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Early-life financial behavior, intergenerational transfers, and employment

Insights from a nudge in student loan policy

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Early-life financial behavior, intergenerational transfers, and employment: Insights from a nudge in student loan policy[1]

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Abstract

This paper investigates the effect of student loans on students' spending, earnings, and parental transfers. For causal identification, we exploit a nudge for the take-up of student loans. 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. A one-euro decline in student loans reduced students' expenditures by 36 cents, but also led to a substantial increase of parental financial contributions (55 cents) and in-kind transfers (13 cents). Student loans substantially affect consumption behavior. Labor earnings are affected among vocational students, but not among university students.

JEL codes: C31, D15, H52, I23, I28

Keywords: Household finance, Default decisions, Debt behavior, Quasi-experiment, Intergenerational transfers, Consumption.

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1 Introduction

In many Western countries the demand for student loans has increased considerably (Lochner and Monge-Naranjo, 2015). That is because of the rising costs and returns to college, but also because of public spending cuts in response to the Great Recession. Whereas in the US the shift from grants to loans started already in the mid-1970s (Gross et al., 2009), governments in the UK and the Netherlands recently decided to replace student grants by student loans. As student loans are rising rapidly, it becomes increasingly important to understand the interaction between student borrowing and other financial decisions (Lochner and Monge-Naranjo, 2011). More specifically, this paper studies the consequences of student loans on students' spending, employment, and intergenerational transfers. In theory, 1) government programs may crowd out private transfers, and 2) private transfers may help to prevent moral hazard due to more intensive monitoring opportunities. We test these hypotheses in the context of student loans.

Student loans may affect 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 student labor supply and student spending behavior. They can also affect *inter vivos* intergenerational transfers from parents to their children, as parent can ease borrowing constraints (Cox, 1990) and compensate income (Hochguertel & Ohlsson, 2009) of their children.

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 policies have large impacts on college enrollment and college completion[5], especially among low-income families (Linsenmeier et al., 2006; Belley & Lochner, 2007; Winter, 2014).[6] Student loans, however, may also crowd out intergenerational transfers, in the same way as government transfers may crowd out private

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

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

transfers.[7] Therefore, changes in student loan policies may not only affect the students' financial behavior but also the parents' financial behavior.

This paper investigates the causal effect of student loans on transfers that students receive from their parents. Furthermore, we analyze how student loans influence earnings, spending behavior and study results of students. In a quasi-experimental approach, we exploit an exogenous change in the take up of student loans in the Netherlands, stemming from a reform in 2009 that changed the default student loan from the government. Before 2009, students who started their fifth year automatically borrowed the maximum student loan from the government.[8] As from 2009, the default student loan of students starting their fifth year was lowered to the former allowance plus the most recent loan. Using this period-cohort-based exogenous variation, we first estimate a Difference-in-Differences model and find that students let themselves be guided by 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 earnings, spending behavior, intergenerational transfers and study results. We thus estimate an instrumental variable (IV) model with a first-stage Difference-in-Differences design. We bring the model to the data 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 as well as on the degree 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 threefold. First, as far as we know, we are the first to investigate the degree 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 study-related expenses). Third, we evaluate the extent to which

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[7] 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.

[8] In this way the government aimed to prevent a negative income shock after depletion of the basic allowances after four year.

debt behavior of individuals in higher education is rational. The reform that we investigate allows us to evaluate rational behavior without having to jointly identify heterogeneous preferences (such as risk and time preferences).[9]

Our results confirm that family exchange is a fundamental economic issue (Altonji et al., 1997; Engelhardt & Mayer, 1998). Student loans crowd out financial support from parents. A one-euro reduction in student loan increases financial parental support with 55 cents. This increase is even higher (68 cents) when we also consider in-kind transfers from parents to their children. A one euro decline in student loan reduces student's spending by 36 cents (of which 7 cents are study related spending). Especially housing and insurances are affected by student loans, but parents compensate this with in-kind transfers. Earnings are not affected significantly (in line with Wolff, 2006, and Kalenkoski & Pabilonia, 2010). Extended models show that responses are heterogeneous depending on students' background, and that decreasing student loans do not have negative consequences for study outcomes. The substitution of student loans by parental transfers may have increased monitoring and pressure from parents on their student children to study more. Finally, an important lesson that can be drawn from this study is that debt behavior of individuals in higher education is irrational; early-life student loan decisions are highly subject to the default option.[10]

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, robustness checks, and heterogeneity analyses are shown in Section 5. Section 6 concludes the paper.

2 Institutions

2.2 Background

In contrast to Anglo-Saxon countries such as the UK and the US, the Dutch educational system largely consists of public universities. In this way, the government controls tuition fees with some limited bounds set by the universities. In contrast to, for example, Norway, tuition fees are not fully

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[9] Similarly, Gathergood et al. (2019) evaluate financial decisions by investigating credit card repayments. By investigating credit card repayment decisions, one can also check for optimal revealed behavior without the need to identify heterogeneous preferences.

[10] According to predictions from the standard life cycle model, individuals should not be influenced by defaults, as they are always assumed to act (optimally) in their own interests. In line with the behavioral life cycle hypothesis (Shefrin & Thaler, 1988), that builds forth on the seminal work of Kahneman & Tversky (1979), the results in this paper show that the default option does matter substantially.

covered by the government. Tuition fees (around 2,000 euros per year), however, are lower than the actual costs, such that each student implicitly receives a subsidy. The highly public character of the educational system extends to the financing of tuition fees and daily-living expenses of students.

The Netherlands has instituted a system in which students can borrow money from the government with relative ease and at a low interest rate (currently around 0.01%).[11] Originally, this system of study loans was instituted for students coming from low income families in order to make studying available to people from all backgrounds. In 1986 the government extended the lending facilities to students of all socioeconomic backgrounds. As a consequence, public support in the form of loans and allowances became the main source of financial support for students, whereas dependence on private borrowing and grants is very low in the Netherlands.

Until September 2015 financial support from the government consisted of allowances, loans (Table 1) and a public transportation card.[12] Allowances were higher for students that lived independently from their parents (about 64% of the students in our data). The basic allowance was received for four years and was given to the student without repayment if the student graduated within 10 years. If this condition was not met, the allowance had to be repaid like a regular loan. These conditions also applied to the public transportation card. For students whose parents' income is below a certain threshold (total gross income below 46,000 euros per year), there was a supplementary allowance with the same conditions as the basic allowance. Students were only eligible for receiving allowances if they earned less than 13,989 euros in a year. Next to these allowances, students could receive a loan for tuition fees (165 euros per month) and borrow additional money up to about 300 euros per month.

