PERCEPTIONS OF STUDENT PRICE-RESPONSIVENESS

A BEHAVIOURAL ECONOMICS EXPLORATION OF THE
RELATIONSHIPS BETWEEN SOCIO-ECONOMIC
STATUS, PERCEPTIONS OF FINANCIAL
INCENTIVES AND STUDENT CHOICE

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A BEHAVIOURAL ECONOMICS EXPLORATION OF THE RELATIONSHIPS BETWEEN SOCIO-ECONOMIC STATUS, PERCEPTIONS OF FINANCIAL INCENTIVES AND STUDENT CHOICE

PROEFSCHRIFT

ter verkrijging van

de graad van doctor aan de Universiteit Twente,

op gezag van de rector magnificus,

prof.dr. W.H.M. Zijm,

volgens besluit van het College voor Promoties

in het openbaar te verdedigen

op vrijdag 24 juni 2005 om 16.45 uur

door

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geboren op 30 december 1966

te Amersfoort

*To my parents
who always taught me to make the best out of it*

Referent:

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Preface

All pursuits come to an end. Even, or maybe I should say especially, the exiting ones. Finishing a dissertation is providing an ambiguous feeling. On the one hand it feels like a triumph because delivering the "master piece" relieves one from an ever-present task that constantly called for attention no matter what other activities needed looking after, either work-related or in private life. On the other hand it brings a kind of sadness as writing a PhD is a once-in-a-lifetime opportunity to devote time, effort and creativity to reading, thinking and writing about one's favourite scientific topic. Still, time is always too short.

This dissertation is the result of a long journey. One of my first research projects at CHEPS in the early 1990s already triggered my curiosity for student financing issues. Why are students reluctant to borrow for higher education, one of the best investments in life? Why do students from different socio-economic classes differ in their reactions to tuition fees, grants and loans? Why do students oppose policies that make them aware of the fact that higher education is a very expensive but profitable service that calls for substantial private contributions in terms of time and money?

Despite a couple of preliminary attempts it took until 1999 that I started to make a serious study about my "hobby horse". Regardless of the fact that science is claimed to be about reducing ignorance, uncertainty, risk, coincidence and unintended consequences, my thesis started with the accidental fact of reading Richard Thaler's article on *behavioural economics* in the *Economisch Statistische Berichten* (ESB, 24-1-1996, pp. 82-84). This inspired me to start a *quaeste* for alternative explanations why individuals from various socio-economic backgrounds seem to reveal different higher education preferences and in many cases object to reasonable and objectively sound arguments about student financing policies, including tuition fees, grants and student loans. *Behavioural economics* provides a wealth of intuitively appealing phenomena like loss aversion, fairness and love to provide reasons for why individuals make seemingly non-rational decisions.

The wonderful *quaeste* or journey of my PhD would have been impossible without the continuous support and inspiration of CHEPS as an organisation and as a group of friends. Stimulating debate, natural collaboration in many research projects, opportunities to cross-disciplinary boundaries, giving room for borderless personal development, and providing the necessary relativistic perspective by putting a high mark on social atmosphere, all make CHEPS a wonderful place to work.

More specifically, I would like to first of all acknowledge Ben Jongbloed's guidance through the process of conducting a major piece of research. His open

door and relentless efforts to discuss my ideas, to thoroughly, critically and positively comment on all my products have been invaluable and unforgettable. Also all the hours of work Peter Boorsma spent in being an excellent promoter and sparring partner are highly appreciated. In addition I would like to thank Jeroen for bringing more structure into my ideas, particularly in the first years of my PhD journey. Special gratitude is due to Uulkje de Jong who not only enabled me to use her survey data but also intensively supported me in applying advanced statistical techniques to fully exploit the given dataset.

I am grateful to Peter Maassen who stimulated and supported me to come to the Norwegian research institute NIFU in Oslo for starting up my PhD work in a quiet but inspiring environment. Besides new friendships and stimulating debates with many NIFU-colleagues, I particularly acknowledge Bjørn Stensaker for the fruitful and enjoyable opportunity to swap our offices and houses for "our PhD and family experiences".

Work at CHEPS would by far not be as enjoyable and productive as it is without the team spirit and friendship of those colleagues who became dear to me. Harry de Boer, Jon File, Leo Goedegebuure, Jeroen Huisman, Ben Jonbloed, Frans Kaiser and Aleksandra Kovač, wherever you are I hope to continue the discussions and close contacts we had so far. Carlo Salerno should be mentioned separately not only for being a brilliant colleague to discuss our work but also for being a perfect office mate and friend to discuss life in general and, not the least, for proof-reading my thesis. Of course without the unconditional assistance of CHEPS' support staff work would be much more complicated and much less fun. Marlies Golbach, Hilly ter Horst-Meester, Gillian Luisman, Marwine van der Molen, Monique Snippers, Karin van der Tuin-Wagenvoort and Mirjam Vaanholt-Visser, thank you.

More generally I would like to thank Jon File and Bruce Johnstone for opening up the world and exposing me to the critical mass of a wide range of national and international audiences to discuss my research interests and many other higher education topics, and to experience how beautiful, different but nevertheless familiar other parts of the world and people are.

A special word of thanks has to be addressed to my parents and family. I am deeply grateful to my parents who taught me to always try to get the most out of every situation and not to be afraid of student loans. Most importantly, I want to show my infinite gratitude to Gerda for her devotion, love and looking after our family in the many hours I spent away from home or locked myself up to complete my PhD. Finally, my sons Maarten and Job continue to be my bright examples of inspiration.

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Hans Vossensteyn
Enschede, May 2005

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1   Introduction

"I know that I don't know"
Socrates, 541 B.C.

Student choice is an important topic in higher education policy. It is also often a subject of heated policy debates, particularly when financial issues like tuition fees and student support are concerned. Policy makers must navigate between the Scylla of meeting the growing demand for higher education by both students and the knowledge economy, and the Charybdis of reduced public funds for higher education. In many countries this has given rise to what is known as *cost sharing*, implying that students and their parents bear an increasingly greater share of higher education costs, usually through higher tuition fees and paid for more with loans and student jobs instead of grants (Johnstone, 2004).

Increasing the cost burden for students and their families immediately raises the question what this means in terms of access to higher education. Can students and their families meet these increased costs? Or will they prevent potential students – particularly those from disadvantaged backgrounds – from entering higher education? Will higher costs prevent students from enrolling in their most preferred program or institution?

Generally, governments believe that students qualifying for higher education and wishing to enrol in a higher education program should be in a position to do so regardless of their personal background or financial situation. Access policies are implemented to achieve this goal. Financial incentives are key instruments behind access policies of both governments and higher education institutions because they are variables that can be controlled by policy makers (Heller, 2001). Such instruments may include tuition fees, student grants, scholarships and student loans and are used to influence the net costs of higher education for students and the way in which they can meet the costs.

Particularly in the cost sharing era it is important to know whether such financial incentives are successful. The basic issue of this thesis is students' price-responsiveness: how do students from various socio-economic backgrounds react to price incentives such as tuition fees, grants and loans?

1.1   Cost sharing and student support: some facts

Modern societies are challenged by an increasing demand for public resources from different public sectors, like education, health care, defence, infrastructure, and social welfare (Barr, 2001). Higher education is thus one of many and every tax dollar or euro it commands cannot be used for other public services. Growing

demand for higher education coupled with scarce public resources has driven many governments to require students and their families increasingly to contribute to the costs of higher education.

The case for greater private contributions is often tied to the returns that students generally can expect from obtaining a degree and show up through increased earnings, a lower risk of unemployment and relatively good employment conditions (Bowen, 1977; World Bank, 2002). In addition, private contributions are argued to improve efficiency in higher education (Jongbloed, 2004a). Introducing market forces is believed to encourage students to make better study choices and make higher education institutions more responsive to students' demands.[1]

Cost sharing takes place in various ways (Johnstone and Shroff-Mehta, 2000). First, there is the introduction of or increase in tuition fees: the price students pay to enrol in a particular study program. In recent years, many governments have raised (substantial) tuition fees. Such was the case in Australia in 1989, New Zealand in 1990, the United Kingdom in 1998 and Austria in 2001 (Chapman, 1997a; Jongbloed, 2004b; BMBWK, 2001; Callender, 2005). In countries where tuition fees have been in place for a long time, the level of these fees has increased substantially in recent years such as Canada, the Netherlands, Portugal and the United States (Junor and Usher, 2004; Vossensteyn & De Jong, 2005; Teixera *et al.*, 2005; Ehrenberg, 2000). Even in the large group of countries in Central and Eastern Europe, Latin America, South East Asia and Africa, where higher education was traditionally free (for students), private contributions were recently introduced, particularly for part-time students. In addition, private higher education institutions charging cost-covering prices have grown tremendously (Vossensteyn, 2003; ICHEFAP 2005).

A second way in which cost sharing takes place is through a reduction of subsidies to students and their families. Students today must rely more heavily on student loans rather than on grants and scholarships to pay for their study costs. Examples can be found in the US (Campaign and Hossler, 1998), the UK (Woodhall and Richards, 2005), and in the Netherlands (Vossensteyn & De Jong, 2005).

