CPB Netherlands Bureau for Economic Policy Analysis

CPB Discussion Paper | 187

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An empirical analysis for the Netherlands

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ISBN : 978-90-5833-521-0

Abstract in English

Recently, there has been considerable debate about a reform of the Dutch system of student support, in which grants will be (partly) replaced by loans. The discussion focuses on the effects on student enrollment decisions. Surprisingly, no study has yet analysed the effect of receiving a grant on parental contribution. Parents may decrease their contribution when their child receives a grant, in which case subsidies meant for the students unintentionally end up with the parents. Understanding the corresponding parental behaviour will contribute to a more in-depth discussion on the financial aid system.

This paper focuses on the effect of the supplementary grant on the parental contribution in the Netherlands. The supplementary grant is meant to support students from disadvantaged families. Parents from students with the supplementary grant have less disposable income, which probably implies a lower contribution. Our identification strategy separates this income effect from the effect due to the payments of the supplementary grant. The results suggest substantial substitution. Each additional euro spent on supplementary grant reduces the parental contribution with approximately 20-60 cents. A broad range of sensitivity analyses support our main estimation results. Nevertheless, some caution in interpreting the results is needed because of data limitations.

Key words: parental contribution, substitution, supplementary grant.

Abstract in Dutch

De hervorming van het Nederlandse systeem voor de studiefinanciering, waarbij studiebeurzen (gedeeltelijk) worden vervangen door leningen, is een recent onderwerp van het politieke debat. De discussie richt zich voornamelijk op de effecten op de deelname aan het hoger onderwijs. Verrassend genoeg zijn er geen studies die de effecten van beurzen op de ouderbijdrage hebben onderzocht. Het is mogelijk dat ouders hun bijdrage naar beneden bijstellen als hun kind een beurs krijgt. In dat geval zou een deel van de beurs onbedoeld terechtkomen bij de ouders. Inzicht in het gedrag van de ouders draagt bij aan de discussie over het systeem van studiefinanciering.

Deze studie analyseert het effect van de aanvullende beurs op de ouderbijdrage in Nederland. Alleen studenten met minder draagkrachtige ouders hebben recht op de aanvullende beurs. Dit houdt in dat ouders van studenten met de aanvullende beurs een lager besteedbaar inkomen hebben, wat naar verwachting ook tot een lagere ouderbijdrage zal leiden. Onze analyse scheidt dit inkomenseffect van het effect ten gevolge van het toekennen van een aanvullende beurs. De resultaten suggereren aanzienlijke substitutie. Elke euro extra aan aanvullende beurs leidt tot een verminderde ouderbijdrage van ongeveer 20-60 cent. Hoewel al onze gevoeligheidsanalyses

een zelfde beeld laten zien, is enige voorzichtigheid bij het interpreteren van de resultaten geboden vanwege beperkingen van de gebruikte data.

Steekwoorden: *ouderbijdrage, substitutie, aanvullende beurs.*

Contents

Summary

The Dutch government spends around one billion euros on grants for students in higher education per year. Recently, some political parties have proposed to introduce a loan system instead of the current student support system in which students receive grants. Abolishing (part of) the subsidies would imply a substantial saving for the government. The discussion and current literature focuses on the effect of the financial aid system for students on the enrolment decision. Surprisingly, to our best knowledge, no study has analysed to what extent the students benefit from receiving grants. Grants are paid to the students, however, parents might decrease their parental contribution if the student receives a grant. In case of complete substitution parents decrease the parental contribution by exactly the size of the grant, implying that the subsidy that is meant for the student ends up with the parents.

This paper analyses the effect of the supplementary grant on the parental contribution in the Netherlands. Only students from disadvantaged families can obtain this grant. The size of the supplementary grant depends on the financial capability of the parents (in other words, it is means-tested). The empirical problem in estimating the effect of the supplementary grant is that grants are not randomly assigned. It is expected that students with the supplementary grant get a lower contribution from their parents just because their parents have less disposable income. Our identification strategy must therefore separate this effect from the effect due to the payments of the supplementary grant. We use two identification strategies in which we make use of the eligibility rule for the grant to determine the effect of the supplementary grant on parental contribution.

Our results indicate that parents decrease their contribution due to the payments of the supplementary grant. Each additional euro spent on supplementary grant reduces the financial parental contribution with approximately 20-40 cents. If we also take into account the direct payments of the parents - as some parents pay directly the tuition fees, books, rents etc instead of giving money - then we find that each additional euro reduces the parental contribution with approximately 60 cents. In other words, students keep only 40 cents of each euro they receive. Although some caution seems to be appropriate because of data limitations, all our sensitivity tests indicate substantial substitution and support our main estimation results.

The degree of substitution seems larger for students that are more independent from their parents. We find that the degree of substitution is larger for students that live independently from their parents, compared with students that live with their parents. Likewise, the degree of substitution is higher for senior students than for freshmen.

Our findings point to an inefficiency in the system of providing financial aid to disadvantaged students as substantial substitution effects imply that subsidies that are meant for students unintentionally end up with parents. Our results contribute to a more profound discussion on supplying grants.

1 Introduction

In many countries the funding of higher education is a topic of considerable political debate. In the Unites States billions of dollars are spent on subsidies for college students each year. The Dutch government yearly spends around one billion euros on grants for students. Some political parties in the Netherlands have recently proposed to introduce a loan system instead of the current student support system. Decreasing or abolishing the subsidies would imply a substantial saving for the government which may help restoring public budgets. Opponents of adjustments in the current system, however, argue that smaller subsidies may result in lower participation in higher education.

The discussion mainly focuses on the effects of financial aid for students on enrolment decisions. A large literature analyses this effect (see, for example, McPherson and Schapiro (1991), Van der Klaauw (2002), Dynarski (2003), Linsenmeier, Rosen and Rouse (2006), and Canton and De Jong (2005) for the Netherlands). Surprisingly, in the current literature on financial aid for students, the role of the parents has not been analysed. To our knowledge no study has yet investigated the effects of receiving subsidies on parental contribution. Understanding the corresponding parental contribution may valuably contribute to the public debate on supplying grants. In case parents decrease the parental contribution if their child receives a grant, then providing grants to students implicitly boils down to subsidising the parents to some extent.

This paper analyses the effect of grants on the parental contribution. Hence, we are essentially investigating how much parents would have given to their children if their child had not received the grant. In order to identify this effect we focus on the supplementary grant in the Netherlands. In the Netherlands, students can basically apply for two kinds of financial aid: the basic grant and the supplementary grant. The basic grant applies, roughly speaking, for all students, while only students from disadvantaged backgrounds can apply for the supplementary grant. The empirical problem in estimating the effect of the supplementary grant on parental contribution is that this grant is not randomly assigned; receiving a grant might be correlated with both observable and unobservable factors. Differences in unobservable characteristics between students with a supplementary grant and students without a supplementary grant may bias the estimation results. We use two different identification strategies that make use of the eligibility rule for the grant to determine the effect of the supplementary grant on parental contribution.

Our main analysis uses a dataset that consists of administrative data on the supplementary grants and self-reported data on parental contribution for the years 2005 through 2009. We find that obtaining a supplementary grant reduces the parental contribution. Each additional euro on

supplementary grant reduces the financial parental contribution with approximately 20-40 cents. When we also take into account the direct payments of the parents - as some parents pay directly the tuition fees, books, rents etc instead of giving money - an even larger effect is found. Then, each additional euro the student receives on supplementary grant reduces the parental contribution with approximately 60 cents. This result suggests substantial substitution effects related to providing financial aid to students, which implies that subsidies meant for the students unintentionally end up with the parents to some extent. If the goal of the supplementary grant is to support the students from disadvantaged families (and possibly in that way enhancing the accessibility to higher education), then our empirical findings suggest that this system is partly ineffective.

We perform a broad set of sensitivity analyses that all yield similar results and support our main findings. Nevertheless, as we rely on self-reported data and cannot completely rule out potential selection effects, some caution in interpreting the results seems appropriate.