As from September 2015 onwards (academic year 2015/2016), allowances are no longer part of the system and students can only apply for a loan for tuition fees and a regular loan. However, this new situation is not included in our research design as our data runs until 2015. In sum, the government is important in intervening in an imperfect credit market as well as in implicitly

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[11] See DUO: 'Rentepercentages' Retrieved from: https://duo.nl/apps/rentepercentage/index.html
[12] See DUO: 'Het oude stelsel van studiefinanciering'. Retrieved from: https://duo.nl/particulier/student-hbo-of-universiteit/het-oude-stelsel-van-studiefinanciering.jsp#

subsidizing higher education in the Netherlands. With this strategy, the Dutch government strives to make higher education available to anyone regardless of socio-economic status.

Table 1. Financial support from the government

	Living away from parents	Living with parents
Basic allowance	291	104
Supplementary allowance[1]	275	253
Maximum loan for tuition fees	165	165
Maximum regular loan	302	302
Total	1033	825

[1.] 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.

2.2 Reforms in student loans

During our period of analysis 2005-2015, the student loan system was subject to several changes. The reform that is subject of research in this paper is a reform that took place in 2009. Before 2009, as soon as one started the fifth year of studies, the government automatically converted the allowance into the maximum student loan, in order to prevent a sudden income loss. After the reform, the default study loan as from the fifth year of studies was lowered to the former allowance plus the most recent loan. Nonetheless, students could still easily opt for a maximum loan via the website of the public student loan administration (DUO).

The change in the default study loan as from 2009 resulted in substantially lower student loans. This change in default gives exogenous variation in student loan claiming. The change in default student loan in 2009 is a matter of choice architecture rather than a borrowing constraint, since students can adjust the height 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 of Van der Steeg (2015)

suggests that the change in defaults decreased the percentage of students with a maximum student loan from 68% to 11%. This paper studies the causal effects of this reform.

Next to the change in the default study loan for fifth year students, other reforms were introduced in the period 2005-2015. In 2011, a fine was introduced for studying too long ('langstudeerboete'). Retroactively, the fine also affected students studying too long in 2009 and 2010. Those students had to pay extra tuition fees over passed years. The fine was an increase in tuition fees of 3,063 euros. Students could use the loan for tuition fees to pay this fine. 'Too long' was defined as the nominal period for the study plus one additional year. For example, students doing a three-year Bachelor's degree program received a fine at the start of their fifth year. The fine for studying too long was already abolished in 2012 because of a large opposition from students. It is unlikely that this reform interferes with our analysis of the 2009-reform, since students could not be aware of the introduction of the fines in 2011. When we exclude the year 2011 from the analysis, the main conclusions do not change.

In 2014, a minor change in the choice architecture of student loans was introduced. First-year's student no longer saw the option "maximize student loan" when first-time applying for student loans. When we exclude those who were enrolled for less than 12 months or those who stated they are first year students in their program, the results are very similar.

Finally, it should be noted that we take into account policies at the national level, but we abstract from university-, faculty-, and study-specific changes. However, it is unlikely that such changes interfere with the 2009-reform unless the policy changes are specifically targeted at fifth year students versus first to fourth year students in 2009.

3 Method

This study exploits the 2009-reform, described in Section 2.2. First, in Section 3.1, we investigate the effect of the decline in the default student loan on actual student loan debt. Second, we use the exogenous variation in student loan debt to analyze the causal effect of student loans on intergenerational transfers, employment and spending patterns (Section 3.2).

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 students between the ages of 23 and 27 years who no longer receive a basic allowance and, hence, enter their fifth academic year. The control group consists of students between 21 and 27 with a basic allowance. That are those who are first, second, third, or fourth year students. The treatment period starts in the academic year 2009/2010. Students receive the allowance for four years, which means most students enter the borrowing phase in their fifth year, mostly at the age of 23. For a graphical representation of the age-academic year combinations in the treatment group, we refer to Table A1 in the Appendix.

We estimate

$$L_{it} = \alpha_0 + \alpha_t + \beta G_{it} + \gamma DD_{it} + X'_{it}\mu + \epsilon_{it} \tag{1}$$

where L_{it} is the amount of student loan debt held by individual 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_{it} is a dummy variable indicating whether individual i is in the treatment group during the treatment period, and X_{it} is a vector of control variables with coefficients μ. We assume the error term ϵ_{it} to follow a normal distribution with mean zero and variance σ_L^2. The control variables are age, sex, immigrant, university, and field of study dummies. The coefficient of primary interest is the treatment effect (γ). If this coefficient is not significantly different from zero, we conclude that students are not sensitive to the changed default in student loans and, hence, behave rationally. If γ is significantly negative we conclude that students are responsive to default setting in student loans and, hence, do not behave according to a rational agent.

The parallel trend assumption is crucial in DD analyses. To test this assumption, we describe trends in the treatment and control group before the change in the default student loan.[13] Furthermore, we test the parallel trends assumption using placebos in the empirical analysis.

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[13] The descriptive statistics in section 4 show that the parallel trend assumption is likely to hold, as pre-treatment trends are fairly similar for the treatment and the control group.

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 2.2, 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 equation (1) simultaneously with equations (2), (3) and (4)

$$T_{it} = \theta_{T0} + \theta_{Tt} + \delta_T L_{it} + \rho_T G_{it} + X'_{it} \varphi_{TX} + u_{Tit} \qquad (2)$$

$$E_{it} = \theta_{E0} + \theta_{Et} + \delta_E L_{it} + \rho_E G_{it} + X'_{it} \varphi_{EX} + u_{Eit} \qquad (3)$$

$$C_{it} = \theta_{C0} + \theta_{Ct} + \delta_C L_{it} + \rho_C G_{it} + X'_{it} \varphi_{CX} + u_{Cit} \qquad (4)$$

Where T_{it} represents the parental contribution received by student i in period t, E_{it} are the earnings, and C_{it} consumption spending of student i in period t. 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_{Tit}, u_{Eit}, and u_{Cit} together with ϵ_{it} 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.

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 $\delta_E, \delta_C, \delta_T$ are identified by the policy reform modeled in Equation (1). In addition to the baseline estimates, we decompose T_{it} and C_{it} 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' study performance.

The models in this paper are estimated with Maximum Likelihood. We also estimated the models using 2SLS and 3SLS. 2SLS is consistent under a broader class of error distributions (but less efficient if the error terms are normal), 3SLS is more efficient than 2SLS. All estimations lead to very similar results (available from the authors upon request).