Finally, cost sharing can emerge through student support policies that do not (fully) compensate for increases in living expenses and study costs or from a growing importance of private higher education in a country.[2] Table 1.1 presents several basic indicators on tuition fees and student support in a number of countries.

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[1]   However, there are also reasons that justify government interference in higher education. These mainly have to do with market failures and can be categorised in three groups: external benefits of education, capital market imperfections and equity considerations. For a further discussion of the public-private debate see for example Blaug (1985), Winston (1999), Geske and Cohn (1998), Oosterbeek (1998), Barr (2004).

[2]   Countervailing developments can also be identified. Higher education in Scandinavian countries remains free tuition while in countries like Ireland and Scotland tuition fees have been abolished (Eurydice, 1999; Woodhall and Richards, 2005).

Table 1.1:   Facts on tuition and student support in some countries[3]

Country	Average tuition fees (fulltime students)	Grants / scholarships	Tax / family support	Student loans	Average debt
Austria	€727	Low	Middle	Middle	
Australia	€2,520 - €4,202	Low	Low	Low	€8,239
Belgium – NL	Up to €505	Low	Middle	Low	
Belgium – FR	Up to €726	Low	Middle	Low	
Canada	€2,900	Low	Middle	Middle	€13,705
Czech Republic	No	Low	Middle	Low	
Denmark	No	High	No	High	
Estonia	No	Low	Middle	High	
Finland	No	High	No	Middle	
France	€350 (public) €3,500	Low	Middle	Low	
Germany	No	Low	High	Low	€5,600
Hungary	Up to €300	Low	Low	Low	
Ireland	No (€750 other fees)	Middle	Low	No	
Italy	+/- €1,000	Low	Middle	Low	
Latvia	Variable	Low	Middle	Middle	
Lithuania	€320	Middle	Middle	Middle	
Malta	€25	Low	No	Middle	
Netherlands	€1,476	Middle	No	Middle	€8,700
Norway	No	High	No	High	
Poland	No (regular)	Low	Low	Low	
Portugal	€464 - €852	Low	Middle	No	
Slovakia	No	Middle	Middle	Low	
Slovenia	No	Low	Low	Low	
Sweden	No	High	No	High	€22,665
UK (Engl. / Wales)	€1,689	Low	No	High	€13,087
USA	€3,215	Middle	Low	High	€17,731

References: Vossensteyn (2004); Swail (2004); Junor and Usher (2004); Usher *et al.* (2005).

This overview shows how widely tuition fees vary across. Nevertheless, tuition fees in most countries reflect only a small proportion of the actual instruction costs. For example, the annual tuition fees of €1476 in the Netherlands are about 15% of average per student instructional costs (CPB, 2002). On the other hand, Table 1.1 also shows that grants, scholarships and support for students' parents (by means of tax benefits and family support) can be substantial.

Finally, it is evident that student loans in quite a few countries play a substantial role in national student support mechanisms.[4] Average student debt (after undergraduate study) does not appear to be very high, although it can differ substantially between individuals. Student loans primarily play a role in

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[3]   All amounts converted into Euros using purchasing power parities (PPPs). The importance (low, middle, high) of grants, loans and family support is based on the amounts of support in relation to total study costs and the proportion of students that are eligible to receive student support.

[4]   By the term student loans, in this study we particularly speak of student loans that are subject to public regulation, either being offered by government or offered by private capital institutions and guaranteed by government.

helping students to compensate for short-run liquidity constraints (Chapman, 2005).

Altogether, students in many countries are increasingly paying more for their higher education, not only in absolute terms but also as a proportion of total higher education costs. They increasingly have to rely on student loans, self-funding (part-time jobs) or parental contributions. However, increased costs may also have negative consequences in terms of access, as is often argued by students, many higher education researchers, policy makers and media. For example, students may choose not to enrol in higher education or prefer shorter and less expensive programs and institutions. Therefore, it is of prime interest to know about the impact of private contributions and public subsidies on student choice. How do students, particularly those from disadvantaged backgrounds, respond to prices and price changes with relation to higher education study?

1.2   Student price-responsiveness: intriguing questions

Although there is an extensive literature on the effects of financial incentives on student choice, the growing role of cost sharing and the increasing reliance on student loans require continuous monitoring of their impact on access and student choice in a broader sense. Heated policy debates about student financing provide an excellent example. One can point to debates on the introduction of tuition fees, the substitution of grants by loans, and the growing attention paid to debt aversion (Callender, 2003; Woodhall and Richards, 2005).

Student choice research reveals a number of interesting phenomena regarding the relationships between financial incentives and student choice. Without going into detail[5] some of the key research findings and unresolved questions regarding the impact of financial incentives on student choice are presented below.

A general finding of student choice research is that students from disadvantaged socio-economic backgrounds are strongly underrepresented in higher education. Socio-economic background or socio-economic status (SES) is assessed in a number of different ways. One can look at parents' employment status, educational attainment and income, ethnicity or religious affiliation. Due to the availability and relevance of data in this study we focus on parental education and income, and ethnicity of students to determine socio-economic status. Table 1.2 provides basic information on the socio-economic composition of student populations for a number of countries.

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[5]   A more extended overview of student choice research will be given in Chapter 2.

Table 1.2:   Socio-economic status of students in a number of countries

Country	% of students from ethnic minorities	% of fathers blue collar worker		% of fathers with higher education		% of students from lowest income groups (quartile)
		students	all	students	all	
Austria		17%	41%	26%	10%	17%
Australia	4%					15%
Belgium – NL				50%	22%	3%
Belgium – FR		19%	45%	50%	15%	
Canada	16%					20%
Finland		28%	30%	23%	14%	
France		20%	34%	38%	21%	12%
Germany		19%	37%	37%	16%	7%
Ireland		24%	38%	30%	19%	
Italy		14%	32%	19%	9%	
Netherlands	8%			39%	26%	9%
UK	19%	13%				
USA	29%					

References: HIS (2002); Commonwealth of Australia (2004); Callender (2003); Junor and Usher
(2004); Kinzie *et al.* (2004)

The indicators in Table 1.2 are consistent with the view that students from disadvantaged SES backgrounds are underrepresented in higher education. If it is assumed that low-SES students are equally qualified and able compared to other students, this raises at least two important questions. Are lower-SES students more responsive to the 'prices' of higher education (tuition fees, living expenses during study, and foregone earnings) than other students? If so, are existing student support mechanisms (not) effective tools for reducing the financial barriers to enter higher education?

Research also reveals that, on average, tuition fees and student support have only a very limited effect on the likelihood that students attend higher education (Leslie and Brinkman, 1988; Heller, 1997). Price increases may lead to minor or negligible decreases in the numbers of applicants and students and grants (price reductions) only lead to slight increases in student demand (Johnstone et al., 2005). Digging a bit deeper, students' low degree of price-responsiveness varies for different groups of students. For example, research in the US shows that students from lower-income families and cultural or racial minorities are responsive to tuition fees and grants though students from other socio-economic classes are not (Kane, 1995; Campaigne and Hossler, 1998). Other researchers found that increases in tuition fees have gradually driven low-income and ethnic minority students away from four-year university programs and instead towards less prestigious two-year colleges (Duffy and Goldberg, 1998; McPherson and Schapiro, 1998). These findings would suggest a difference in price-responsiveness across students from different SES groups. However, research on Australia shows that the effects of price changes there did not differ across the

socio-economic composition of the student body (Andrews, 1999). Does this imply that national or cultural contexts play a much greater role, that relative amounts of grants and tuition fees matter more, or rather that the way financial incentives are designed and communicated is of more importance? These are some of the intriguing questions that require more research.

As loans become a more important element in public student support mechanisms, another issue that draws increasing attention is debt aversion. Loans are often believed to be a barrier that keeps students from entering higher education. This may be the case for lower-SES individuals but it also may be the case for female students (Callender, 2003). Regardless of the observation that students dislike borrowing, there is, however, no conclusive evidence that it prevents students from taking up loans or from entering higher education and particular programs (Johnstone *et al*., 2005). In addition, one can argue that in the long run, debt aversion is seems an irrational phenomenon. On average, private benefits of higher education are high and the risks of repayment difficulties are very low due to interest subsidies, debt forgiveness and extended repayment periods. In addition, Table 1.1 indicated that average graduate debt is not that high in the perspective of graduate income that it would create repayment difficulties. The issue of debt aversion raises another intriguing question.

1.2.1   Theoretical challenge

The next question is what theories can help explain students' behaviour in terms of debt aversion and price-responsiveness. Two traditional economic theories often employed are neo-classical price theory and human capital theory.[6] At first sight, the low price-elasticity of students seems counter-intuitive according to price theory. One would expect that higher prices would lead to less demand for higher education. However, the fact that students, in particular those from middle- and high-income families, do not seem to be responsive to price changes raises serious questions about the applicability of the neo-classical perspective.