The rest of this paper is organized as follows. Section 2 discusses the current system of student support in the Netherlands. In section 3 we present our empirical strategy. Section 4 describes the data and the main results are presented in section 5. The sensitivity tests can be found in section 6. Section 7 determines and discusses the effect of the supplementary grants for subgroups, such as male versus female. Finally, section 8 concludes and discusses the implications of our findings.

2 The Dutch system of student support for higher education

The current Dutch system of student support is based on the idea that the income of the students that is not generated from work consists of three components: the basic grant, the parental contribution and a loan. In addition students from disadvantaged backgrounds can receive a supplementary grant. The regulation of the Dutch system of support has been written down in the Student Finance Act (2000).

Basic grant

All students, younger than 30 which are registered at an institute for higher education (higher vocational education ("HBO") or university education ("WO")) and earn less than approximately 10 thousand euro a year, are eligible for the basic scholarship during the nominal length of their study (4-6 years).[1] The amount of the basic scholarship depends on the living situation of the student. That is, students that live independently from their parents receive about 3 times as much as students that live with their parents. Table 2.1 shows the exact size of the basic grant for the years 2005-2009. Clearly, as shown in table 2.1, the government marginally adjusts the amounts each year. The scholarship is conditional on graduating within 10 years. If the student fails to meet this criterion, the total sum received must be repaid with interest.

Table 2.1 Basic scholarships

	Living situation student	
Basic scholarship (p/month in €)	at parental home	independent
- 2005	76	233
- 2006	89	248
- 2007	91	253
- 2008	92	256
- 2009	93	260

Parental contribution and the supplementary grant

On a yearly basis, the Dutch government estimates a 'standard amount' that students are expected to receive from their parents. This standard amount depends on the living situation of the student. Table 2.2 gives the standard amounts for the years 2005-2009. Although parents are expected to provide at least the standard amount to their children, they are free to donate more or less in practice.

[1] Special additional criteria apply to students that do not have the Dutch nationality.

Table 2.2 Standard amount (=maximum supplementary grant)

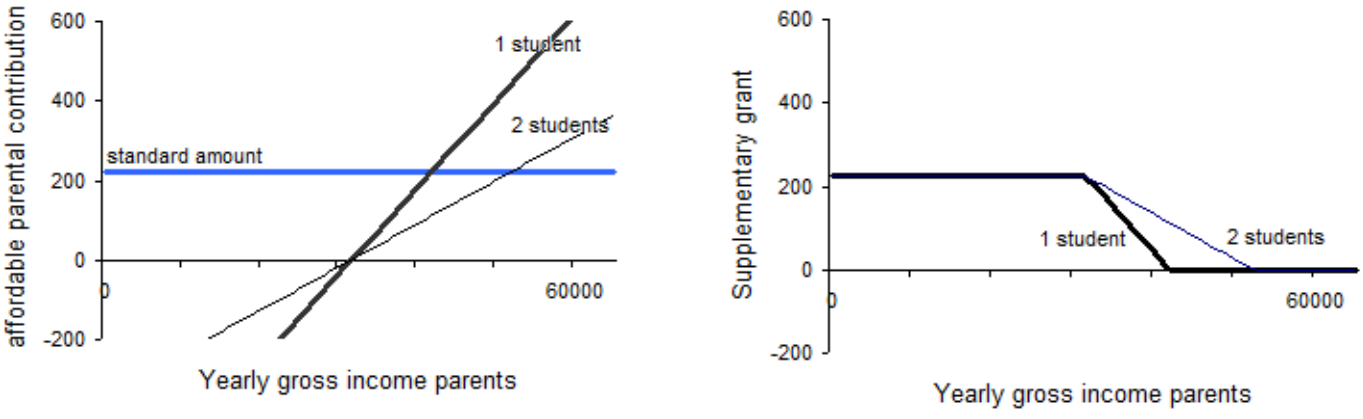
	Living situation student	
Standard amount (p/month in €)	at parental home	independent
- 2005 [a]	203	221
- 2006	207	226
- 2007	204	224
- 2008	209	228
- 2009	212	231

[a] In 2005, the standard amount also depended on the kind of medical insurance. The average standard amount is shown.

A student that is eligible for the basic grant can apply for the supplementary grant when he believes that his parents are financially unable to pay the standard amount. In that case the government determines the exact parental financial capability, as eligibility to the supplementary grant and the size of the grant (in case of eligibility) is based on this capability. The financial capability is mainly determined by the gross aggregated income of the parents. Other components that are taken into account are the number of siblings at high school and higher education. If the financial capability is insufficient, then the student receives a supplementary grant. Around 30% of the students currently receives a supplementary grant (Vossensteyn, 2008).

The size of the grant is determined as follows. Based on parental financial capability the government first determines the corresponding amount that they should be able to donate to their child, indicated as the 'affordable amount of parental contribution'. The affordable amount increases with the parental gross income and decreases with the number of siblings that are at high school or higher education. This is graphically illustrated in the left part of figure 2.1, where the '1 student' and '2 students' lines indicate the affordable parental contribution for parents that have 1 child or 2 children at higher education respectively. In general, the slope of the '1 student line' flattens if the parents have more children enrolled at higher education, and the line shifts outward if they have more children at high school (not shown in the figure).

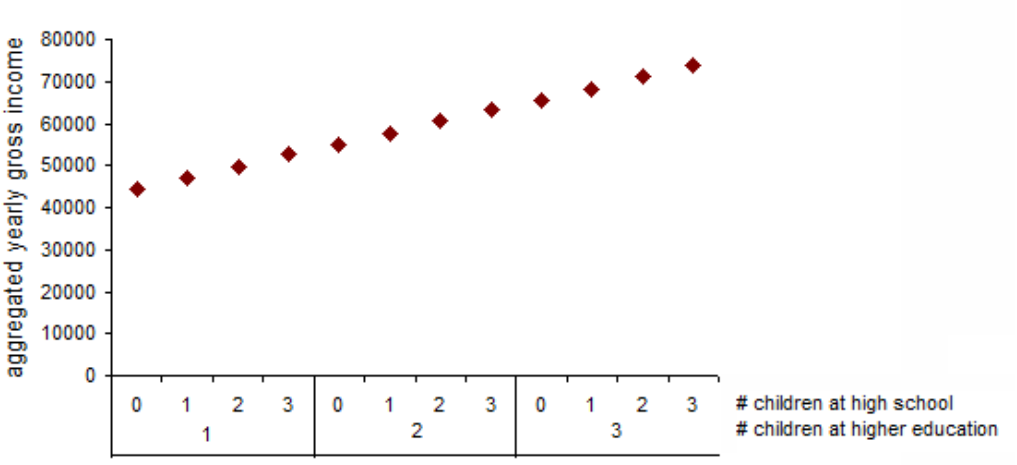
Figure 2.1 Affordable parental contribution and size of supplementary grant



The size of the supplementary grant is consequently calculated as the difference between the standard amount and the affordable amount. Hence, the supplementary grant fills the gap between the standard amount and affordable amount, to ensure that students can obtain the standard amount of money. This is illustrated in the right figure. This system implies that there is some variation in the size of the supplementary grant. The supplementary grant is at least a couple of cents (in which case the affordable amount is nearly as high as the standard amount) and at most equal to the level of the standard amount. The first year of the supplementary grant is a gift independent of educational achievement. The other years are only converted into a gift if the student graduates within 10 years.

Figure 2.2 shows the maximum yearly gross aggregated parental income at which a student is eligible to receive the supplementary grant. More precisely, we show the corresponding gross parental income for students that live independently from their parents and receive a supplementary grant of €1. The horizontal axis gives the total number of children at high school and higher education and the vertical axis shows the corresponding gross parental income for the year 2009. The results for the other years are similar (not shown). Clearly, eligibility to the supplementary grant is influenced by the family composition.