4 Data

4.1 Student monitor

To analyze the effect 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*").[14] This is a yearly online survey that is fielded at the request of the Ministry of Education, Culture and Science by ResearchNed. It was initiated in 2000 in light of the Eurostudent Project which aims to keep track of socioeconomic traits of students.[15] In 2010, the survey was not fielded. The survey covers around 15 topics but the most relevant ones for this research include: current education, study progress, personal traits, socioeconomic background, characteristics of parents, income and expenses, earnings, and time allocation. Topics and 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 Nibud (2015), based on a different survey.

Data collection takes place 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. 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. For comparison of treatment and control groups we disregard the first four years, and select all students in the years 2005-2015, which gives us a sample of 80,498 students.[16]

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[14] See http://www.studentenmonitor.nl/over/over1.htm
[15] See http://www.eurostudent.eu/about/intentions
[16] Because of some item nonresponse, the regression analysis contains 77,722 students.

4.2 Summary statistics

Table 2 describes the composition of the sample. As expected, the average age is higher in the treatment group than in the control group. The last column shows that trends, however, are quite similar in the treatment and control group. For example, the percentage of males and university students declined both in the treatment and the control group. The percentage of economics students increased in the control group, but not in the treatment group. We control for this differential trend in the analysis (all variables in panel A will be included as control variables in the models).

Table 3 presents summary statistics of the dependent variables by control period, treatment period, control group, and treatment group. This allows us to do a simple Difference-in-Differences analysis (DD) for the dependent variables. The simple DD suggests that student loans decreased by about 139 euros per month because of the reform. As a consequence of the lower student loan, students spent about 38 euros per month less (largely due to housing and living), earned about 14 euro per month more, and received about 62 euros per month more from their parents (47 euros cash and 15 euros in-kind). So, according to this descriptive evidence, about one third of the decline in student loans is substituted by parental contributions. 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 Figures A1-A2 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 Figure 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. Both groups face an upward trend from 2006 to 2008 and a plateau around 2008/2009.[17] Figure 1 shows that it is important to take into account period effects. After 2009, we see a small decline in student loans also in the control group, which could be due to the crisis and general pessimism. For the development of student earnings, spending, and parental contributions over 2005-2015 we refer to Figures A3-A6 in the Appendix.

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[17] Section 5.2 provides more formal evidence on the Parallel Trend Assumption.

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	22.94	2.15	24.75	1.26	22.69	2.11	24.39	1.17	-0.11
Male (0-1)	0.48	0.50	0.53	0.50	0.38	0.49	0.43	0.49	0.00
Immigrant (0-1)	0.13	0.34	0.12	0.32	0.08	0.28	0.10	0.31	0.03
University (0-1)[a]	0.64	0.48	0.84	0.37	0.56	0.50	0.77	0.42	0.01
Science (0-1)	0.26	0.44	0.22	0.42	0.23	0.42	0.23	0.42	0.04
Social science (0-1)	0.13	0.34	0.17	0.38	0.17	0.37	0.20	0.10	-0.01
Medical (0-1)	0.17	0.37	0.10	0.30	0.17	0.38	0.10	0.30	0.00
Economics (0-1)	0.11	0.32	0.16	0.37	0.17	0.37	0.17	0.37	-0.05
Law (0-1)	0.06	0.24	0.09	0.29	0.04	0.19	0.08	0.27	0.01
Agriculture (0-1)	0.10	0.30	0.08	0.27	0.05	0.23	0.05	0.22	0.02
Education (0-1)	0.04	0.20	0.01	0.12	0.06	0.23	0.03	0.17	0.00
Interdisciplinary (0-1)	0.00	0.00	0.00	0.00	0.01	0.11	0.01	0.10	0.00

[a] When university is zero, the student is in higher vocational education.

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.	
Dependent variables (euros/m)											
Student loan			129.98	211.23	360.76	350.76	100.28	182.48	192.34	278.31	-138.72
Spending											
	-	Total	857.60	540.42	957.24	454.14	627.57	357.53	689.71	383.21	-37.50
	-	Housing	220.52	276.48	243.72	217.86	211.71	186.79	220.10	193.03	-14.81
	-	Living	246.75	213.91	282.84	192.15	118.49	92.25	136.67	100.11	-17.91
	-	Clothing	105.45	262.18	103.71	218.83	40.92	44.94	46.19	47.95	7.01
	-	Leisure	81.18	88.48	92.07	85.45	54.98	49.24	59.97	53.61	-5.90
	-	Cellphone	35.17	42.06	36.32	35.23	23.99	17.04	24.93	17.68	-0.21
	-	Commuting	25.28	50.94	26.79	48.51	20.62	36.21	31.32	45.45	9.19
	-	Other	30.65	63.89	35.65	65.55	39.93	54.08	40.44	58.63	-4.49
	-	Tuition	56.87	62.69	64.18	62.77	73.14	78.32	75.99	78.70	-4.46
	-	Study materials	28.64	21.17	27.86	21.25	17.09	20.94	14.91	18.79	-1.40
	-	Insurances	58.98	46.57	63.97	46.21	20.36	39.02	25.44	43.70	0.09
	-	Other large	73.57	76.38	83.84	83.03	43.31	55.00	41.75	57.85	-11.83
Earnings			244.78	315.03	324.47	360.35	202.32	246.17	295.94	344.07	13.93
Parental contributions											
	-	In-cash	129.37	172.07	149.25	198.49	129.84	174.32	196.71	245.76	46.99
	-	In-kind									
		- Total	411.28	161.46	427.88	166.85	251.74	285.18	283.66	322.94	15.32
		- Housing	163.72	119.53	161.44	121.78	91.07	179.57	117.31	198.15	28.52
		- Living	35.11	35.03	34.13	32.57	30.53	76.07	35.05	80.26	5.50
		- Tuition	121.48	19.60	120.99	20.63	73.28	77.22	66.59	79.43	-6.20
		- Study mat.	28.19	21.18	23.59	18.77	8.06	17.51	4.87	13.29	1.41
		- Insurances	51.70	36.43	51.49	36.48	11.61	30.27	12.79	31.92	1.39
		- Other large	64.36	52.55	68.80	56.77	6.73	26.27	6.87	29.88	-4.30
Observations			18,015		6,137		35,533		6,895		