Human capital theory (Becker, 1964) takes a long-run investment perspective; education costs are evaluated against the present value of the future benefits. As long as the expected (discounted) future benefits are larger than the costs, students should invest in higher education. If we acknowledge the fact that graduates' future earnings are generally high compared to those of others, one would expect students not to be very responsive to price changes. This also holds for low-SES students, even more so if they can claim grants and scholarships or subsidised student loans. From the human capital perspective, students' reluctance to take up loans and the recent indications of debt aversion are also difficult to understand, particularly because of the favourable repayment conditions.

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[6]   The traditional theoretical perspectives on student price-responsiveness will be further elaborated in Chapter 3.

On their faces, neither price theory nor human capital theory seem to satisfactorily explain student choice. An alternative, a relatively new approach called *behavioural economics*, is adopted in this study to explore student choice. Based on the concept of bounded rationality, behavioural economists claims that individuals show systematic deviations from rational economic decision-making, particularly in situations characterised by a large degree of uncertainty (Kahneman and Tversky, 1979; Thaler, 1991). For example, people save money for going on a holiday, but simultaneously borrow large sums at high interest rates to buy a new car. Behavioural economics states that individuals process available information through a number of psychological phenomena, or "filtering" mechanisms. This produces subjective perceptions about the outcomes of financial decisions. Some of the psychological phenomena often referred to in behavioural economics are reference levels, loss aversion, endowment effects, and rules of thumb.[7] Perceptions are individually "coloured" visions of (or opinions about) the information and options underlying financial decisions. Perceptions of objective facts or situations are, among other things, coloured by family wealth, gender, social class, tastes, habits, religion, emotions, etc.[8] Behavioural economics logically then provides a tool for understanding students' perceptions of financial incentives like tuition fees, grants, loans and financial rewards of education as intermediary factors influencing the relationship between SES and student choice.

1.3   Objectives of the study

It is clear that student price-responsiveness is a complex area of study. Policy makers expect financial incentives to influence student choice, possibly as predicted by traditional price theory. However, human capital theory predicts that the impact of financial incentives will be limited as long as the expected (future) benefits outweigh the costs of higher education, which is often the case in practice. Research shows that, on average, financial incentives do not little if anything to affect student choice. However, research also indicates that the effects of financial incentives can differ for students from different SES-groups. Consequently, it is difficult to generate unidirectional conclusions about the role of financial incentives play in student choice. Traditional theories do not satisfactorily explain the average effects of financial factors or the effects on students from different SES-groups. In addition, the presence of debt aversion illustrates the notion that students' perceptions are very real, and, that these can be substantially different across SES-groups.

In view of the increasing role cost sharing plays, a number of intriguing questions remain unresolved. Why do student background characteristics

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[7]   Behavioural economics and its application to the area of student choice are further addressed in Chapters 4 and 5.

[8]   For example, poor individuals may regard a €10,000 car as expensive, whereas rich individuals find it a cheap car.

dominate financial incentives when it comes to student choice? Why do students from different SES-groups respond differently to financial incentives when faced with the same financial pay-offs from education? Why are students averse to debt? How can variations in students' price-responsiveness be understood from a theoretical perspective? Based on these questions the objectives of this study are twofold: improving both the theoretical and practical understanding of the role financial incentives play in determining student choice.

Concerning the theoretical objective, it is worthwhile to investigate whether behavioural economics can contribute to the understanding of student choice. It starts from the assumption that individual decision-makers are limited in their rationality when filtering objective information through their own subjective psychological framework. This adds an intermediate stage of (psychological) information processing to the typical decision-making process suggested by traditional economic theories. The economic reasoning there basically assumes that individuals act rationally, i.e. they optimise their personal utility in decision situations based on full information. However, there are reasons to believe that students are not fully rational (Avery and Hoxby, 2004; Jongbloed, 2005; Menon, 2004; Meijers, 1995). Therefore, it is interesting to apply behavioural economics to student choice and see whether students' perceptions of financial incentives can help to better explain students' price-responsiveness. *The theoretical objective of this dissertation is to develop a behavioural economics framework for understanding and analysing the relationships between financial incentives, socio-economic background and student choice in higher education.*

The practical objective of this study relates to the question whether a "behavioural economics perspective" on the role of financial incentives in shaping student choice can help to improve the design of policies seeking to increase higher education participation and particularly widen access for students from lower SES-groups. Policies in this area are characterised by targeted tuition and student support policies as well as through improved information provision on these issues. *The practical objective of this dissertation is to provide suggestions for improving the design of tuition fee structures and student support policies.*

1.4   Problem statement and research questions

The central research problem of this dissertation is as follows:

What is the impact of students' socio-economic status on the relationships between financial incentives related to studying (e.g. tuition fees and student support) and student choice? What are the implications for policy making to improve access to higher education?

This central problem focuses particularly on the micro level: individual students' decision-making. To analyse the issue in further detail we distinguish between a number of more specific research questions.

Before exploring theories to study the relationships between financial incentives and student choice, a literature review of studies in student choice is carried out that emphasises the role of students' socio-economic status and financial variables. The first research question is as follows:

1. *What have been the major outcomes of student choice research and what can be said about the impact of socio-economic background variables and financial incentives have on student choice?*

The second step in the analysis explores the traditional theories used to study the impact of financial incentives on student choice. Financial incentives like tuition fees, grants and loans are only some of the many factors that can influence students' choices. Other factors suggested in research include parental education, parental income, ethnicity, student's secondary school results, motivation, opinions of peers and college characteristics. Because the primary interested is in the role of financial incentives, focus is given to the economic theories traditionally used to explain student choice. There are basically three economic approaches that are used to study education choices (Heller, 1997): 1) neo-classical price theory, 2) human capital theory, and 3) the screening hypothesis. The second research question is as follows:

2. *What are the major arguments put forward in the traditional economic theories for explaining student choice?*

Traditional theories have been very successful in identifying a wide array of factors that affect student choice, however, is was shown in Section 1.2 that such approaches are unable to explain debt aversion, the low take-up rate of student loans and the variation in price-responsiveness across students from different backgrounds. The main issue here is whether assumptions underlying traditional theories (e.g. rationality, self-interest, coherent and time-consistent preferences) hold in the context of uncertainty and risk.

We explore the relevance of a new strand of economic theory, known as *behavioural economics*, which claims that individuals cannot be assumed to engage in rational decision-making because their perceptions of financial signals are filtered by psychological phenomena such as *loss aversion*, *reference levels*, *mental accounting* and *intertemporal choice*.

Today, behavioural economics is relatively new, especially for the area of student choice. As such, the main challenge is to translate this theory into a testable framework for explaining the relationships between financial incentives, socio-economic status and student choice. To determine the theory's potential added value, the hypotheses derived from this framework should point to

outcomes that cannot be explained by traditional economic approaches. In this respect, the third research question is as follows:

3. *Is behavioural economics relevant for understanding student choice and what hypotheses can be derived from it that are particularly relevant for analysing and empirically testing the relationships between financial incentives, socio-economic status and student choice?*

The empirical part of this study focuses on whether students' socio-economic background influences students' perceptions of financial incentives related to student choice, and whether these perceptions actually lead to variation in the observed study-related choices. For example, do tuition fees have a stronger negative impact on the perceptions and choices of lower-SES students than of higher-SES students? Are lower-SES students more debt averse than higher-SES students? Does this lead to differences in borrowing behaviour?

To test the hypotheses, an empirical model is developed that captures information on student background characteristics (independent variables), students' perceptions of financial incentives (intermediary variables) and students' observed study-related choices (dependent variables). Figure 1.1 shows the model in a simple form.

Figure 1.1:   A simple financial perceptions model of student choice
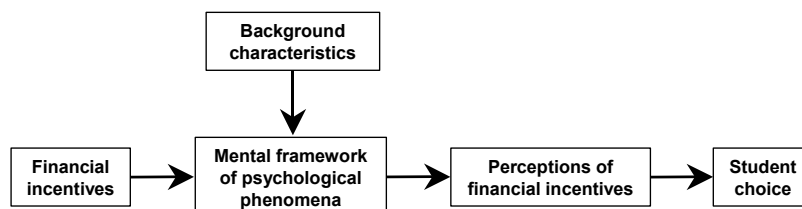
The background characteristics, perceptions and observed choices are operationalised into variables that are then quantified by information in a (survey) database with information on individual students. The empirical model is tested with statistical methods that address the relationships between the specified independent, intermediary, and dependent variables. This test is carried out on the basis of an integrated model incorporating the above variables. Bivariate statistical tests are performed, multiple regression analysis is used and so is structural equation modelling. The fourth research question is:

4. *How can the hypotheses be operationalised for empirical analysis? What are the outcomes of these econometric analyses of the relationships between students' socio-economic status, their perceptions of financial incentives, and their actual study-related choices?*

Finally, the information from the theoretical and empirical analyses is analysed. The conclusions are reflected upon vis-à-vis their relevance for the design of student support and tuition policies as well as for indicating potential directions for future research. This leads to the final research question:

5. *What lessons can be learned from the theoretical and empirical analyses when it comes to the design and impact of tuition fees regimes and student support policies?*

1.5   Plan of the book

This book is divided into ten chapters that together cover theory, empirical analysis, conclusions, and reflections of this study. Chapter 2 begins with research question one, presenting a literature review of student choice research. It details the state of the art of research in this area and identifies key issues and variables that must be accounted for when studying the impact of financial incentives on student choice. Chapter 3 addresses research question two by discussing the economic theories that are traditionally used to describe and explain the role of financial variables in student choice: neo-classical price theory and human capital theory. Research question three concerning the relevance of behavioural economics is discussed in Chapter 4. The theory is translated in Chapter 5 into a testable theoretical framework for analysing student choice.