Figure 2.2 **Maximum yearly gross parental income (in year 2009)**



Loan

In addition to these grants students can borrow from the government till three years after eligibility for the basic grant. The maximum amount that students can borrow depends on the amount that the student receives from the supplementary grant. That is, the received amount of this grant is deducted from the maximum loan. Similar to grants, the maximum loan depends on the living situation of the student and is marginally adjusted each year.

3 Empirical strategy

In order to estimate the effect of the supplementary grant on the parental contribution, we can regress the parental contribution on the level of the supplementary grant, taking into account observable differences between students (X_i). Accordingly,

(1) $$PC_i = \beta_0 + \beta_1 S_i + \beta_2 X_i + \varepsilon_i$$

with PC_i the parental contribution of student i, S_i the level of the supplementary grant, and X_i a vector of observable control variables. Estimation of regression **(1)** with ordinary least-squares (OLS) yields the causal effect of the supplementary grant in case the allocation of the grants is not correlated with unobservable characteristics of the students that influence the level of the parental contribution. This means that the provision of the supplementary grant can, while taking into account the observable differences of students, be seen as random. In the literature this is called the 'unconfoundedness assumption' (Imbens and Wooldridge, 2009).

The empirical problem in estimating the effect of the supplementary grant on parental contribution is that grants are not randomly assigned; receiving a grant might be correlated with both observable and unobservable factors. Differences in unobservable characteristics between students with a supplementary grant and students without a supplementary grant may bias the estimation results. This is why unconfoundedness is generally considered to be a strong identification assumption.

In our case, however, the eligibility rule for the supplementary grant may contribute to the credibility of the unconfoudedness assumption. Eligibility depends on the financial capability of the parents (see section 2), which is mainly determined by gross aggregate income. Students with parents below a certain threshold level of income (I*) are eligible for the grant, while students with parents above this level of income are not eligible. In addition, the size of the grant for eligible students depends on parental income. Hence, parental income is the most important underlying variable determining the amount of supplementary grant a student receives.

In our first approach we rely on the unconfoundedness assumption in a cross-section regression in which we control for a flexible function of parental income. We estimate the following equation by OLS:

(2) $$PC_i = \beta_0 + \beta_1 S_i + \beta_2 f(I)_i + \beta_3 X_i + \varepsilon_i$$

where $f(.)$ is a smooth polynomial function and I is the net parental income. The unconfoundedness assumption seems reasonably valid when we control for a smooth polynomial of parental income. Obviously, for a causal interpretation of the estimated coefficient β_1 we need that there exists a continuous relationship between parental income and parental contribution. After all, in case of misspecification of the functional form, part of the effect of income on parental contribution might be picked up by the coefficient for the supplementary grant. It seems, however, most plausible to assume a continuous relationship, in which case the smooth polynomial function will completely pick up the income effect.

To further reduce potential endogeneity problems that might violate our identification assumption, we also perform analyses that focus on a narrower sample around the threshold income level for eligibility to the grant. Students around the threshold income of being eligible seem comparable as students cannot exercise precise control over the assignment of the treatment (Lee, 2008). That is, students do not determine the wage of their parents, nor do parents base their income decision on the corresponding size of the supplementary grant. Students on one side of the cut-off were just 'lucky' to obtain the treatment while students on the other side did not. Students further away from the cut-off seem less similar as the income difference increases. Therefore focussing on a narrower window reduces the risk of an incorrect specification bias, but has the disadvantage of a loss of efficiency (Van der Klaauw, 2008).

Ideally we would have followed the exact identification strategy of the recent innovative studies of Card et al. (2009) and Simonsen et al. (2010) who have introduced the regression kink design to determine the effect of kinked treatment functions. The size of the supplementary grant is a kinked function of parental income (see the right panel of figure 2.1). The regression kink design exploits the shift in slopes, rather than the shift in levels as done in regression discontinuity analyses (Hahn et al., 2001). Data limitations, however, prevent us from using our preferred identification strategy. That is, we only dispose of self-reported data on classes of income levels of the parents which makes it difficult to use a kink point for identification. In addition, we cannot perfectly determine the precise cut-off level of the parental income of individual students, as we lack data on the number of siblings of the students (see section 4).

Although model **(2)** controls for the single most important variable determining eligibility and the size of the grant, we can think of two potential sources of bias in estimating the effect of the supplementary grant. First of all, not all students that are eligible for the grants do actually apply for it. There may be unobservable differences between the group of students that is eligible and applies for the grant and the group of students that is eligible but does not apply. The standard approach to deal with this concern would be an instrumental variables technique (see for instance Angrist and Pischke, 2009), in which receiving a grant is instrumented by a variable for eligibility. However, this is not feasible to us because of the data limitations

discussed above. We address this possible bias performing two sensitivity checks (see section 6). Firstly, we restrict the sample to students from low-income families. All students in this group should be eligible to the supplementary grant. In case unconfoundedness holds we expect to find similar results. Secondly, we restrict the sample to students that receive the supplementary grant. Finding similar results for this subgroup of students that all applied and received the grant, using only variation in the size of the supplementary grant, suggests that non-appliers do not bias the estimations.

Our second concern, and probably more important, is that the number of siblings of a student may be correlated with both the size of the grant and the parental contribution. That is, it is plausible to believe that parents with more children donate each child somewhat less. At the same time, from the assignment rule for the supplementary grant it follows that the size of the grant increases with the number of siblings. Therefore, not controlling for the number of siblings might give a downwards bias on the estimated effect of the supplementary grant on the parental contribution. Our second approach, in which we make use of panel data, aims to address this problem.

Our second identification strategy is an extension of our first approach. By using data containing two successive years for each student, one can estimate

(3) $$PC_{i,t} = \beta_0 + \beta_1 S_{i,t} + \beta_2 f(I)_{i,t-1} + \beta_3 PC_{i,t-1} + \beta_4 X_{i,t} + \varepsilon_{i,t}$$

where ($PC_{i,t-1}$) indicates the size of the parental contribution of the previous year. In contrast with our first identification, this model additionally controls for the lagged value of the parental contribution ($PC_{i,t-1}$). We can interpret this variable as a measure for individual fixed effects. Some families just prefer to donate to their child more or less, potentially caused by the family composition. Specially, assuming that a student's number of siblings remains constant, not observing the number of siblings does not bias the estimation results in this specification. The data set needed for this approach, however, also has its limitations (see section 4). As it only contains parental income in the first year, we cannot include parental income ($I_{i,t}$). Therefore, we include lagged parental income in **(3)** instead of current parental income. This should be a reasonable proxy assuming a low year-to-year variation in parental income. However, if specification (2) is correct, we would not expect to find an effect of lagged parental income conditional on lagged parental contribution. We will present results of model (3) both with and without inclusion of lagged parental income. Our second approach, using panel data. can be considered as a robustness analysis in which we address the issue of missing information on the number of siblings.

4 Data description

For our empirical analyses we employ two datasets. The first dataset, the so-called 'Student Monitor', consists of cross-section data of students. These data have been extended with administrative information on the grants that students have obtained. These data are suitable for the first identification strategy and will be described in section 4.1. Our second dataset, named 'Determinants of participation in higher education', is collected by SEO - SCO Kohnstamm Institute of the University of Amsterdam. This dataset can be used for both identification strategies as it disposes of longitudinal data. We describe this dataset in section 4.2.

4.1 Cross-section data: Student Monitor

Our first dataset is the Student Monitor extended with administrative data that includes information about the size of the grants. The Student Monitor is a yearly large-scale survey held among students enrolled in higher education, financed by the Ministry of Education. Students are asked a large set of questions related to their life and study. We use the surveys of years 2005 through 2009. These 5 surveys gathered cross-section information about the student's personal characteristics (age, gender, marital status, living situation, etc), the student's educational position (level of higher education, sector, number of studies, etc) and socioeconomic background characteristic (parental income, education level and occupation of the parents). Each survey also included information on the parental contribution.

