichino, A., & Rettore, E. (2011). College cost and time to complete a degree: Evidence from tuition discontinuities. *The Review of Economics and Statistics, 94*(3), 699–711.

Goodman, S., Isen, A., & Yannelis, C. (2021). A day late and a dollar short: Liquidity and household formation among student borrowers. *Journal of Financial Economics, 142*(3), 1301–1323.

Gross, J. P., Cekic, O., Hossler, D., & Hillman, N. (2009). What matters in student loan default: A review of the research literature. *Journal of Student Financial Aid, 39*(1), 19–29.

Hanushek, E. A., Leung, C. K. Y., & Yilmaz, K. (2014). Borrowing constraints, college aid, and intergenerational mobility. *Journal of Human Capital, 8*(1), 1–41.

Hochguertel, S., & Ohlsson, H. (2009). Compensatory inter vivos gifts. *Journal of Applied Econometrics, 24*(6), 993–1023.

Ionescu, F., & Simpson, N. (2016). Default risk and private student loans: Implications for higher education policies. *Journal of Economic Dynamics and Control, 64,* 119–147.

Jensen, R. T. (2004). Do private transfers 'displace' the benefits of public transfers? Evidence from South Africa. *Journal of Public Economics, 88*(1-2), 89–112.

Johnson, M. T. (2013). Borrowing constraints, college enrollment, and delayed entry. *Journal of Labor Economics, 31*(4), 669–725.

Joulfian, D. (2005). Choosing between gifts and bequests: How taxes affect the timing of wealth transfers. *Journal of Public Economics, 89*(11-12), 2069–2091.

Juarez, L. (2009). Crowding out of private support to the elderly: Evidence from a demogrant in Mexico. *Journal of Public Economics, 93*(3-4), 454–463.

Kalenkoski, C. M., & Pabilonia, S. W. (2010). Parental transfers, student achievement, and the labor supply of college students. *Journal of Population Economics, 23*(2), 469–496.

Kane, T. J. (2003). *A Quasi-Experimental Estimate of the Impact of Financial Aid on College-Going.* NBER Working Paper No. 9703.

Keane, M. P., & Wolpin, K. I. (2001). The effect of parental transfers and borrowing constraints on educational attainment. *International Economic Review, 42*(4), 1051–1103.

Linsenmeier, D. M., Rosen, H. S., & Rouse, C. E. (2006). Financial aid packages and college enrollment decisions: An econometric case study. *The Review of Economics and Statistics, 88*(1), 126–145.

Lochner, L. J., & Monge-Naranjo, A. (2011). The nature of credit constraints and human capital. *The American Economic Review, 101*(6), 2487–2529.

Lochner, L. (2015). *Student Borrowing: Debt, Default, and Repayment.* NBER Reporter 2015 Number 3: Research Summary.

Marx, B. M., & Turner, L. J. (2019). Student loan nudges: Experimental evidence on borrowing and educational attainment. *American Economic Journal: Economic Policy, 11*(2), 108–141.

McGarry, K. (1999). Inter vivos transfers and intended bequests. *Journal of Public Economics, 73*(3), 321–351.

McGarry, K. (2016). Dynamic aspects of family transfers. *Journal of Public Economics, 137,* 1–13.

Modigliani, F., & Brumberg, R (1954). Utility analysis and the consumption function: An interpretation of cross-section data. *Post Keynesian Economics.* K.K. Kurihara, ed.

Nibud. (2015). *Studentenonderzoek 2015.* Nibud/Nationaal Instituut voor Budgetvoorlichting.

OECD. (2012). *Students at work.* https://www.oecd.org/statistics/students-at-work.htm.

Page, B. R. (2003). Bequest taxes, inter vivos gifts, and the bequest motive. *Journal of Public Economics, 87*(5-6), 1219–1229.

Poterba, J. (2001). Estate and gift taxes and incentives for inter vivos giving in the US. *Journal of Public Economics, 79*(1), 237–264.

Reil-Held, A. (2006). Crowding out or crowding in? Public and private transfers in Germany. *European Journal of Population, 22*(2), 263–280.

Rosenzweig, M., & Wolpin, K. I. (1994). Parental and public transfers to young women and their children. *The American Economic Review, 84*(5), 1195–1212.

Schoeni, R. F. (2002). Does unemployment insurance displace familial assistance? *Public Choice, 110*(1-2), 99–119.

Statistics Netherlands. (2021). Hoe vergaat het studenten in het leenstelsel?. *Statistische Trends 2021 by Lonneke van den Berg.* Radboud University) and Ruben van Gaalen (Statistics Netherlands and University of Amsterdam.

Van der Steeg, M. (2015). Gedragsinzichten benutten voor beter onderwijsbeleid. *Economisch Statistische Berichten, 100*(4707).

Winter, C. (2014). Accounting for the changing role of family income in determining college entry. *The Scandinavian Journal of Economics, 116*(4), 909–963.

Wolff, F.-C. (2006). Parental transfers and the labor supply of children. *Journal of Population Economics, 19*(4), 853–877.