The empirical analysis (research question 4) begins in Chapter 6 with selecting the research population and database for the analyses, as well as the operationalisation of the hypotheses. Chapter 7 concentrates on the statistical approaches and the sample description. Chapters 8 and 9 present the results from the statistical analyses. Chapter 8 explores whether students from various SES-groups have different perceptions of financial incentives and Chapter 9 looks at whether this leads to differences in the choices students actually make. Chapter 10 provides a summary and the conclusion of the analyses. Addressing research question five, Chapter 10 also presents some reflections on the major conclusions of this research and what they mean both for theory building and in terms of cost sharing policies. The contents of the book are summarised in the following figure:

Figure 1.2:   Issues covered in this book

Introduction (Chapter 1)

Background of the study, objectives, central problem & research questions

Traditional theories (Chapter 3)

Price theory, Human capital theory

Literature overview (Chapter 2)

Student choice research

America, Australia, UK, Netherlands

New theory (Chapter 4)

Behavioural economics

Theoretical framework (Chapter 5)

Application of BE to student choice

Hypotheses

Research design (Chapter 6/7)

Operationalisation, One country study, Database, Selection of statistical methods

Empirical evidence (Chapter 8/9)

Statistical tests: bivariate analysis, multiple regression and structurel equation modelling

SES and students' perceptions; SES, perceptions and choice

Conclusion (Chapter 10)

Summary, Conclusions, Reflections

1.6   Major concepts and definitions in this study

This study uses terminology familiar to researchers and others involved in the study of college choice, access, affordability and equity. However, even among scholars it may be difficult sometimes to understand what is exactly meant by these terms. For instance if one talks about the cost of higher education, the net cost of attendance and student choice. Therefore, Table 1.3 provides an overview of the major concepts and definitions used in this study.

Table 1.3:   Major concepts and definitions in this study

Concepts	Definitions
Price-responsiveness	The extent to which students react to financial incentives in their study choices.
Financial incentives	Financial factors or arrangements that directly influence student behaviour, often organised in governmental or institutional arrangements. These include tuition fees, student support (grants, loans, family allowances, tax benefits), but also future earnings and foregone earnings.
Student choice	All choices students make related to studying, including whether or not to enrol, what (type of) institution and program to choose, whether to stay in college or to drop out, to live at the parental home or independently, to take up loans, to take a part-time job, etc. Up to now, student choice was limited to only the first three variables mentioned.
Access	The extent to which qualified students can enter the study program (and institution) of their choice (selection and affordability).
Affordability	The extent to which students are able (partly thanks to public and institutional policies) to meet the costs of attending a higher education program.
Socio-economic background (or SES)	Indicators of the social origins of a student, including parental education, parental occupation, parental income, ethnicity, and religion.
Costs of instruction	The annual amount spent by a particular higher education institution to provide a particular educational program.
Study costs	All costs for a student related to following a higher education program, including tuition and other fees, study materials, and living costs like nutrition, accommodation, personal care, travelling and leisure, etc.
Tuition fee (price)	The price students have to pay for enrolling in a particular study program at a particular higher education institution. Tuition fees are related to the costs of instruction. Tuition fees can cover part or total of these costs, or even more.

Table 1.3:   Major concepts and definitions in this study (continued)

Concepts	Definitions
Sticker price	The gross price students have to pay for enrolling in a particular study program at a particular higher education institution not taking into account any subsidies received by students to reduce the gross tuition price.
Net price	The price students (and their families) have to pay after the subtraction of any subsidies they received to reduce the sticker price. This can also be calculated for the total costs of study (costs minus subsidies).
Student financial support	Financial assistance to students provided by public authorities or higher education institutions agencies in order to meet the costs of study, including grants, scholarships, loans, family allowances and tax incentives.
Grants	Generic subsidies (gifts) to groups of students that do not have to be repaid.
Scholarships	Subsidies (gifts) to (individual) students that do not have to be repaid and which are based on individual characteristics or achievements.
Loans	Money lent to students that must be paid back, typically after the student leaves higher education. Student loans often include favourable repayment conditions (e.g. interest subsidies, grace periods, or income related repayment methods).
Family allowances	Government subsidies per child to families. These may also be allocated as long as the children are in higher education.
Tax benefits	Government subsidies to families with (studying) children in the form of tax rebates or deductions.
Future earnings	The income students expect to earn when they enter the labour market as graduates. These can for example be starting wages of graduates, total lifetime labour income, or the maximum wage at some point in a working career.
Foregone earnings	The income from work a student could have earned if s/he would have (fulltime) entered the labour market instead of going to college.

2 Student choice research: a literature review

This chapter addresses the first research question, which is about research on student choice. Because the major concern is with the impact of financial factors on student choice, particular focus is given to the approaches and models used to study the relationships between financial instruments (fees, grants, loans, etc.) and students' enrolment choices, living status, and ways of financing a degree. Questions related to tuition fees, student support and their potential impact on student choice have been widely addressed in the research literature (e.g. Leslie and Brinkman, 1987; McPherson and Schapiro, 1991; Heller 1997; Hofman *et al.*, 2003; Hossler *et al.*, 1999).

Student choice will be defined in the first section as a series of decisions made in the context of the college going process. These may include whether or not to enrol in higher education, which institution and program to choose, persisting or dropping out, and what ways to finance their degree. In the second section the "student college choice models" will be described, which are three broad groupingss of conceptual models that specify factors determining college choice behaviour as well as the relationships among such factors. These can be termed "status-attainment", "economic" and "information-processing" models. Based on these models we will construct a more extensive model of the student choice process and the various variables believed to be important in the various stages. The third section provides a brief overview of the major findings of the student choice literature. The major aim is to identify the role that financial variables play in student choices and what other factors may be absolutely necessary for analysing student choice.

2.1 Student choice as a process

Literature on student choice recognises that choices to attend higher education are complex multistage processes involving a series of successive decisions that result in the decision to attend or not attend higher education (Hossler *et al.*, 1989). Generally, the student choice process is divided into three broad stages (as visualised in Figure 2.1):
1. attending higher education or taking up other activities like work (predisposition);
2. learning about specific institutions and their characteristics (search);

3. choosing a particular higher education program, institution or mode of study, and once enrolled, choosing whether or not to persist (choice).[9]

Figure 2.1:   The Hossler and Gallagher model of student choice (1987)

| Predisposition | → | Search | → | Choice |
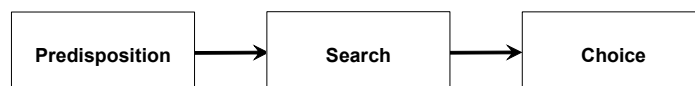
Given the complexity of the decision-making process, it is be clear that many different factors and actors can have an impact on students' enrolment decisions. Financial aspects are just one set of them. As with many other complex social phenomena, research on student choice imposes many different assumptions and relies on multiple theoretical perspectives. Before presenting the main results from student choice research (Section 2.3), attention is first given to the major conceptual models developed to analyse student choice.

2.2   Student choice models

Following a chronological pattern, three categories of theoretical models can be distinguished (Hossler *et al.*, 1999):
1. *Status-attainment models* (also called sociological models), which are based on sociological theory that students choose according to what they think is expected from them;
2. *Economic models* (also called econometric models), which are rooted in the assumptions that prospective students are rational actors who make careful cost-benefit analyses;
3. *Information-processing models* (also called the combined models), which combine the ideas of the economic and sociological models.

All models take the individual student as the central actor. The theoretical perspective of the models largely determines what factors are given primary focus in trying to explain student choice. The three types of models are discussed in their turn below.

2.2.1   Status attainment models

Sociological models have been very important to the development of the student choice literature. These models are rooted in sociology and consider (prospective)

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9   Note that the in traditional literature the term "student choice" particularly refers to enrolling and persisting in higher education, including in particular programs and institutions. The current study extends the choice decisions into other areas like where to live, whether to take up loans, and getting part-time jobs.

students as a *'homo sociologicus'*. Individuals are assumed to act according to what they think is expected of them. Based on a given set of norms and values they make choices according to the *'logic of appropriateness'* (Hossler *et al.*, 1989). As such they associate themselves with the norms, purposes, codes of rights and duties, procedures, methods, practices and techniques of their constituent group (March & Olsen, 1995). Most individuals are part of different social groups and they voluntary or compulsively adjust to what the group expects them to do.

Status-attainment models focus on the interactive process between broad social environment variables and students' individual characteristics in relation to students' college choices (Hossler *et al.*, 1999). The models focus on the socialisation processes that shape the possibilities and ambitions of students since they were born, including family conditions, peer interactions, and school environments. Different variables may have interactive effects at different stages in the college choice process and the influence of such variables may change over time. The sociological models generally leave financial factors out of the analysis and instead utilise the following groups of independent variables to explain student choice:

- Behavioural variables: students' academic performance, students' aspirations, spending of leisure time, motivation;
- Background variables: family background characteristics (parental encouragement, parents' income, education and occupation), gender, ethnicity, and influence of peers (e.g. teachers, friends).