For the questions regarding the parental contribution, students were asked to report the monthly financial parental contribution. As some parents might pay bills of the student directly, like the tuition fee, the rents, insurance, etc, students were also explicitly asked about these kinds of contributions. Based on this information we construct two dependent variables: the financial parental contribution and the total parental contribution. The financial parental contributions (FPC_i) are the monthly financial contributions of the parents. The total parental contribution (TPC_i) is the financial parental contribution plus the monthly direct payment of the parents (for rents, tuition fees, etc).

The main explanatory variable in our analysis is the size of the supplementary grant. This variable is administratively obtained and gives the monthly level of the supplementary grants, which can be as high as the standard amount and as low as zero (in which case the student does not receive the supplementary grant). The monthly net parental income is the most important control variable. In all 5 surveys this variable is measured on a 8 point scale: no income; less than 700 euro; between 700-1400; between 1400-2100; between 2100-2800; between 2800-

3500; between 3500-4200; more than 4200 euro a month.[2] We use the midpoints of the ranges as estimator for the income of the parents. For the category 'more than 4200 euros' we follow the method used by Card and DiNardo (2002) who multiply censored earnings by 1.4. That is, we set the category equal to €5880. Students could choose to report the aggregated monthly net income of the parents, or to report the income of the mother and father separately (in which case the sum gives the aggregated net monthly income). We focus our analyses on the students that report both the income of the mother and father. These observations contain more information since more income classes are possible (26 [3] instead of 8). If the income level of one of the parents is missing then we exclude the observation.

Other covariates we use are the personal characteristics of the students (age, gender, ethnic group, living situation, marital status), their educational position (level of higher education, sector of education, years in intermediate/higher education, number of studies enrolled) and the socio economic background characteristics (occupation and employment parents, years of education parents, county of origin parents). Except for age and gender that have been obtained from administrative data, the data are self-reported. Age might be important as a decrease of the parental contribution typically occurs when the student gets older. Likewise, all other personal characteristics, the educational position of the student and the socioeconomic background characteristics might influence the level of the parental contribution.

In total, more than 50 thousand students responded to one of the five surveys (approximately 10 thousand a year). We limit the sample to students that are eligible for the basic grant, as students that are ineligible for the basic grant are automatically also ineligible for the supplementary grant. In total 35119 respondents are eligible for the basic grant and 18055 of these students report their parental contribution and parental income.[4] Leaving out students that report an exceptional (unrealistic) high monthly total parental contributions of more than €1500,

[2] As we only dispose of self-reported income categories, we probably have measurement error in our parental income variable. Although we are not interested in obtaining a causal estimate for the effect of income, this still might be a concern in our analyses. If observed income differs from true income, there will be variation in true income that is contained in the error term. This may cause correlation between the error term and the supplementary grant, which is based on true income. This potential concern is inherently related to the use of the 'Student Monitor' in our analyses.

[3] $\sum_{i=1}^{8} i$ minus overlapping categories (for instance between 1400-2100 (=1750) plus between 2100-2800 (=2450) equals 4200. The sum of the parental income is also equal to 4200 if the student reports between 700-1400 (=1050) and between 2800-3500(=3150)).

[4] We necessarily have to restrict our sample to students that report both parental contribution and income. This leaves us with a substantially smaller estimation sample compared to the total sample size of 35119 eligible students. This might give rise to concerns on the external validity of our estimation results, if our estimation sample would contain a selective group of students. We have compared descriptive statistics for students in our estimation sample and the students that are not in our estimation sample and find that both groups are well comparable on characteristics like age, gender, ethnicity, education level, living status and parental education. This suggests that sample selection is not really a concern for our analyses.

gives us 17745 students. The restriction excludes less than 2% of the sample. Of these students 5694 reported the aggregated income of the parents, and 12051 the income of the mother and father separately. As the last group contains more information, we use this group as our main estimation sample. The students that report the aggregated parental income are used in a sensitivity test.

Figure 4.1 shows the histograms of our two dependent variables for our estimation sample separately for students without and with the supplementary grant. The histogram of the financial parental contribution is shown in figure (a), and figure (b) shows the histogram of the total parental contribution. A remarkable proportion of the students receive no (financial or total) parental contribution. The proportion of students that receive no parental contribution is higher for the students that receive the supplementary grant than for the students that do not receive the supplementary grant.

Figure 4.1 Histogram of financial and total parental contribution

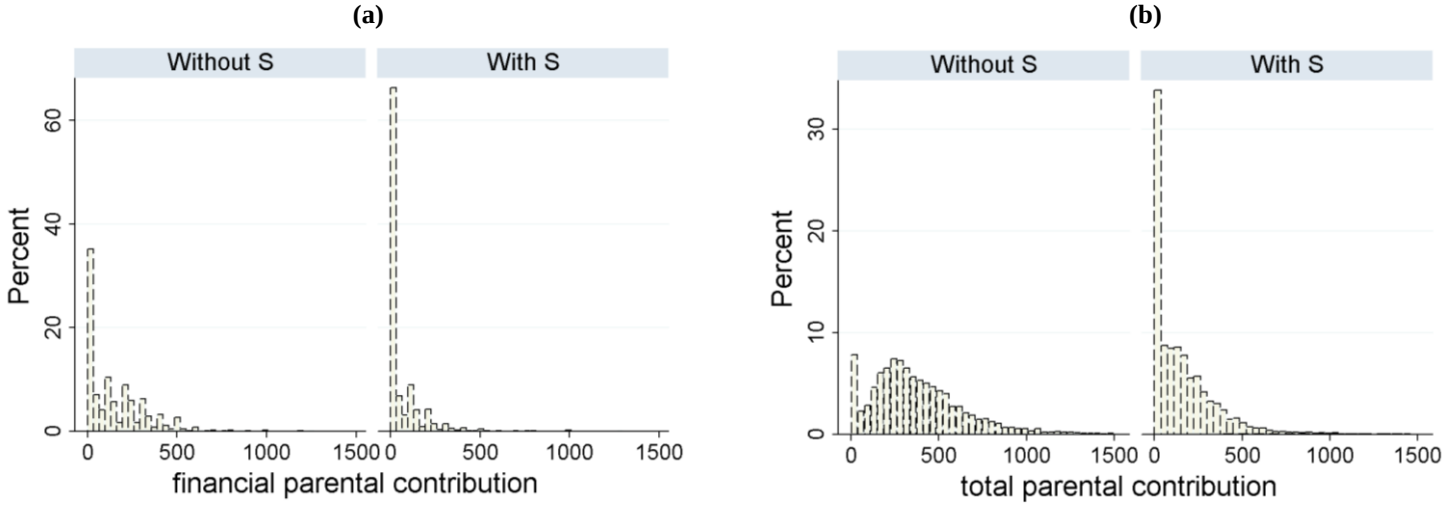


Table 4.1 gives the sample means and standard deviations of the parental contribution and the average size of the supplementary grant for our estimation sample. The monthly financial parental contribution for students that do not receive the supplementary grant is €148. Adding the direct payments gives a total parental contribution of €375. If we compare the financial contribution with the standard amount shown in table 2.2 we observe that the average financial contribution is lower than the standard amount. Adding the direct payments shows that average total parental contribution is higher, though.

Table 4.1	**Average (financial/total) parental contribution and size of supplementary grant (N=12051)**					
Year	2005	2006	2007	2008	2009	2005-2009
Students without S (N=8364)						
FPC (p/month in €)	138 (157)	156 (168)	145 (164)	150 (167)	149 (174)	148 (166)
TPC (p/month in €)	359 (247)	396 (269)	379 (259)	380 (255)	359 (267)	375 (260)
S (p/month in €)	n/a	n/a	n/a	n/a	n/a	n/a
Students with S (N=3687)						
FPC (p/month in €)	58 (115)	59 (114)	51 (98)	50 (104)	46 (97)	54 (107)
TPC (p/month in €)	169 (194)	167 (191)	154 (186)	151 (175)	136 (193)	157 (184)
S (p/month in €)	162 (68)	170 (68)	170 (67)	173 (67)	176 (70)	170 (68)

Standard deviations in parentheses.