Figure 1. Average student loans for the treatment and control group over 2003-2015 (euros per month).
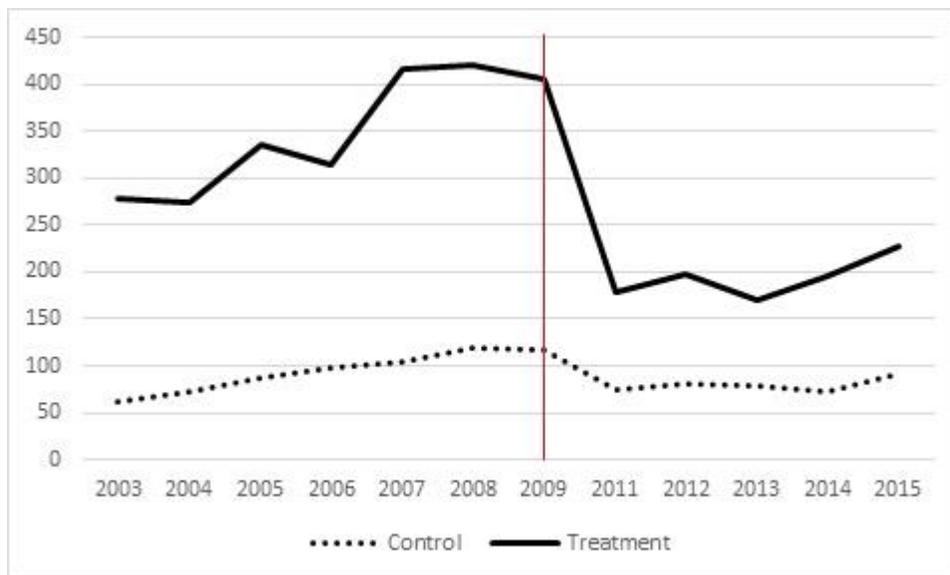
5 Estimation results

5.1 Baseline results

Table 4 presents the estimation results. We find that the change in the student loan default, highly relevant as an instrumental variable according to its F-statistic, reduced student loans on average by 81 euros per month. This may be explained by students procrastinating on changing the default (in the new and/or in the old situation), a status quo bias, or because students just considered the default option the right thing to do (implicit advice).

Students' parental contributions increased by 55 eurocents for each euro reduction in student loan. Hence, students received about 45 euros per month more from their parents (81 x 0.55). 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 36 eurocents. On average, the decline in student loans implied a decline of 29 euros of spending (81 x 0.36).

Next, in Table 5, parental contributions do 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 0.55 to 0.68. Hence, taking into account in-kind parental transfers shows that on average about 2/3 of the reduction in student loans is replaced by parental contributions. Due to the decrease in student loans, total parental transfers increased by 55 euros per month (81 x 0.68).

5.2 Robustness of the Difference-in-Differences

To check the robustness of the results we conduct 1) a placebo test (to check the parallel trend assumption), and 2) we change the age-window. We test the parallel trend assumption by estimating a 'placebo-treatment' for the years prior to the actual treatment. That is, we compare academic years 2005/2007 (control period) and 2008/2009 ("treatment" period) in the baseline regression, as if the default already changed in the academic year 2008/2009. The coefficient of this placebo is much smaller than in the baseline regression (14.64 instead of -80.61), and is not significant (p-value of 0.17). Therefore, we conclude that the parallel trend assumption holds.

Estimation results also hold when we narrow the sample to students aged 22-23, to make sure that treatment and control groups are more comparable. These students are right around the cutoff age as explained in Section 3.1. Estimated coefficients are highly similar to the estimated coefficients in the baseline regression (see Table A3 in the Appendix). Hence, conclusions are robust to using a smaller age-window.

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)			-0.55 ***	0.05	-0.08	0.07	0.36 ***	0.11
Change in default (γ)	-80.61 ***	4.05						
Observations	77,722		77,722		77,722		77,722	
F-stat. excl. instrument	396.81							

* denotes significance at the 10% level, ** at the 5% level and *** at the 1% level. 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. Extended estimation results, including the correlation matrix of the error terms, can be found in the appendix (Table A.2).

Table 5. 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)			-0.68 ***	0.13	-0.08	0.07	0.38 ***	0.11
Change in default (γ)	-80.61 ***	4.05						
Observations	77,722		77,722		77,722		77,722	
F-stat. excl. instrument	396.81							

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

5.3 Heterogeneous effects

Responses to the changed default may be heterogeneous, for example because of difference in financial literacy. Therefore, in Table 6 we investigate heterogeneous effects for education level (university students vs. higher vocational education students), and for students studying in different fields. As the change in default is merely a matter of choice architecture, it might be that more rational agents are less prone to change their behavior. For this matter, we focus on economics students, who are trained with rational agent models, and science students (beta-studies such as physics, math, chemistry, etc.), who are perhaps also more likely to behave rationally due to their training in more math-dependent programs.

The estimation results suggest that university students (Panel A) are significantly less responsive to the change in default: they respond by decreasing student loans by about 44 euros less than students with higher vocational education.[18] University students are less likely to increase earnings and decrease spending after a decline in student loan. However, they receive more parental transfers for compensation.[19] Despite their better knowledge of rational behavior and financial decision-making, economics and science students (Panel B) respond not significantly different to the change in the default as students from other disciplines. Student loans decrease by about 84 euros due to the reform. As a result of lower student loans, economics students especially reduce their spending substantially more (about a third more than non-economics students). They also receive slightly less compensation from their parents. However, for science students we find no significant differences compared to non-economics students.

In politics and in the literature much emphasis has been placed on the accessibility of higher education. Therefore, in Table 7 we analyze whether students with low- and high-income parents respond differently. More specifically, we estimate heterogeneous responses for students whose parents earn a relatively high or relatively low income. Parental income is reported by the students and measured by five net income brackets. When interpreting the results, we have to take into account that there could be some measurement error correlated with parental transfers. When students whose parents do not compensate for reductions in student loans underestimate their

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[18] Prior to the reform, the average student loan of the treatment group of university students was 329 euro per month. This was slightly higher for vocational education students with 345 euros per month. The difference is only significant at the 10 percent-level (p = 0.08).

[19] This also holds when we consider both in-cash and in-kind transfers, which may be important as students of vocational education are more likely to live together with their parents. The estimated parameters are -0.69 for "Student loan" and -0.08 for "Student loan · University", respectively (both have a p-value of 0.00, not reported here).

parents' income, our estimate is biased upward. The estimation results show that students with low income parents (lower than 1,400 euros net per month, 10.17% of the data) or high income parents (higher than 3,499 euros per month, 43.81% of the data), do not respond significantly different to the change in the default than students with middle income parents. Neither do we find a significant difference between students with high- and low-income parents. Also, with regard to earnings and consumption spending there are no significant differences. Although we observe that students with high-income parents receive on average about 100 euros per month more compared to students without high-income parents, parents do not react differently to changes in student loans.