2.2.2 Economic models

A second strand of models take an economic perspective and appropriately are referred to as "economic models".[10] Whereas status attainment models focus on the interactions between social contexts and student characteristics, economic models focus more on the rationality of individual decision-making. As such, this class of models can be placed within the traditions that assume individuals behave as a *'homo economicus'*. Because students are confronted with scarcity (in terms of their total resources and the amount of education available) they are presumed to use all available information and rationally maximise some utility function. Thus, students behaving as *'economic man'* are expected to have clear goals and transparent and consistent preferences; they are rational individuals. Rational decision-makers take action if and only if the marginal benefit of the action exceeds the marginal costs (Mankiw, 2004). As a result, economic college choice models argue that students choose to attend higher education and select particular institutions or programs if and only if the perceived benefits of that choice outweigh the perceived benefits of other alternatives (opportunity costs).

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[10] Because the economic models often use econometric techniques to study the potential relationships between financial instruments and students' schooling choices, they sometimes also are referred to as "econometric models".

Economic college choice models focus on how individuals with certain characteristics (e.g. gender, ability and parental socio-economic status) differ in the extent to which financial variables are deemed important in choosing post-secondary education. In the process of decision-making, individuals face trade-offs and value (the costs and benefits of) various college characteristics (Hossler *et al.*, 1999). It is important to stress that students make these decisions themselves and not just take the decisions expected by their social environment.

Although economic models use many variables that are sociologically based, the models are focused on financial incentives and thus concentrate on the monetary costs and benefits of higher education. The major explanatory variables used in economic models include (Hossler *et al.*, 1989):

- Monetary costs: tuition fees, net tuition fees (tuition fees minus financial support), other study costs (e.g. books and equipment), costs of living, and foregone earnings (opportunity costs);
- Monetary benefits: expected or future earnings, grants/scholarships;
- Intervening non-financial factors: family background characteristics (parents' income, education and occupation), average ability and aspirations of peers, and institutional characteristics (transition rates, admission standards, admission rates, average ability, academic reputation).

2.2.3   Information-processing models

The third class of college choice models are information-processing models. Neither status-attainment nor economic models provide satisfactory explanations for enrolment decisions in the sense that they each focused on a limited range of explanatory variables. Therefore, the most powerful indicators in the different stages of the decision-making process have been combined in the information processing models to provide an improved conceptual framework for understanding student choice. Such combined models have also been developed to better explain the effects of institutional recruitment efforts and policy interventions (Hanson & Litten, 1982). Hossler *et al.* (1989) underline researchers' and policy makers' interest in knowing what variables can be controlled for when influencing college choice. These include constraints (e.g. infrastructure, location and the types of students admitted) and auxiliary policy actions like pricing, programming and recruitment efforts.

The combined models have been extended by the idea of information-processing. In this perspective, college choice is regarded as a continuous cyclical process of uncertainty reduction in which prospective students make successive decisions, based on incomplete information, and then treat the outcomes of one stage as inputs to the next stage (Stinchcombe, 1990).

The starting point in the information-processing model is the student's particular social setting (Coleman, 1990). The model introduces the (long-run) dynamic roles of parents, peers and schools in collecting and using information about college choice (Hossler *et al.*, 1999). Prospective students' social capital is

believed to be influenced by background characteristics (e.g., ability) and family factors (e.g., parents' income and education), but also by the preferences and attitudes transmitted to children, and the way in which parents motivate their children, such as through encouragement of reading, critical thinking and college attendance. As a result, college choice is seen as a process that starts early and requires different sets of information at different times. Collecting and processing information enables students to reduce uncertainty about colleges and programs considered and applied to.

Altogether, the information-processing (or combined) models are the most extensive student choice frameworks, including various choice stages and an extensive set of explanatory variables that are deemed important in the various stages of the student college decision-making process. Figure 2.2 provides one of the more elaborated models to explain student choice.

Figure 2.2:   The student choice process and its most important variables
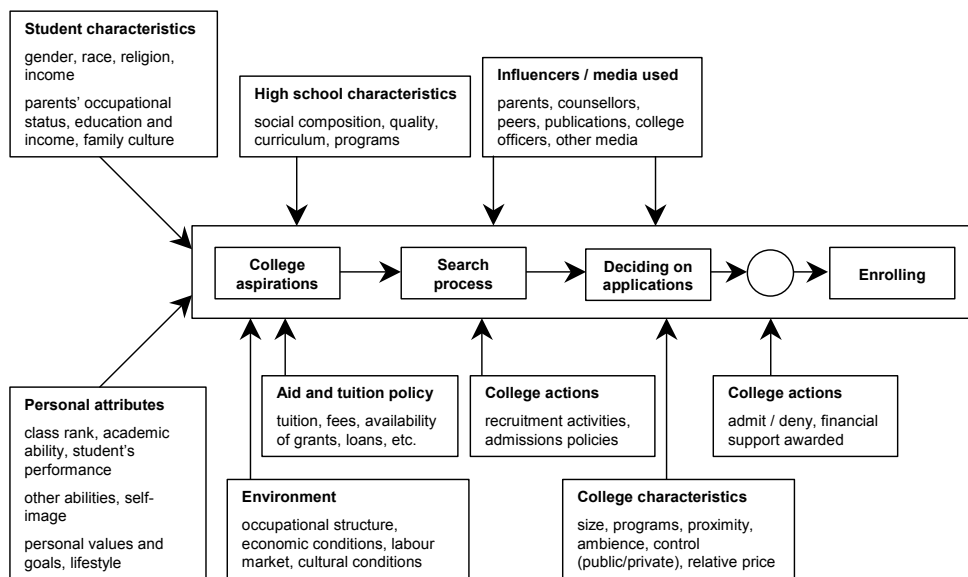
Note: This is a slightly modified version of the Hanson and Litten's 1982 model. The small circle represents a stage in which the institution, not the student, decides.

Figure 2.2 depicts student choice as a multi-stage process in which a host of variables may impact on students' successive choices. The model indicates that certain variables are more important in particular stages of the process. However, this does not imply that such factors cannot play a (lesser) role in other stages as well.

Student choice models are not without critics (Hossler *et al.*, 1999). First, Figure 2.2 indicates that the models include many explanatory variables but do not show

what factors are most important. In addition, various factors are active at the individual, the institutional and at policy levels. Furthermore, the models are not specified for time lags and feedback mechanisms. Nevertheless, the models provide good examples of the complexity of the student choice process and the many influences involved.

The next section presents the major findings of student choice research, shows the relative importance of various explanatory variables and emphases the role of financial incentives.

2.3   Major findings of student choice models

The results of student choice models are of prime importance to this study. Most existing studies are based on surveys and address many variables. We summarise the major outcomes of studies in the countries with the most elaborated research in this field: the United States, Australia, the United Kingdom and the Netherlands.[11]

2.3.1   *Student choice in the Unites States*

The United States is arguably the cradle of student choice research, including a host of studies at both the national and institutional level. Institutions have their own recruitment policies of which tuition and student aid play an important role. Many of such studies have been discussed and summarised in literature reviews by Leslie and Brinkman (1987), Hossler *et al*. (1989), and Heller (1997). All studies agree that socio-economic background – in terms of parents' education and income – are the strongest predictors for whether or not students pursue a higher education, what type of institution and program they attend and whether or not they persist. The extent to which (prospective) students are sensitive to financial factors is discussed below and concentrates on the major research findings related to tuition fees, grants, scholarships and loans.

Impact of tuition fees

In reviewing the major studies of the 1970s and 1980s, Leslie and Brinkman (1987) found that students are price responsive and that – *ceteris paribus* – a $100 increase in tuition fees reduced the participation rate by 0,7 percent. Importantly, more recent studies arrive at comparable results (Gladieux and Hauptman, 1995; Kane, 1995). In his 1997 review of student choice studies, Heller (1997) concluded that there is a similar inverse but moderate relationship between tuition and enrolment rates across most studies, ranging from -0,5 to –1,0 percentage point

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[11]   There is a rapidly growing body of student choice research in Canada. See for example the work of the Canada Millennium Scholarship Foundation, http://www.millenniumscholarships.ca.

for each $100 tuition increase. In 2001, Heller found even smaller average effects, particularly in the four-year public institutions. The general conclusion was that average price responsiveness to tuition changes is modest at best (Swail and Heller, 2004).