The average monthly financial contribution for students with the supplementary grant is €54, the total parental contribution €157, and the average size of the supplementary grant €170. This gives a total income of €327 (TPC+S). Note that this is a smaller amount than the average total parental contribution for students without the supplementary grant, but higher than the standard amount.

The descriptive statistics of the covariates are shown in table 4.2. The first column reports the descriptive statistics for the students that do not receive the supplementary grant, while the second reports them for the students with the supplementary grant. It turns out that students with the supplementary grant are more often from an ethnic minority group, less often enrolled in university education, and have lower general socioeconomic background characteristics. Their parents earn less, have had less education, are less often employed, and have more often occupations for which no training is needed. In our regressions we additionally control for age squared and the living situation of the student (student house, at landlady, etc).

Table 4.2 Descriptive statistics of covariates (N=12051)

	Without S		With S	
Personal characteristics				
Age	21.2	(2.07)	21.6	(2.30)
Female (%)	53		55	
University education (%)	64		53	
Ethnic minority (%)	10		24	
Lives independent from parents (%)	64		60	
Marital status: % single [a]	90		88	
Student had no child (%) [b]	99		99	
Educational position student				
Years in intermediate/higher education (MBO/HBO/WO)	2.9	(1.41)	2.8	(1.41)
Enrolled for >1 study (%)	6		6	
Sector of education: % agriculture	9		9	
% behaviour & society	13		15	
% economics	12		11	
% education	4		6	
% health care	19		17	
% language & culture	12		12	
% law	5		5	
% nature	10		8	
% technique	16		16	
Socio economic background				
Net monthly parental income (income mother + father)	4490	(2151)	2248	(1393)
Year of education mother [c]	12.7	(2.71)	11.0	(2.90)
Year of education father [c]	13.7	(2.94)	11.5	(3.10)
Employment mother: % employed [d]	76		56	
Employment father: % employed [d]	90		69	
Level of occupation mother: % unskilled, untrained job [e]	5		15	
Level of occupation father: % unskilled, untrained job [e]	2		8	
Country of origin mother: % the Netherlands [e]	89		75	
Country of origin father: % the Netherlands [f]	89		73	

[a] The other categories are: married/unmarried partners, and divorced/widowed

[b] The other categories are : 1 child, 2 children, more than 2 children

[c] Education is in the survey a categorical variable. In this table we assign years to all categories and show the average and standard deviation. For the regressions in section 5 we use the initial categories.

[d] The other categories are: Unemployed, Not suitable for employment, Unknown/na

[e] Students could choose between 9 categories, ranging from unskilled to high intellectual. If the parent was unemployed, then students were asked to report the level of the last occupation.

[f] The other categories are: Surinam, Antilles (inclusive Aruba), Morocco, Turkey, Indonesia, Other, Unknown/na

Standard deviations in parentheses.

4.2 Longitudinal data: Determinants of participation in higher education

This dataset consists of two cohorts, the 1995 cohort and the 1997 cohort. For the 1995 cohort a survey was held among freshmen enrolled in higher education in the academic year 1995-1996 (henceforth year 1). The follow-up survey gathered information one year later about the academic year 1996-1997 (henceforth year 2). The 1997 cohort also consists of information about freshmen at two different points in time: for 'year 1' a survey was held right after the beginning of the academic year 1997-1998 and for 'year 2' roughly one year later about the academic year 1998-1999 (Belot et al., 2006). The two major differences between this dataset and the dataset of the Student Monitor are i) this dataset includes information about two successive points in times, and ii) this dataset is not extended with administrative data.

The surveys of both years include a question on the monthly financial parental contribution. No questions were asked about the indirect payments of the parents. Therefore, for our main dependent variable we use the financial parental contribution only. Besides this type of income, students were also asked to report the size of the basic grant, supplementary grant, contribution of a partner, net wage, income from social security, income from other sources, and the total income (that should be equal to the sum of the individual components). We impute missing values for the supplementary grant and financial parental contribution as zero only in case the sum of the individual components of income are equal (or higher) than the reported total income.

For our first identification strategy, defined in equation **(2)**, we use the data of year 1. This is because our main control variable, the parental income, is only reported in the first surveys of both cohorts. We focus on students that report the income of the parents separately. For both parents the income is reported in ranges[5] and we use the midpoints of the ranges (except for the highest category that is multiplied by 1.4). The estimator of the parental income is the sum of the income of the mother and father. Within this dataset we use the following covariates: age, age squared, gender, living situation, level and sector of education, ethnic group, country of origin and education level of the parents.

In total, 8726 students responded to the survey of year 1 (4412 students in the 1995 cohort and 4314 students in the 1997 cohort). Restricting the sample to students that are eligible to the basic grant - this implies that we exclude students with missing or zero values for the basic grant - leaves us with 6736 students (3671 for cohort 1995 and 3065 for cohort 1997).Within this group, 3929 students report the size of the supplementary grant, parental income and

[5] For cohort 1995 the categories are: 0, <1500, 1500-1750, 1750-2000. 2000-2250, 2250-2500, 2500-3000, 3000-3500, 3500-4000, 4000-4500, 4500-5000, 5000-5500, >5500. In the 1997 cohort, the last two categories (5000-5500 and >5500) are replaced by: 5000-6000, 6000-7000, 7000-8000, >8000.

financial parental contribution. Leaving out students that report an unrealistically high monthly financial parental contribution of more than €650 and/or an unrealistic high supplementary grant of more than €220, gives 3902 students. This last restriction excludes less than 1% of the sample. That is, our estimation sample for our first identification strategy consists of 2362 students for cohort 1995 and 1540 students for cohort 1997.

Our second identification strategy additionally requires that students responded to the follow-up survey, were still eligible for the basic grant in that year, and reported realistic values for the size of the supplementary and financial parental contribution. In total, 1806 respondents meet all these conditions: 1192 for the 1995 cohort and 614 for the 1997 cohort.

5 Main estimation results

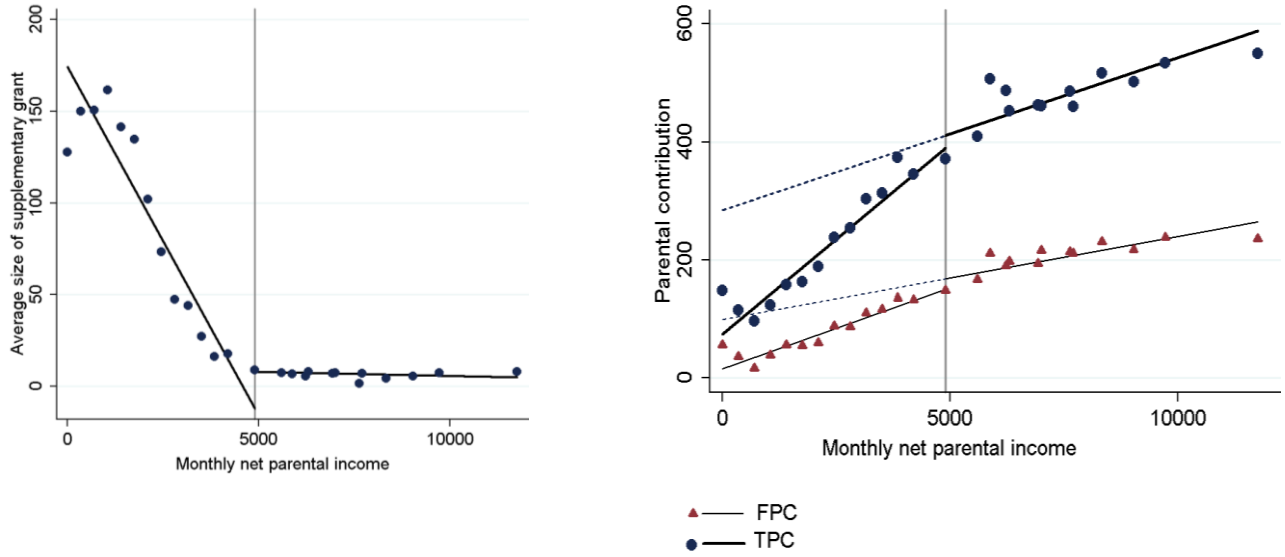
This section discusses the results for both identification strategies. Section 5.1 presents the results of the cross-section analyses. In section 5.1.1 we use the dataset of the Student Monitor, and in section 5.1.2 the dataset 'Determinants of participation in higher education'. Section 5.2 shows the results for our second identification strategy. For our second identification strategy we only use the dataset 'Determinants of participation in higher education', as longitudinal data are needed.