Another specific group that is underrepresented in higher education are migrants. Our data show that students with a migration background are remarkably overrepresented in study areas that are likely to generate a high return to their education. We observe that immigrant students are less than 9% of the respondents in the data, but these students represent about 14% and 12%, in law and economics, respectively. For comparison, only less slightly than 8%, 5%, 4% of immigrant students enroll in arts, agricultural, and educational studies respectively.[20] This may suggest that the return to education is more important to immigrant students, to be able to pay back their monetary investment of studying. The immigrant students in our sample (Panel B) respond nearly twice as strong to the reform than non-immigrant students. Nonetheless, they do not decrease spending significantly more than non-immigrant students and responses in earnings are slightly bigger.[21] Parental compensations are slightly higher for immigrant students than for non-immigrant students. All conclusions from Table 7 are robust to using both in-cash and in-kind transfers from parents.

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[20] The percentage of immigrant students in medicine, sciences, and social sciences are highly comparable to the average of 8% in the data.
[21] However, the sum of coefficients of the effects of student loans on earnings is not significantly different from zero (p-value = 0.31).

Table 6. Heterogeneous effects with respect to education level and field of study.

	Student loan			Parental transfers (in-cash)			Earnings			Spending		
	Coeff.		S.E.	Coeff.		S.E.	Coeff.		S.E.	Coeff.		S.E.
A. University												
Student loan				-0.45	***	0.05	-0.17	**	0.07	0.54	***	0.10
Student loan · University				-0.07	***	0.01	0.06	***	0.01	-0.12	***	0.02
Change in default	-114.87	***	8.35									
Default · University	43.80	***	8.90									
B. Economics/Science												
Student loan				-0.48	***	0.04	-0.08		0.07	0.34	***	0.10
Student loan · Econ				0.03	***	0.01	0.03	**	0.01	0.14	***	0.02
Student loan · Science				-0.01		0.01	0.01		0.01	0.01		0.02
Change in default	-83.83	***	4.90									
Default · Econ	-3.57		10.27									
Default · Science	7.89		8.90									

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

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.

Table 7. Heterogeneous effects with respect to parental income and immigrant status

	Student loan		Parental transfers		Earnings		Spending	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
A. Parental income								
Student loan			-0.54 ***	0.12	0.61 ***	0.20	0.30	0.30
Student loan · 1(Income < 1,400)			0.00	0.02	-0.01	0.04	-0.01	0.06
Student loan · 1(Income > 3,499)			-0.01	0.01	0.02	0.02	0.00	0.04
Change in default	-64.12 ***	17.08						
Default · 1(Income < 1,400)	1.02	36.75						
Default · 1(Income > 3,499)	-28.15	23.16						
B. Immigrants								
Student loan			-0.50 ***	0.04	0.03	0.06	0.52 ***	0.09
Student loan · Immigrant			-0.02 *	0.01	0.03 **	0.02	0.02	0.02
Change in default	-76.89 ***	4.05						
Default · Immigrant	-60.71 ***	12.39						

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

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.

5.4 Spending categories

Table 8 breaks down the total amount of spending into several consumption spending categories: housing, living, clothing, leisure, cellphone, commuting, tuition fees, study material, insurances (ex. health insurance), and other large expenses. The data include information on in-kind parental transfers in all consumption categories, except for clothing, 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.[22] In Table A4 we show that estimation results are highly robust to different definitions of spending, regardless of the in- or exclusion of in-kind parental transfers and yearly spending categories. The first row in the table show that including in-kind parental spending does not affect our conclusions. The second row of estimates shows that total spending decreases with lower student loans, even if in-kind transfers from parents (which increase due to the cut in student loans) are taken into account. The third row shows that conclusions are robust to including both monthly and yearly spending categories.

In Table 8, we re-estimate Equation (2) for each of the consumption spending categories available in the data. The left columns present the average change in students' spending as 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 8 indicates that student loans influence spending patterns of students. More particularly, we observe that a decrease in student loans of one euro decreases monthly spending on housing, living, and other monthly expenses by 16, 9, and 5 eurocents, respectively. Interestingly, we do not observe changes in spending categories that are most likely to be luxury-goods such as leisure, clothing, and cellphone. Commuting expenses increase by 9 eurocents which could be a consequence of moving to cheaper housing that is further from the place of study.[23] We also observe that a reduction in student loans of one euro decreases yearly spending on tuition fees, insurances, and other large

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[22] 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.

[23] We find a negative coefficient for student loan on commuting time, indicating that a reduction in student loan increases commuting time. However, this coefficient is not significant (not reported here).

expenses by 5, 6, and 10 eurocents, respectively. Small decreases in study materials and other study-related spending due to the cut in student loans are also observed but only marginal. We cannot rule out that cuts in student loans partially go at the cost of sources necessary for studying, although most substantial changes are related to housing, living, and insurances.

The parental in-kind transfers in Table 8 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 35 eurocents for a one-euro decline in student loan. Also, yearly insurances paid by the parents increase by 2 eurocents. Hence, decreases in student loans not only result in changing consumption patterns of students but it also has consequences for consumption patterns of parents who, next to in-cash *inter vivos* transfers, start paying parts of the students' consumption categories. Especially, expenses related to housing and insurances.

Table 8. Effect of student loan on several consumption spending categories, paid by students and parents.

Dependent variables	Paid by student			Paid by parents		
	Coeff.		S.E.	Coeff.		S.E.
	Monthly spending (euros)					
Housing	0.16	***	0.06	-0.35	***	0.06
Living	0.09	**	0.04	-0.02		0.02
Clothing	-0.06		0.09	n/a		n/a
Leisure	0.03		0.02	n/a		n/a
Cellphone	-0.01		0.01	n/a		n/a
Commuting	-0.09	***	0.01	n/a		n/a
Other expenditures	0.05	***	0.02	n/a		n/a
	Yearly spending normalized to monthly (euros)					
Tuition fee	0.05	***	0.02	-0.03		0.02
Study material	0.01	**	0.01	0.00		0.01
Insurances (ex. health insurance)	0.06	***	0.01	-0.02	**	0.01
Other large expenditures	0.10	***	0.02	0.02	*	0.01

 * denotes significance at the 10% level, ** at the 5% level and *** at the 1% level.
Earnings and parental transfers are not reported here. Control variables include age, sex, immigrant, university, group that is subject to the change in default, and field of study dummies. Living paid by parents includes clothing. We omitted expenditures on children as this category is only important to a few students.

5.5 Study results

Bachmann & 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 might improve their study results as suggested by the evidence from Kalenkoski & Pabilonia (2010). 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. This probably 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. Student may feel more pressure from their parents to spent time on their study and this may positively affect study results. In this section we extend the baseline model (equations (1)-(4)). The baseline model defines a four-equation model. Table 9 presents estimation results for a five-equation model where we include additional equations for study achievements (time studying, self-reported duration of studying since starting their studies, self-reported average grades, and self-reported probability to achieve the final degree of the study program).