However, if one distinguishes between different student groups then the picture changes. Students from various socio-economic backgrounds, in terms of parental income and parental education, show much larger differences. Heller (1997) suggests that low-income students are sensitive to (changes in) tuition but that higher-income students are almost perfectly price inelastic. Kane (1995) added that increases in net cost over time are related to decreases in enrolment rates for lower-income students, but that they did not constrain enrolment for more affluent students. Middle-income students also seem to have reached a price threshold, particularly in the private sector (Breneman, 1994; Campaigne and Hossler, 1998). The same pattern can be observed for students from different racial groups. Most ethnic students, like African-American and Hispanic students seem to be more sensitive to tuition changes than white students (Heller, 1997 and 1999; McPherson and Schapiro, 1997 and 1998). These findings may be due to the way income and substitution effects of price changes differ for students from various SES-groups.[12]

Finally, tuition differences between various institutions also seem to have an impact on enrolment patterns. Hossler *et al*. (1989), have shown that tuition fees are the second most important institutional characteristic for students in affecting the choice of a higher education provider. McPherson and Schapiro (1997, 1998), Kane (1995), Campaigne and Hossler (1998), and Duffy and Goldberg (1998) all suggest that increases in net price (tuition minus subsidies like grants and scholarships) have driven low-income and ethnic minority students away from the (expensive prestigious) universities and four-year programs and pushed them towards relatively inexpensive studies at less prestigious institutions (e.g., community colleges). St. John and Starkey (1995) found patterns in persistence studies.

Impact of grants and scholarships

Grants and scholarships more or less show the opposite effects compared to tuition fees. As a rule they are expected to have a positive impact on higher education participation. Indeed, the literature reviews by Leslie and Brinkman (1988) and Heller (1997) find that grants do increase the likelihood of enrolment of students. This is also confirmed by longitudinal research of Dynarski (2003).

The effect on students from low-income families is generally found to be stronger than for students from middle- and high-income families. Leslie and Brinkman (1988) estimate that the enrolment of low-income students would be reduced by about 20% to 40% if there were no grants. Others, like Schwartz (1986)

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[12]   This will be further discussed in the Section 3.1 on general price theory (Chapter 3).

and Heller (1997), also conclude that grants have been successful in promoting wealth neutrality[13] in higher education. The same patterns are found for the impact of grants on the participation rates of students from different races, with ethnic minorities being more influenced by grants. This can be partly explained by the observation that ethnic minorities tend to be overrepresented among low-income families.

Grants also seem to have an impact on the choice of particular institutions or programs. Leslie and Brinkman (1988) point out that student aid is an effective way of changing net-price differentials among competing institutions. The availability of student aid is shown to be the third important institutional characteristic affecting students' decisions to apply, attend or persist in a higher education institution (Hossler *et al*., 1989). It was found that financial support and low-costs are more important for high school seniors not attending higher education than for those who actually enrolled. This supports the idea that there is a group of students on the margin that are uncertain about whether to enrol in higher education. Finally, some research points out that financial support has a stronger influence on community college students than on students at 4-year institutions (Kane, 1995; Heller, 1997). This is consistent with the previous findings that tuition changes push lower-SES students from more prestigious 4-year institutions to the less prestigious 2-year community colleges.

Impact of loans

Studies of the impact student loans have on student choice show diverse results. Campaigne and Hossler (1998) state that it is difficult to isolate the effects of loans from other financial instruments because they are often awarded together in broader financial aid packages. Nevertheless, significant differences have been documented in the willingness to borrow of students from different income groups. Individuals from lower-income backgrounds are averse to taking up (student) loans (Hossler *et al*., 1989; McPherson & Schapiro, 1997). As such, the shift from grants to loans in federal student support policies is argued to have pushed low-income students toward the two-year colleges, or not even enrolling in postsecondary education at all instead of attracting them to four-year colleges (St. John, 1994). The available research suggests that middle- and upper-income students are not opposed to taking up loans. They regard higher education as a good investment (McPherson & Schapiro, 1997; St. John, 1994). However, others argue that the persistent tuition increases leave middle-income students in the private sector reaching a price threshold that is difficult to overcome even with loans (Breneman, 1994; McPherson and Schapiro, 1991). The overall conclusion is that the impact of loans is small concerning the choice whether to go to higher education, but larger for the college destinations students choose (Campaigne

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[13]   This implies that parental wealth becomes less important for children's higher education aspirations.

and Hossler, 1998). In addition, Bouse and Hossler (1991) found that student loan policies have a negligible impact on initial post-secondary education aspirations because financial motives are only taken into consideration in the later stages of the student choice process.

Combined effects

The individual effects of tuition fees and various components of student support are difficult to identify. Here brief attention is given to indicate the evidence on composite effects. One might expect that prospective students simultaneously value tuition costs, living expenses, opportunity costs, student support and the future benefits of higher education. However, a review by O'Brien (1992) suggests that students react to "sticker prices"[14] rather than to net prices (tuition fees minus student support). Students are either not aware of the availability of financial assistance or they do not believe they are eligible for it. It is argued argues that in particular low-income students react to "sticker price" instead of net prices.

St. John and Starkey (1995) suggest that the poorest students are more responsive than other groups to grant increases than to tuition decreases. Interestingly, students seem to be more responsive to tuition increases than to similar sized grant increases (St. John, 1994). Heller (2001) calculated that to offset the negative enrolment impact of a 10% tuition rise would require a 15.9% increase in per capita grant spending at four-year institutions and a 129% per capita increase in grants at community colleges.

As expected, grants appear to have a larger positive impact on access than loans (St. John and Starkey, 1995; Heller, 1997). Grants are found to be particular effective for African-American and lower income students. An overall conclusion of the American student choice research is best phrased by Donald Heller (1997):

> *"Although the sizes of the effects differ across studies, they find that poorer students are more sensitive to increases in net cost, whether those increases take the effect of tuition increases or financial aid decreases. … Tuition increases that are not offset by concomitant increases in financial aid appear to have the effect of reducing access to higher education for our country's poorest students."*

2.3.2   Student choice in Australia

Australia provides an interesting case because of the reintroduction of tuition fees in 1989 and because of the equity policies that have been undertaken to improve underrepresented groups' access to higher education.

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[14]   Tuition fees before deducting financial support

Tuition fees[15]

Tuition fees were reintroduced in Australia in 1989 in the form of the "higher education contribution scheme" (HECS). Students now contribute to the costs of their higher education by means of a flat-rate fee that in 1989 represented about a quarter of average per-student instruction costs. Students are free to pay their tuition upfront (receiving a 25% reduction) or to defer payments until after graduation. In the case of the latter, repayments are income contingent – graduates with low earnings repay little (thus slowly) and higher earning graduates repay larger amounts (thus faster) – and collected through the tax authorities. In 1997, the flat-rate structure was replaced by three different fee levels or tariff-bands reflecting cost-differences between programs as well as differences in expected future earnings. In 1997 the income level (threshold) before graduates have to start repaying their study debt was also lowered, implying that the repayment process was accelerated.

The primary objective of HECS was to generate resources for expanding higher education by reintroducing private contributions without jeopardising accessibility. Since 1989, enrolments in Australian higher education have increased by 80%, from 441.000 in 1989 to 795.000 in 2002 (DEST, 2003). What is more, the proportion of rejected applicants for higher education places has fallen substantially.

Several studies were conducted to explore HECS' effects on accessibility, several. Chapman and Chia (1989) found that HECS marginally affects the private rate of return to higher education. This was also found with respect to the 1997-changes discussed a moment ago (Chapman and Salvage, 1997). Studies focussing on the effects of HECS on students from different socio-economic backgrounds find that the introduction of tuition fees together with an income contingent repayment scheme does not lead to changes in the social composition of the entrance cohorts (Chapman and Chia, 1993; Andrews, 1997, 1999; Chapman, 1997b). The proportion of matriculating students from low-SES background has remained stable, around 20%, before and after the introduction of the HECS. It was found that the participation of indigenous Australians (e.g. Aboriginals and Torres Straight Islanders) has steadily increased since 1987. All of these findings also hold after the 1997 changes (Andrews, 1999). Though low-SES students are underrepresented in the highest tariff disciplines (e.g., law, engineering and medicine), this appears to be a feature that prevailed even before 1989. Subject choice is primarily influenced by the intrinsic interest in the field, which then also appears to relate to socio-economic background (Harvey-Beavis and Elsworth, 1998; James *et al.*, 1999).

Other surveys have looked at the effects of HECS on individual attitudes with respect to higher education decisions. Robertson *et al.* (1990) found little effect of

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[15] This section is primarily based on: Hans Vossensteyn and Erik Canton (2001), Tuition fees and accessibility: The Australian HECS, in: CPB/CHEPS, *Higher Education Reform: Getting the Incentives Right*, Den Haag: Sdu Uitgevers.

HECS on the composition of applicant pools and no effect on those actually enrolling. The Higher Education Council (1992) found that school-leavers or adults who decided not to go to higher education only considered HECS as a low- or middle-ranking factor in that decision. Overall, surveys on the attitudes of students do not support the idea that HECS creates a barrier to higher education.

In sum, ever since the introduction of private contributions through HECS and its subsequent changes, higher education has expanded considerably without lowering the proportion of students from low-SES groups. This suggests, that at least in Australia, applicants are relatively unresponsive to changes in tuition fees.