5.1 First approach: cross-section analysis

5.1.1 Results Student Monitor

The key for our first identification strategy, defined in equation **(2)**, is that we control for the parental income. Therefore, we first consider the average size of the supplementary grant for every possible income class. If students report the parental income correctly, then it is expected - from the rules about the assignment of the supplementary grant - that the size of the supplementary grant decreases with an increase of the parental income. The left panel of figure 5.1 shows the average size of the supplementary grant for every possible income class. As shown, the average supplementary grant is approximately zero for monthly net parental income levels of €4900 or higher. Hence, the figure suggests that the cut-off of being eligible for the supplementary grant is at about €4900. The figure also shows two regression lines, one estimated for the students below the cut-off, and one for students above the cut-off.

Figure 5.1 Average supplementary grant and parental contribution as function of the parental income



Importantly, the left panel illustrates a decrease of the supplementary grant with an increase in parental income. Two remarks on this figure are in order. Firstly, the average size of the supplementary grant should be zero for students that have parents with high income, while it is somewhat higher than zero. Apparently, some students misreport the parental income (recall that the information about the grants is administratively obtained). Secondly, students seem to overestimate the parental income. Large families (3 students and 3 children at higher school) are ineligible for the supplementary grant if the yearly gross aggregated parental income is more than ±€70000 (see figure 2.2), which corresponds to a monthly net income of somewhat below €4000.[6] The maximum gross aggregated parental income that allows receiving the supplementary grant is smaller for students from smaller families. Hence, from the rules about the assignment of the supplementary grant, we would expect to find a cut-off somewhat below €4000.

The right panel of figure 5.1 gives the parental contribution as function of the parental income. It also presents two OLS regression lines, one for students below the cut-off of €4900 and one for students above the cut-off. The figure shows that the relationship between the parental income and parental contribution changes when we cross the cut-off income level. The dotted lines show the expected parental contribution if the student had not obtained the supplementary grant. It seems that, due to the supplementary grant, parents decrease their contribution more than can be explained from the decrease in income. The figure suggests the presence of substitution. It should be noted that the figure gives just a first impression as the covariates are excluded. In addition the figure assumes a linear function for the income, while a more flexible functional form might be more appropriate.

Table 5.1 presents the results for our first identification strategy. The first row shows the estimated coefficients for the supplementary grant in the regression with the financial parental contribution as dependent variable. The second row presents the estimated coefficients in the analyses with total parental contribution as dependent variable. In the first column we regress the parental contribution on only the supplementary grant and dummy year variables. Column 2 additionally includes the control variables. Column 3 adds the parental income and in column 4 a third order polynomial of the parental income is also included. Note that column 2 is the model presented in equation **(1)** and column 4 the model presented in equation **(2)**.

[6] The exact size of the corresponding net monthly income depends on many factors, like having a lease car or not, the exact year, renting or owning a house, etc.

Table 5.1 Effect of supplementary grant on parental contribution (N=12051)

	(1)	(2)	(3)	(4)
Parental contribution				
Financial	-0.517***	-0.278***	-0.235***	-0.230***
	(0.016)	(0.017)	(0.018)	(0.018)
Total	-1.196***	-0.715***	-0.611***	-0.597***
	(0.025)	(0.028)	(0.028)	(0.029)
Control	NO	YES	YES	YES
Parental income	NO	NO	LINEAR	POLYNOMIAL

* Significant at a 10% level, ** Significant at a 5% level, *** Significant at a 1% level. Standard errors in parentheses
All regressions include year dummies.

The estimated coefficients are negative and statistically significant in all specifications. The effects decrease (in absolute value) when more control variables are added to the model. In the full model, including all control variables, the effect of receiving a supplementary grant on the financial parental contribution is -0.23.[7] This implies that every additional euro supplementary grant reduces the financial contribution of the parents with 23 cents. The substitution effect is larger when we consider the effect for the total parental contribution. The estimation results in the full model show that total parental contribution decreases with around 60 cents for every additional euro supplementary grant. Our findings suggest that the subsidy meant for the students is implicitly passed on to the parents to some extent.

In order to further decrease potential endogeneity problems in our estimations, we also focus our analyses on a narrower window. Table 5.2 shows the estimation results of some regression analyses in which we focus on a narrower subsample of students around the cut-off of being eligible for the supplementary grant. The first column shows our initial full model estimate. Subsequently we narrow the window to the income class €4900 plus minus €3000 (column 2) and plus minus €1000 (column 3). We find similar results for narrower windows around the cut-off of being eligible. In the last regression we exploit the data points at the cut-off, that is, we estimate the results for students that report an income class of €4900. Even in that case the estimates remain in the same ballpark, although the standard errors increase strongly due too the smaller sample size. Our findings support the credibility of the unconfoundedness assumption and improve the internal validity of the results.

[7] In the full model, including a polynomial function of income, both the estimated coefficients for the second and third order income variables are significantly different from zero.

Table 5.2 Effect of supplementary grant on parental contribution for samples near the cut-off

	(1)	(2)	(3)	(4)
Parental contribution				
Financial	-0.230***	-0.234***	-0.231***	-0.157
	(0.018)	(0.023)	(0.061)	(0.131)
Total	-0.597***	-0.627***	-0.688***	-0.770***
	(0.029)	(0.037)	(0.096)	(0.209)
N	12051	9321	3229	902
Income class	Initial regression	4900±3000	4900±1000	4900

* Significant at a 10% level, ** Significant at a 5% level, *** Significant at a 1% level. Standard errors in parentheses
All regressions include covariates including the polynomial function of the parental income, and year dummies.

5.1.2 Results Determinants of participation in higher education

In line with the analysis of the Student Monitor, we start by presenting the average size of the supplementary grant for every possible income class (see figure 5.2). Note first of all, that this dataset contains more income classes than the Student Monitor. The number of observations for each income class ranges from 1 to 246. This explains some of the apparent outliers, as they represent very few observations. As shown, the average supplementary grant is approximately zero for parental income levels of €2800 or higher. This seems to correspond well with the assignment rules for the supplementary grant. The maximum gross aggregated parental income at which large families (3 students and 3 children at high school) are eligible was about €50000 a year[8], which implies a monthly net income of about €2800. We also show two regression lines, one for the respondents below the cut-off value of €2800, and one for the respondents above the cut-off.

The right panel of figure 5.2 illustrates the financial parental contribution as function of the parental income with corresponding regression lines. The dotted line shows the expected financial parental contribution if the student would not receive the supplementary grant. The figures show a similar pattern as in figure 5.1 and hence suggest substitution.

[8] Source: Informatie Beheer groep (1995).