The coefficient of the effect of student loan on time studying suggests that a one-euro decrease in student loans increases time studying by about half a minute per week (60 x 0.0076). Thus, for the average decrease of 80 euros that we find after the decline in the default student loan, student increase time studying by about 40 minutes per week (80 x 0.5). Similarly, we find that a one-euro decline in student loans decreases the duration of studies by about one day (30 x 0.03). So, the decline in the default student loan induced students to be about 80 days faster completing their studies, on average (80 x 1). The faster pace of studying induced by the reform does not go at the cost of study grades. We find that a one-euro decrease in student loans increases students' GPA by 0.0006 on a 1-10 scale which is an average increase of the GPA by 0.05 (80 x 0.0006). Hence, decreasing student loans might well increase the pace of studying while it is likely not to go at the cost of study grades. The self-reported probability to achieve the final degree of the study program is not significantly influenced by the amount of student loan.

Table 9. Effect of student loan on study results.

Dependent variables	Study results		
	Coeff.		S.E.
Time studying (h/w)(/100)[24]	-0.76	**	0.33
Duration (months)	0.03	***	0.01
GPA (1-10)(/100)	-0.06	***	0.02
Subjective probability diploma (1-11)[25]	0.00		0.00

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

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.

6 Conclusion

In a variety of contexts, it is known that government programs crowd out private transfers (Cox, 1987). For example, public pensions reduce private transfers from children to their parents (Jensen, 2004, Jung et al 2016) and welfare programs reduce private transfers (Albarran and Antanassio, 2003). As far as we know, this study is the first to quantify the effect of governmental student loans on private parental transfers. Student loans have an important impact on people's lives. We analyze the causal effect of student loans on *inter vivos* intergenerational financial support, student spending and student earnings. In addition, according to the theory, private transfers may reduce moral hazard due to increased monitoring opportunities. We test this hypothesis with estimations on study results.

To be able to estimate causal effects, we exploit a decline in the default governmental student loan for fifth year students. This policy became effective at the start of the academic year 2009/2010.

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[24] Time studying includes both contact hours and hours of self-studying.
[25] "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).

Therefore, we can define a group that is subject to the change and a group that is not affected by the reform depending on age and academic year. Data are taken from the Student Monitor 2005-2015, which contains detailed information on the financial situation and decisions of students and their parents.

First, we estimate the effect of the decline in the default student loan on the actual uptake 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 are crowding out private *inter vivos* income transfers from parents to their children. 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 rational behavior predicts that default options should not influence the outcome, we find that the average student loan is reduced on average by 81 euros per month. Students let themselves be guided by the default student loan and according to the behavioral economics literature this can be explained by students procrastinating on changing the default, a status quo bias, or because students infer the default as an implicit recommendation.

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 55 cents. This increase is even higher (68 cents) when we also take into account in-kind transfers from parents. This evidence contributes to the debate about private transfer motives and suggests that altruistic motives play a key role. That is because in case the exchange motive would dominate, public transfers need not crowd out private ones (Cox, 1992).

Using the same methodology, we also investigate the effect of student loans on spending and earnings. While a one-euro decline in student loans decrease expenditures in housing and insurances in particular, increased parental in-kind transfers compensate in these categories. Although the consequences for expenditures on study resources are small, we cannot rule out that cuts in student loans have an effect on the money spend on study resources. Overall, student earnings are not significantly affected by changes in student loans, but we do find that higher

vocational students increase their earnings about 15 cents for every one-euro decline in student loans.

Although conclusions are robust to a variety of specifications, we find substantial heterogeneity in responses to the change in student loan default. Heterogeneity largely depends on the background of the study with economics students being more responsive. We find no evidence for heterogeneity between students with high and low-income parents. This suggests that the change in the default student loan had a large impact on low-income families. Extended models also show that student loans affect study results. Interestingly, decreasing study loans increases the pace of studying and increase average study grades. This may be due to the increased monitoring of parents, when student loans are mostly substituted by parental transfers.

For policy implications it is important to conclude that 1) debt behavior of students in higher education is irrational; the behavior is highly responsive to changing defaults in borrowing facilities, 2) government intervention in imperfect credit markets, in order to allow students to study, do not only affect the finances of students but even more so the finances of their parents (who seem to have altruistic motives to provide financial support). Finally, lower student loans increased study results, which may be due to increased monitoring of parents who increased their private transfers and reduced moral hazard.

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Appendix. Additional Tables and Figures

The treatment group is defined as all students between 23 and 27 years old who no longer receive a basic allowance after 2010. Students are eligible for the basic allowance from the age of 18 and receive the allowance for four years. $18 + 4 = 22$, which means most students enter the borrowing phase at the age of 23. Though students can apply for the allowance at a later age, it is not possible to distinguish which students did so in the data set. To cancel out any students who already lost their right of basic allowance, the cut off is set at the age of 27. This way we account for all students that could have dealt with the intervention from 2010 onwards. This logic is illustrated in Table A1.

Table A1. Age-academic year combinations in the treatment group.

Academic year											
2008/09							~~23~~	~~24~~	~~25~~	~~26~~	~~27~~
2009/10						23	~~24~~	~~25~~	~~26~~	~~27~~	-
2010/11					23	24	~~25~~	~~26~~	~~27~~	-	-
2011/12				23	24	25	~~26~~	~~27~~	-	-	-
2012/13			23	24	25	26	~~27~~	-	-	-	-
2013/14		23	24	25	26	27	-	-	-	-	-
2014/15	23	24	25	26	27	-	-	-	-	-	-

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				-0.55	***	0.05	-0.08		0.07	0.36	***	0.11
Change in default	-80.61	***	4.05									
Age	17.85	***	0.45	8.40	***	0.98	19.34	***	1.41	47.23	***	2.21
Male (0-1)	-14.18	***	1.72	0.03		1.76	-31.72	***	2.53	-7.48	*	4.04
Immigrant (0-1)	20.35	***	2.83	-18.04	***	2.83	-33.72	***	4.06	-21.22	***	6.28
University (0-1)	17.42	***	1.79	86.80	***	1.89	-39.86	***	2.70	49.69	***	4.31
Science (0-1)	-44.04	***	2.88	-19.69	***	3.44	-30.08	***	4.93	-30.30	***	7.82
Social science (0-1)	-21.12	***	3.05	-28.30	***	3.05	39.06	***	4.37	11.08		6.93
Medical (0-1)	-35.19	***	3.03	-8.40	**	3.32	-26.85	***	4.75	-19.34	***	6.93
Economics (0-1)	-26.97	***	3.17	-13.08	***	3.25	50.66	***	4.65	10.08		7.42
Law (0-1)	-4.05		4.17	-16.10	***	3.95	64.31	***	5.66	-1.59		9.10
Agriculture (0-1)	-52.99	***	3.63	-13.30	***	4.27	-77.84	***	6.11	-31.08	***	9.98