Equity policies

Access equity became a key national goal during the massification of Australian higher education in the 1980s (James & McInnis, 2003). In 1974, tuition fees were abolished and a means-tested Tertiary Education Allowance System was introduced in order to widen access. The major effect was that more mature and female students were attracted to higher education, but not students from disadvantaged groups. In the mid-1980s special support packages were introduced to improve the participation rates of disadvantaged groups, such as the 'program of growth', the Aboriginal Participation Initiative and the Higher Education Equity Program (James and McInnis, 2003). In 1989, HECS was supplemented by a grants system (AUSTUDY) to broaden access and to equalise higher education opportunities for all. Since 1991, a number of other arrangements were introduced following the 1990 policy paper *A fair chance for all* (NBEET, 1990). The effects of these policies have been analysed in several studies (NBEET, 1996; Birrell *et al.*, 2000; and Dobson, 2003). The major conclusion is that participation patterns of individuals from lower socio-economic backgrounds illustrate a very limited impact of the equity policies with relatively stable shares of individuals from different SES groups (James and McInnis, 2003).

Some equity groups have, however, increased in relative enrolment terms, like women in non-traditional study areas, indigenous students, and individuals from non-English speaking backgrounds yet the relationship with equity policies is uncertain. In addition, participation rates for individuals from rural and isolated areas have declined. Most studies show that other factors such as aspirations, attitudes about student life, and the lack of family financial resources are more important in explaining the persistent underrepresentation of lower socio-economic groups (James & McInnis, 2003).

2.3.3   Student choice in the United Kingdom

In 1990 student loans were introduced in the United Kingdom next to the existing means-tested maintenance awards. The importance of loans was gradually

increased and in 1999, all student support was transferred into a student loan system with an income contingent repayment mechanism. The loan take up rate among those eligible for student loans increased from 28% in 1990 to 68% in 1998 and increased even further to about 82% in 2003 (SLC, 2004). Tuition fees were introduced in 1998 and since then all fulltime undergraduate students pay a flat rate tuition fee.[16] In 1998 the fee was set at £1000 (€1450). It was increased to £1125 (€1635) in 2003.

Research on how prospective students choose universities and colleges concludes that the decision whether or not to go to higher education is taken long before individuals apply for college or university (IES, 1999). These decisions are primarily influenced by students' achievements in school, access to career advice, gender, and expectations from peers (family and school). Costs appear to be important for non-traditional students, like those from disadvantaged SES-groups. They prefer to study close to home, taking courses with good employment prospects. In addition, over half of the prospective students who decide not to enter higher education feel that university is not for them and many also think that the student lifestyle does not fit them. This would indicate that socio-economic background may be more important than financial incentives (Callender, 2003).

Tuition fees and student debt

Though tuition fees were only introduced in 1998, early statistics show that the number of applicants and those accepted in higher education only marginally decreased in 1998 and 1999. These numbers rose again afterwards. Between 1996 and 2001 the relative proportions of applicants and students accepted from various social classes (based on parental education) remained remarkably stable (UCAS, 2003). These findings would suggest that the introduction of tuition fees did not harm access. However, the National Union of Students (NUS, 2000) claims that fees and loans most certainly prevented students with disadvantaged backgrounds from applying to higher education.

Recent research shows that students' resource mixes have changed considerably over time. Grants and parental contributions are now largely extent offset by loans, job earnings and credit (Callender, 2005). A literature review in the relatively new branch of British studies on students' attitudes toward costs and debt shows that since 1998 British students have more serious financial concerns. This has a negative impact on the perceptions of going to college (Callender, 2003). Students from lower-SES groups are more likely to be deterred by higher education costs and the prospects of debt. Furthermore, prospective students who are not certain about going to higher education are strongly

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[16]   Before 1998, higher education institutions were allowed to charge tuition fees that to a certain maximum level were paid by the Local Education Authorities (LEAs) on behalf of regular fulltime students. In practice, all universities charged this maximum amount of fees.

attracted to the financial independence of getting a job instead of studying. Students who are uncertain about going to higher education but finally do go are more likely to reduce their study costs and debt by enrolling in shorter, lower level, less advanced and more vocational courses. In addition they more often apply to institutions close to their parents' home to curb costs (e.g. Forsyth & Furlong, 2000; Connor *et al.*, 2001).

Another issue concerns (prospective) students' attitudes to debt (Callender, 2003). Though it is not possible to extend attitudes to debt to real borrowing and choice behaviour, it does provide some indication of problem areas. Various studies indicate that prospective students are worried about the amount of debt they might incur, especially students from low-SES groups (e.g. Forsyth & Furlong, 2000; Connor *et al.*, 2001). Students seem to believe that debt deters entry into higher education, and often regard it as one of the drawbacks of student life. However, those taking up student loans or serious overdrafts become much more tolerant towards credit and debt (Callender, 2005). This is supported by the steady increase in the proportion of students taking up loans (from 28% in 1990 to 82% in 2003) (SLC, 2004). Because all student support now is in the form of student loans, it has also become a necessity to take up loans.

Research by Callender (2003) among prospective students suggests that doing paid work is the major reason for not entering higher education. Prospective students who are undecided about whether to go to higher education mention financial barriers as the main reason for their ambivalence. This group included primarily pupils from lower-SES classes who were deterred by debt and having little money. Lower-SES female students have strong anti-debt attitudes. Prospective students who choose not to enter higher education have more negative perceptions of the benefits of getting a degree than those undecided or certain about entry. Furthermore, most prospective students have unrealistic expectations about their potential financial situation. They underestimate students' income and expenditure levels and overestimate final debt levels. Finally, most prospective students, especially those from lower-SES groups lack information and guidance on what to study, where and on the financial consequences and arrangements.

Overall, the UK case shows that students have considerable concerns about student financing and student debt, particularly those from disadvantaged backgrounds. Nevertheless, application and enrolment patterns do not indicate that the imposition of considerable tuition fees in 1998 and the transfer to a full loans system in 1999 have harmed access.

2.3.4   Student choice in the Netherlands

The Netherlands provides an interesting case study. Tuition rates are considerable from a European perspective and have gradually been raised in the past decades. In addition, performance requirements were attached to grants in 1993 and the focus of student support has gradually changed to loans.

The general conclusion from most Dutch studies on what factors influence student choice is that students' higher education aspirations and decisions are primarily related to parental encouragement, education and income, as well as students' motivation, proximity of institutions and personal interest (De Jong *et al.*, 1991; De Jong *et al.* 1997; Van Leeuwen *et al.* 2002).

Tuition fees and grants

One of the first Dutch studies on student choice was found that demand for higher education seems to be price-inelastic (Kodde & Ritzen, 1986). They also found that higher education demand was fairly insensitive to the level of tuition fees, with an elasticity of -0.003. This has been confirmed in most other and more recent Dutch research in this area (Felsö *et al.*, 2000). Using long-term data, Canton and De Jong (2002) showed that "the coefficients on tuition fees are negative but insignificantly different from zero". Sterken (1995) showed in a simulation model that even substantial tuition fee increases will hardly affect enrolment rates, except for students from lower-SES families.

Similarly, changes in grant amounts were also found to have a very small effect on participation. The introduction of a relatively generous student support system in 1986 did not lead to a major increase in the transition rate from secondary to higher education nor did it lead to changes in the social composition of the student body (De Jong *et al.*, 1991, De Jonge *et al.*, 1991). Finally, Leuven *et al.* (2003) did a randomised field experiment in which first-year economics and business students at the University of Amsterdam could earn financial rewards for completing the first year of study within one academic year, a rarity in Dutch universities. The financial rewards were €681, €227 or €0, the highest being close to the annual amount of basic grants for students living with their parents. Controlling for many external factors, the financial rewards did not improve students' study efforts or final achievements, even though students indicated beforehand that the reward would increase their passing rates.

Performance requirements

The introduction of performance requirements related to student grants in 1993 and 1996 increased the financial risk of not getting a degree or of taking too long to complete a program.[17] If it would be assumed that students are price-sensitive and debt averse, this change could be expected to have a serious impact on access.

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[17]   In 1993 'progress-related grants' (*Tempobeurs*) were introduced. Students had to pass 25% of their annual study credits or else grants would be converted into interest-bearing loans. Since 1996, the 'performance-related grant' (*Prestatiebeurs*) system made all grants – basic as well as supplementary – be awarded initially as loans instead of gifts. The conditional loans (in the first year of study) could only be converted into non-repayable grants if students passed 50% of their exams. The grant portions in succeeding years only become a gift if students completed their degree within the nominal duration of the program plus 2 years (6 or 7 years in total).

In practice, the impact of these arrangements has only been found to be temporary. Initially, the number of new entrants to university studies decreased slightly (De Jong *et al.*, 1996). Some (potential) students postponed their actual enrolment and a number of individuals who qualified for university chose instead to enter professional higher education. The main reason reported was that these programs were perceived to be easier to complete. However, after a few years, the traditional enrolment patterns re-established again (De Jong *et al.*, 2001). More recently, Belot *et al.* (2004) investigated the effects of the 'performance-related grant' and the reduction in the duration of study grants in 1996 on four student choice variables: 1) the choice between university and higher professional education, 2) drop-out behaviour, 3) the division of time between study and working activities, and 4) study performance in the first year. Cohorts of first-year students from 1995 and 1997 were compared. Students from the 1997-cohort who qualified for university education were found to be significantly less likely to enrol in university than students from the 1995-cohort (-2.2%). It was also found that the performance of students improved after the reform. The probability of dropping out fell by 2%, university students completed 5% more courses and the involvement in part-time work increased at the expense of study time. The conclusion is that students became more efficient, even though some were driven away from university. However, it must also be acknowledged that the indicated effects can (partly) be temporary. Students may have returned to regular study habits a few years after the changes.