Figure 5.2 **Year 1: Average supplementary grant and financial parental contribution as function of the parental income**

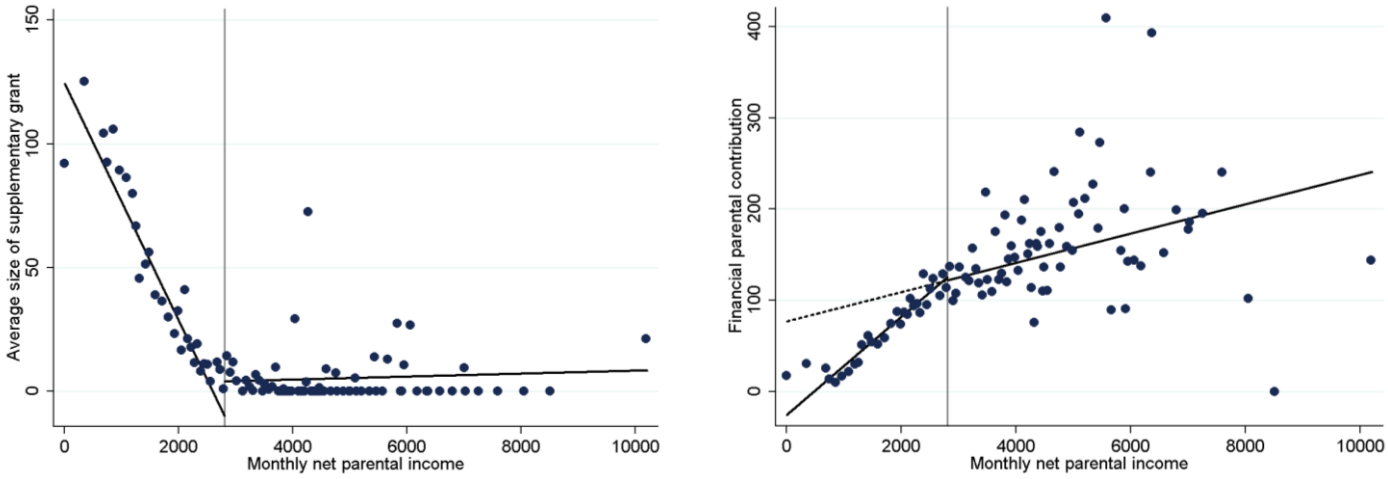


Table 5.3 shows the estimates of the effect of the supplementary grant on the financial parental contribution. Similar to the results of the Student Monitor, the estimated coefficients are significant negative in all specifications and decrease (in absolute value) when more control variables are added to the model. In the full model the effect of receiving an additional euro on supplementary grant reduces the financial parental contribution with 40 cents. This suggests an even higher degree of substitution compared the results of the Student Monitor (-0.40 compared to -0.23). This difference might be due to differences in sampling, data collection, or time period. We checked whether the difference occurred due to the difference in the number of included covariates. When we restrict the covariates of the Student Monitor to the same ones as used in table 5.3, then we find an estimated effect of -0.24. Hence, including less covariates in the analyses presented in table 5.3, does not explain the difference.

Table 5.3 **Year 1: Effect of supplementary grant on the financial parental contribution (N=3902)**

	(1)	(2)	(3)	(4)
Parental contribution				
Financial	-0.640***	-0.488***	-0.421***	-0.399***
	(0.029)	(0.027)	(0.028)	(0.029)
Control	NO	YES	YES	YES
Parental income	NO	NO	LINEAR	POLYNOMIAL

* Significant at a 10% level, ** Significant at a 5% level, *** Significant at a 1% level. Standard errors in parentheses
All regressions include a cohort dummy variable.

In table 5.4 we narrow the windows around the cut-off of being eligible. The first column shows our initial full model estimate. Subsequently we narrow the window to the income class €2800 plus minus €2000 (column 2), plus minus €1000 (column 3) and plus minus €500 (column 4). Also here, we find similar results which improve the internal validity of the results.

Table 5.4 Year 1: Effect of supplementary grant on the parental contribution for samples near the cut-off

	(1)	(2)	(3)	(4)
Parental contribution				
Financial	-0.399***	-0.379***	-0.456***	-0.464***
	(0.0292)	(0.0305)	(0.0505)	(0.102)
N	3902	3532	2105	855
Income class	Initial regression	2800±2000	2800±1000	2800±500

* Significant at a 10% level, ** Significant at a 5% level, *** Significant at a 1% level. Standard errors in parentheses
All regressions include covariates including the polynomial function of the parental income, and year dummies.

5.2 Second approach: longitudinal analysis

5.2.1 Results Determinants of participation in higher education

For our second approach, defined in equation **(3)**, we use the parental income of year 1 as proxy for the parental income of year 2. Figure 5.3 presents the average supplementary grant of year 2 as function of the parental income of year 1. The figure shows a similar pattern as in figure 5.2.

Figure 5.3 Size of supplementary grant of year 2 as function parental income in year 1

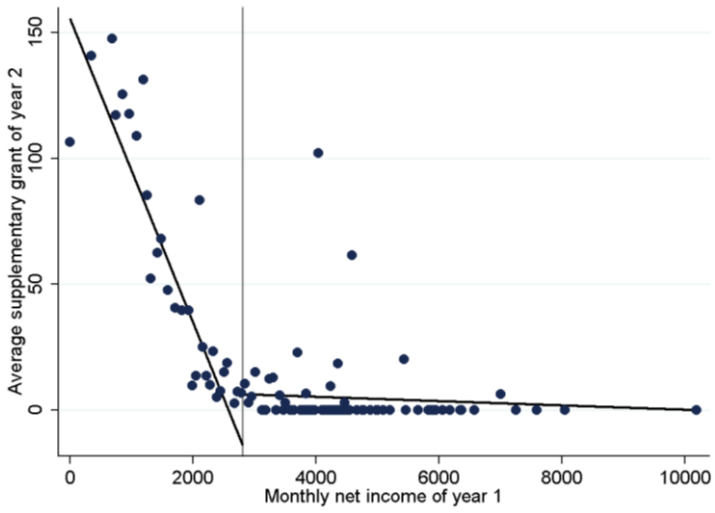


Table 5.5 shows the

estimates when using the second identification strategy. In the first column we regress the parental contribution on only the supplementary grant, the lagged parental contribution and a dummy variable for the two years. Column 2 additionally includes the control variables. Column 3 adds the lagged parental income and in column 4 a third order polynomial of the lagged parental income is also included. The full model estimation results imply that financial parental contribution decreases with around 33 cents for every additional euro spent on supplementary grant, which is not far of the estimate of -40 cents in table 5.3. Hence, the results are robust to the inclusion of the lagged parental contribution which controls for unobserved individual fixed effects. The estimation results provide additional evidence for the negative effect of the supplementary grant on the financial parental contribution.

Table 5.5 Year 2: Effect of supplementary grant on financial parental contribution (N=1806)

	(1)	(2)	(3)	(4)
Parental contribution				
Financial	-0.376***	-0.357***	-0.338***	-0.329***
	(0.033)	(0.034)	(0.035)	(0.037)
Lagged value of FPC	YES	YES	YES	YES
Control	NO	YES	YES	YES
Lagged parental income	NO	NO	LINEAR	POLYNOMIAL

* Significant at a 10% level, ** Significant at a 5% level, *** Significant at a 1% level. Standard errors in parentheses
All regressions include a cohort dummy variable.

6 Sensitivity tests

This section presents several sensitivity tests. For the sensitivity tests and heterogeneity checks in the next section, we use the dataset of the Student Monitor. This dataset contains more observations, and is extended with administrative data about the size of the grants.

The first column in table 6.1 shows the initial full model estimation results. In columns 2 till 4 we address the influence of possible outliers. One concern in our previous analyses might be the arbitrary decision to exclude students that report to receive a monthly total parental contribution of €1500 or more. To investigate whether this choice affects our results, we perform some sensitivity tests. In the second model we restrict the sample to students that receive less than €800. In the third model we exclude students with a parental contribution that exceeds 40% of total net parental income, which also seems unrealistic. Estimation results are quite similar to the initial regression results. Column 4 presents the estimates of a median regression. Rather than minimizing the sum of the squared residuals (as within the OLS), the median regression minimizes the sum of the absolute value of the residuals. In that way, the influence of outlying observations is reduced. The result for the total parental contribution hardly changes, while we find a lower degree of substitution for the financial parental contribution.