Education (0-1)	-40.29	***	4.58	-45.81	***	4.74	20.34	***	6.79	-38.01	***	10.91
Interdiscipl. (0-1)	1.23		9.79	71.42	***	9.27	-41.74	***	13.27	29.52		19.72
Group (0-1)	143.51	***	2.60	96.11	***	5.86	58.61	***	8.39	-74.18	***	12.72
Year 2006 (0-1)	17.25	***	3.15	13.44	***	3.11	11.55	***	4.45	41.88	***	7.88
Year 2007 (0-1)	56.65	***	3.60	41.99	***	4.32	3.29		6.19	49.75	***	10.26
Year 2008 (0-1)	87.68	***	4.11	47.12	***	5.67	26.67	***	8.12	71.44	***	13.04
Year 2009 (0-1)	81.76	***	4.15	61.81	***	5.48	52.40	***	7.85	102.62	***	12.62
Year 2011 (0-1)	-1.54		2.72	17.57	***	2.59	-18.00	***	3.71	-123.00	***	6.88
Year 2012 (0-1)	10.13	***	3.43	17.23	***	3.21	-14.76	***	4.59	-135.35	***	7.94
Year 2013 (0-1)	-5.29	*	2.91	25.32	***	2.83	-53.09	***	4.05	-172.80	***	7.70
Year 2014 (0-1)	-3.25		3.18	4.26		3.04	-58.74	***	4.36	-142.06	***	8.17
Year 2015 (0-1)	12.69	***	2.98	7.54	***	2.72	-40.21	***	3.90	-186.09	***	7.26
Constant	-268.26	***	11.30	-53.25	***	17.02	-112.02	***	24.39	-330.51	***	38.70

σ_L^2	218.03	***	0.55
$\sigma_{L,E}$	-0.03		0.05

$\sigma_{L,C}$	0.05		0.06			
$\sigma_{L,T}$	0.50	***	0.04			
σ_E^2	295.65	***	0.88			
$\sigma_{E,C}$	0.22	***	0.01			
$\sigma_{E,T}$	-0.10	***	0.02			
σ_C^2	393.88	***	1.68			
$\sigma_{C,T}$	0.06	*	0.03			
σ_T^2	206.46	***	5.18			
Observations	77,722			77,722	77,722	77,722
F-stat. excl. instrument	396.81					

* denotes significance at the 10% level, ** at the 5% level and *** 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			-0.57 ***	0.07	0.13	0.09	0.65 ***	0.16
Change in default	-97.8 ***	6.61						
Observations	33,236		33,236		33,236		33,236	
F-stat. excl. instrument	219.04							

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

Year dummies and control variables are included. Control variables include age, sex, immigrant, university, 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 different definitions of spending. Effect of student loan on parental transfers, earnings and student spending.

		Parental transfers			Earnings			Spending		
		Coeff.		S.E.	Coeff.		S.E.	Coeff.		S.E.
In-cash + in-kind transfers	Student loan	-0.62	***	0.13	0.08		0.07	0.39	***	0.11
In-cash + in-kind spending	Student loan	-0.55	***	0.05	0.08		0.07	0.23	*	0.13
In-cash spending monthly + yearly (/12)	Student loan	-0.55	***	0.05	0.08		0.07	0.34	*	0.10

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

Figure A1. Average income sources for the treatment group (euros per month).
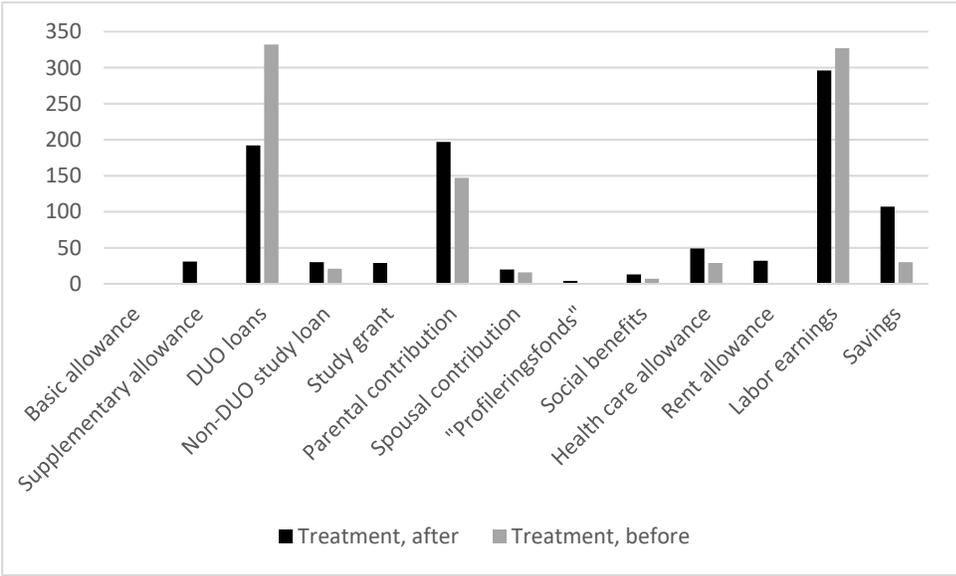
Figure A2. Average income sources for the control group (euros per month).
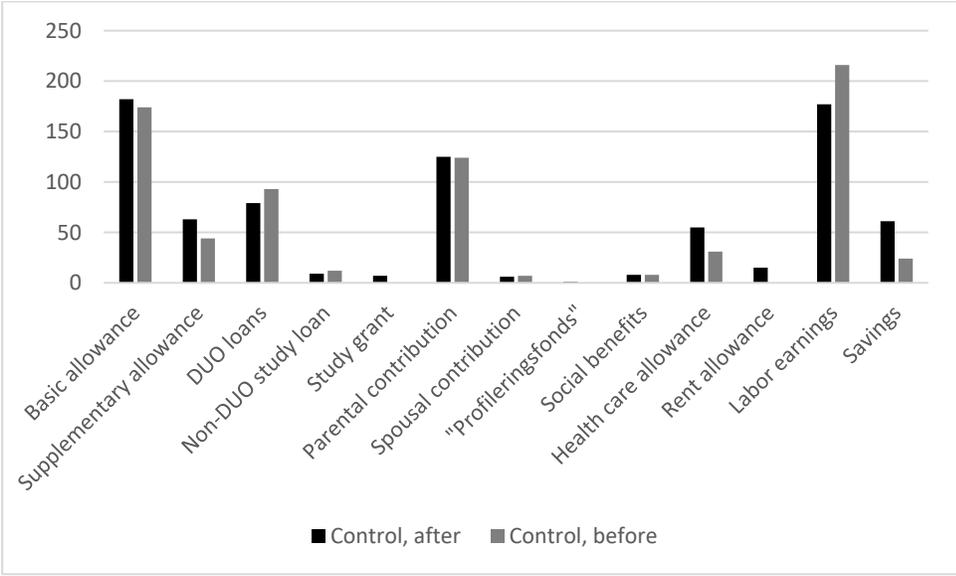
Figure A3. Average student earnings for the treatment and control group over 2003-2015 (euros per month).
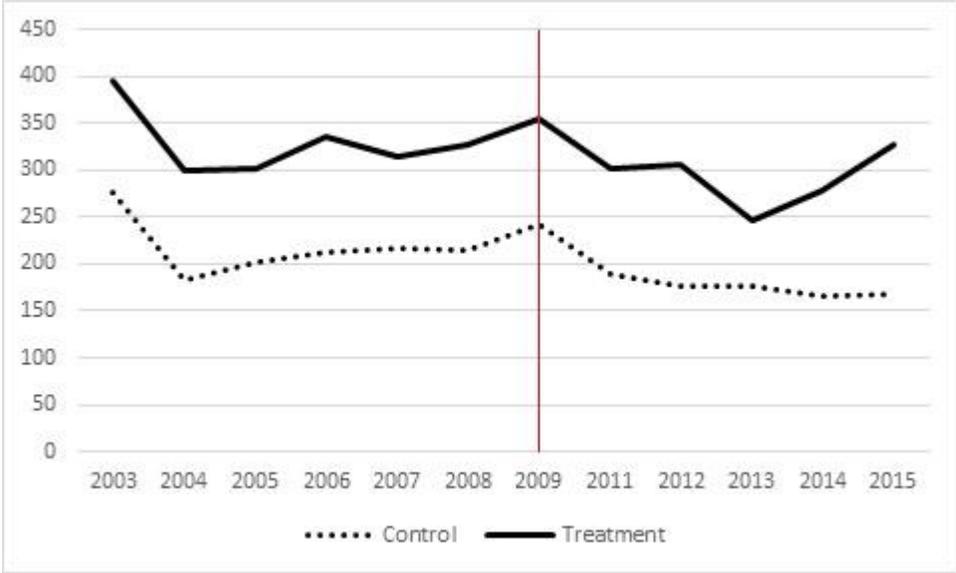
Figure A4. Average parental contribution for the treatment and control group over 2003-2015 (euros per month).
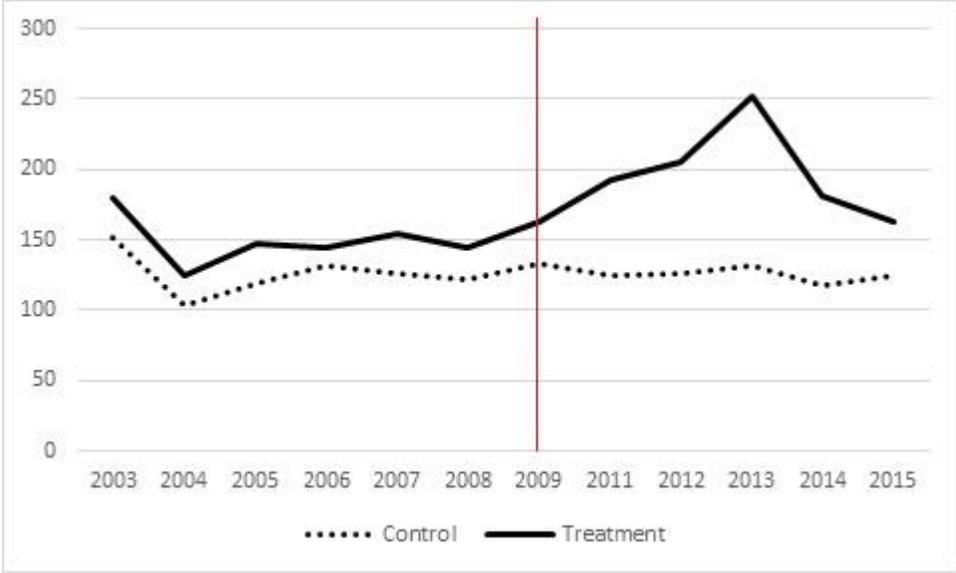
Figure A5. Average student spending for the treatment and control group over 2005-2015 (euros per month).
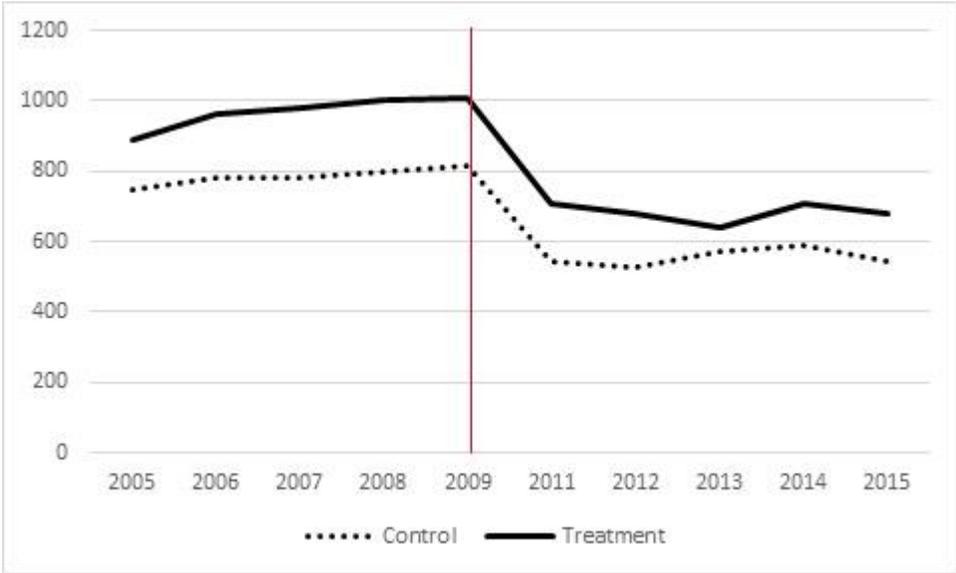
Figure A6. Average in-kind benefits from parents for the treatment and control group over 2005-2015 (euros per month).