Table 6.1 Sensitivity tests

		Excluding outliers			Non-compliance		Excluding zeros		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Parental contribution									
Financial	-0.230***	-0.197***	-0.204***	-0.107***	-0.217***	-0.242***	-0.222***	-0.213***	-0.232***
	(0.018)	(0.015)	(0.018)	(0.013)	(0.017)	(0.0284)	(0.021)	(0.030)	(0.030)
Total	-0.597***	-0.529***	-0.545***	-0.611***	-0.568***	-0.535***	-0.573***	-0.573***	-0.628***
	(0.029)	(0.022)	(0.029)	(0.022)	(0.028)	(0.0467)	(0.032)	(0.047)	(0.048)
N	12051	11408	11646	12051	9329	3572	10839	7101	5694
Check	Initial	TPC<800	TPC<0.4*I	Median	I≤4900	S>0 & I≤4900	TPC>0	FPC>0	Aggregate

Another potential bias may be caused by the students that are eligible for the supplementary grant but do not apply for this. There may be unobservable differences between the group of students that is eligible and applies for the grant and the group of students that is eligible but does not apply. This issue is addressed in models 5 and 6. In these models we restrict the estimation sample to the eligible students and to the eligible students that receive a supplementary grant, respectively. The intuition behind these analyses is as follows. In our main

estimations, variation in the supplementary grant can arise from both differences in parental financial capability and differences in appliance. First of all, the parental financial capability determines eligibility to the grant. Second, within the group of eligible students, financial capability determines the size of the grant. Third, within the group of eligible students, non-appliance causes variation in the supplementary grant. If we find similar results in both robustness analyses and our main analysis, this implies that the source of variation does not affect the estimated effect of the supplementary grant on parental contribution. In column 5 we restrict the sample of students to all students that should be eligible to the supplementary grant on the basis of figure 5.1. More precisely, we restrict the sample to the students that report an average income class of € 4900 or less. In the main analysis, receiving a grant depends on both eligibility (and hence financial capability) and appliance behaviour. In model 5, variation in obtaining a grant only comes from non-appliance: all students should be eligible and only non-appliers do not receive the supplementary grant. We find similar estimation results which suggest that non-appliance does not bias our estimation results. In model 6 we further restrict the sample to the students that are below the cut-off value of parental income and receive the supplementary grant. Hence, we only include eligible applicants. This means that we only use the variation in the size of the grant (that comes from differences in financial capability) to identify the effect on parental contribution. The estimation results presented in column 6 are also very comparable, suggesting that non-appliers do not bias our estimation results.

An additional concern is the large proportion of students that report a (financial/total) parental contribution of zero, as shown in figure 4.1 (a) and (b). In columns 7 and 8 we exclude these observations to test whether our results are affected by the large group of zero observations. A comparison with the initial regression shows that the results are nearly the same.

Finally, in column 9, we estimate the regression for the students that reported the aggregated income instead of the income of both parents separately. The results are similar to our initial regression. Hence, the focus on students that report the income of the mother and father separately does not influence our results.

Summarizing, the main results are robust for a number of sensitivity checks. Each additional euro on supplementary grant reduces the financial parental contribution with approximately 20 cents, and the total parental contribution with approximately 60 cents.

7 Heterogeneity checks

The results presented so far suggest that receiving grants decreases the parental contribution. Another question is whether this effect differs for specific subgroups, such as female versus male students, students living at home or independently, or students in higher vocational education versus students in university education. In this section we investigate this question, by estimating some models that are an adjusted form of equation (**2**), that is,

(4) $$PC_i = \beta_0 + \beta_1 S_i + \beta_2 D_i S_i + \beta_3 D_i + \beta_4 f(I)_i + \beta_5 X_i + \varepsilon_i$$

where D_i is a dummy variable that takes the value 1 if the individual belongs to the subgroup under consideration and 0 otherwise. This model implies that the effect of the supplementary grant on the parental contribution is given by $\beta_1 + \beta_2$ for individuals that belong to the subgroup, whereas it equals β_1 if the student does not belong to the subgroup. By modelling it in this way we assume that the effect of the covariates does not depend on the subgroup (otherwise interaction terms should be included).

Table 7.1 Effect of the supplementary grant on the parental contribution for subgroups (N=12051)

		Year	**Gender**	**Living situation**	**Level of education**
D=0 (β_1)		Freshman	Female	with parents	higher vocational
D=1 ($\beta_1 + \beta_2$)		Senior	Male	independent	university
Parental contribution					
Financial	β_1	-0.126***	-0.232***	0.026	-0.110***
		(0.034)	(0.022)	(0.027)	(0.024)
	β_2	-0.132***	0.004	-0.394***	-0.224***
		(0.036)	(0.029)	(0.030)	(0.029)
Total	β_1	-0.488***	-0.616***	-0.299***	-0.472***
		(0.054)	(0.036)	(0.042)	(0.038)
	β_2	-0.139***	0.041	-0.459***	-0.234***
		(0.058)	(0.046)	(0.048)	(0.046)

* Significant at a 10% level, ** Significant at a 5% level, *** Significant at a 1% level. Standard errors in parentheses
All regressions include covariates including the polynomial function of the parental income, and year dummies.

Table 7.1 shows the regression results. The first column shows that the degree of substitution is higher for senior students, as the interaction term (β_2) is significantly negative. For freshmen each additional euro on supplementary grant decreases the financial parental contribution with 0.13 cents and total parental contribution with 0.46 cents. On the contrary, the financial contribution decreases with 0.26 cents and the total contribution with 0.64 cents for senior

students. For gender we do not find a difference in the degree of substitution. In the last two columns the interaction terms are significant negative. This means that the degree of substitution is larger for students that live independently from their parents and students that are enrolled in university education. Hence, our estimation results suggest that the degree of substitution is larger for students that are more independent.

8 Conclusion and discussion

Prior investigations of grants have focussed on attendance decisions, the likelihood of matriculation and students' performance. To our best knowledge no study has yet analysed the effect of grants on parental contribution. Understanding the parental behaviour will contribute to a more profound discussion on supplying grants. If substitution takes places - meaning that part of the subsidy ends up with the parents -, then the financial aid system which is meant to support the student is not entirely effective.

This paper focuses on the effect of the supplementary grant on the parental contribution in the Netherlands. The supplementary grant is meant to support students from disadvantaged families. Students with the supplementary grant have parents with less disposable income and therefore it is expected that they get a lower parental contribution. Our identification strategy separates this income effect from the effect due to the payments of the supplementary grant. We use two identification strategies in which we make use of the eligibility rule for the grant to determine the effect of the supplementary grant on parental contribution.

Our results indicate that parents decrease their contribution due to the supplementary grant. That is, each additional euro spent on supplementary grant reduces the financial parental contribution with approximately 20-40 cents and the total parental contribution with 60 cents. This result suggests substantial substitution effects related to providing financial aid to students, which implies that subsidizing students implicitly boils down to subsidizing parents to some extent. If the goal of the supplementary grant is to support the students from disadvantaged families, then our empirical findings suggest that this system is partly ineffective.

We perform a broad set of sensitivity analyses which all yield similar results and support our main findings. Nevertheless, as we rely on self-reported data and cannot completely rule out potential selection effects, some caution in interpreting the results seems appropriate.

The substitution effect we find might be (partly) induced by the way the financial aid system is organised by the government. If a student applies for the supplementary grant, the government determines the 'affordable amount' of the parents and consequently communicates it to them. Parents receive a letter in which the affordable amount they are expected to contribute is explicitly written down. The fact that the government informs the parents about the amount of money they are expected to give may induce a decrease in parental contribution in itself. Hence, we cannot rule out that the substitution effect is caused by providing information to the parents about their expected contribution rather than by providing additional financial resources to the students.

Further research may investigate the underlying mechanisms of substitution of parental contribution in the current system of the supplementary grant. To what extent is substitution induced by provision of additional resources to the students, and to what extent is it induced by the provision of information on the affordable amount? This question could be addressed by means of an experiment, in which a randomly assigned part of the student's parents obtains information, while the other part of the student's parents does not. If providing information would (partly) cause the decrease in parental contribution, then the efficiency of the current system could be improved by no longer providing the information about the affordable amounts.

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Publisher:

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August 2011 | ISBN 978-90-5833-521-0