Student loans

Another interesting phenomenon is the gradual shift from grants to loans in the student support system during the 1990s. Despite the growing emphasis on loans, the number of students taking up loans markedly declined from over 40% in 1991 to less than 15% in 1998 (De Vos and Fontein, 1998). Loan take-up rates have risen slightly since 2000 to about 22% by 2004. The reasons for the decline in the willingness to borrow include the 1992 introduction of interest on student loans during college time.[18] Students also started to borrow in other ways. Kerstens and De Jonge, (1999) showed that many students (about 80%) used overdraft facilities from private banks. In addition, many students took up flexible and temporary loans from private banks (or from parents) in order to cover extraordinary expenses, such as for purchasing computer equipment or holidays. In general they seem to prefer the flexible high interest loans of private banks over the low interest student loans that come in relatively low monthly instalments from the national student support agency (IB-Groep).
Other studies indicate that students do not borrow because they do not need the money; parental contributions and job earnings generate sufficient resources

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[18] Until 1991, many students took up maximum levels of interest free student loans, put the funds in a private bank savings account, made a profit and directly after graduation repaid their debt.

(Mattens *et al.*, 2003). Students who borrow tend to receive lower parental contributions. The major conclusion is that students are not deterred by loans, but rather prevent study debt by increased job earnings, exploit parental contributions or study faster. According to Biermans *et al.* (2003), the preference for increased job activity or speeding up one's study pace are clear expressions of a fear for debt. The authors support their claim with the finding that almost 30% of students surveyed in 2002 said they would not enter higher education if student support only consisted of student loans. The truth is probably somewhere in the middle. Increased job activity is not only stimulated by a fear of debt. Increased opportunities for students at the labour market, due to the labour market shortages in the late 1990s, are also likely to have attracted students into part-time work and especially when students were given more flexibility in terms of more relaxed performance requirements in 2000. Finally, young individuals increasingly attach higher value to having a high standard of living (Mattens *et al.*, 2003).

A final reason for the drawback in student borrowing may be the introduction of the 'performance-related grant' in 1996. Since the 'performance-related grant' system students receive their grant portions initially as loans, they may be less likely to take up additional voluntary student loans.

Participation in science and engineering

One final interesting phenomenon involves participation in science and engineering programs. Regardless of the emphasis of public opinion on the importance of science and engineering for the "knowledge society", participation in most traditional science and engineering programs is declining and the growing participation in new science and engineering programs cannot make up for that decline in the Netherlands, like in many other countries (Kaiser *et al.*, 2003). Providing additional scholarships for science and engineering students is shown to have practically no impact (Kaiser & Vossensteyn, 2005). The universities of technology experimented with giving students additional scholarships and financial guarantees in cases of dropout but this did not attract extra students (Van den Broek en Voeten, 2002). Simulation studies show that abolishing tuition fees might increase enrolments in science and engineering programs by 7% at most (Felsö *et al.*, 2000). Guaranteeing students a job after graduation and increasing engineers' salaries would have a stronger influence. The major problem seems to be that science and engineering programs suffer from a poor image as being difficult, harsh, and leading to jobs with lower earning potentials than other programs like business studies (De Jong *et al.*, 2001).

2.4 Conclusions

In providing a clear overview of the main findings of this literature review and of its relevance for the remainder of this study, the conclusions are clustered into four categories: 1) the student choice models, 2) the main factors influencing student choice, 3) the role of financial factors, and 4) the relevance for the current study.

Student choice models

The conclusions about the models and theories for student choice are as follows:
- Student choice must be considered as a process of cumulative decisions rather than a one-time decision. The stages include the formation of college aspirations, searching for an institution and program, applying, enrolling, and then persisting, switching or dropping out;
- Student choices involve many complex decisions and many factors that impact the direction of the final choices made;
- Studying the impact of one explanatory factor on college choice behaviour cannot be done in isolation but must be analysed in conjunction with (or controlling for) a whole set of influences;
- Models that integrate the sociological and economic perspectives better explain student choice than the models built around one perspective;
- Most of the student choice literature focuses mainly on the decision to enrol in higher education, what institution or program to choose and whether to stay in college (persist) or drop out. More recently, research extends to issues like borrowing and involvement in part-time work.

Major factors impacting on student choice

There is a host of factors that (potentially) influence student choice but not all factors are equally important, neither do all explain the same stages of the student choice process. Several variables however are dominant in most stages:
- Students' socio-economic background (parental education, family income, ethnicity, encouragement of parents and peers);
- Gender: female students make different choices than male students;
- Students' motivation and aspirations;
- Students' academic ability and achievements.

Other factors that are also often regarded as important but to a lesser extent and often only in particular stages include:
- The general economic and labour market situation in a country;
- College characteristics like proximity of the institution to a student's home, relative selectivity (selection criteria) and relative (net) price;
- Program characteristics, like subject / discipline and selectivity.

Finally, there are some categories of factors that are infrequently mentioned as important for student choice:
- Information such as counselling, media and other publications. Both parents and students pay little attention to collecting and analysing information about opportunities, costs and benefits;
- Institutional recruitment and admission activities;
- High school characteristics: quality, curriculum and social composition;
- Expected future benefits in terms of higher earnings and a reduction in the likelihood of unemployment.

Role of financial factors

The literature review shows a number of clear conclusions about the influence of financial factors like tuition fees, grants and loans on student choice:
- In general, students are not very responsive to price changes, implying that increasing or reducing tuition fees hardly affects the number of applicants and students. This also goes for grants and scholarships;
- Students from lower socio-economic backgrounds are more sensitive to differences in tuition fees and grants/scholarships than middle- and higher-SES students. This is particularly the case in situations with large differences in sticker prices and/or net prices, like in the US where lower-SES students increasingly seek cheaper higher education opportunities. Moderate price differences, as in Australia, do not generate significant negative participation effects for disadvantaged students;
- Student loans have a more ambiguous impact on student choice. Though loans provide the opportunity to meet the costs of study and to overcome cash constraints, they often do not have a positive impact on access. Middle- and high-SES students more readily take up loans than low-SES students;
- Particularly recent research indicates that students are debt averse, especially lower-SES and female students. However, it has not been shown that this leads to different student choices. On the contrary, borrowing from parents and private banks (e.g. through overdrafts and credit card debt) has increased substantially in recent years;
- Students increasingly take on part-time work as a substitute to taking up loans.

Relevance for this study

This chapter indicates that student choice is a fascinating field of study, particularly the role of financial incentives, that form an important part of public access policies, pose an intriguing challenge for researchers. Intuitively, tuition fees, grants and loans should be expected to have an impact on access. At the same time, if one takes into account the relatively high benefits of higher

education, students are not expected to be price sensitive, regardless of their socio-economic status. Empirical evidence shows that various SES groups show different price responsiveness, which indicates that they use different decision-making structures. One potential explanation could be that the income and substitution effects of changes in the price of higher education are different for students from various backgrounds. This poses the intriguing question of how (potential) students arrive at their decisions and how these can be theoretically understood.

In addition, the review shows that sociological factors dominate economic ones and that students are debt averse. These findings do not fully correspond to general situations in society (public policy) where economic reasoning and rational decision-making often dominate social policies. Furthermore, the demonstrated fear of debt for investing in higher education does not correspond to people's regular borrowing behaviour for cars, mobile phones, computers and holidays that easily lose value.

Based on these findings, student choice is clearly a complex area of study that requires a nuanced theoretical and empirical approach. The literature review shows that, in exploring research questions about the impact of financial incentives on student choice, a basic economic approach is insufficient. One also needs to take into account a sociological perspective. Even more so, relatively recent research on students attitudes about debt, part-time work and future income expectations indicates that students' perceptions of these issues may also play a role. Therefore, a more psychological approach may be promising for student choice research. These steps form the heart of the current study: formulating and empirically applying a theoretical framework that integrates economic, sociological and psychological perspectives in studying students' perceptions of financial incentives (tuition, grants, loans and future income) and the actual choices they make. Chapter 3 takes the logical next step by exploring the traditional economic theories used to explain student choice.

3 Traditional economic approaches

This chapter addresses the second research question presented in Chapter 1, which is about the economic theories traditionally used to analyse student choice behaviour. The focus is on economic approaches because the study's primary interest is the impact financial instruments (fees, grants, loans, etc.) have on student choice.

Reviewing the literature, two major economic theories underpin student choice research. The first is general (neo-classical) price theory that provides a short-run perspective on the role of financial instruments in student choice. The second and arguably more popular theory is human capital theory, which discusses student choice from a long-run investment perspective, including present and future costs and benefits. In addition, there is also the "screening hypothesis", a perspective that regards education as a selection mechanism differentiating individuals on the basis of characteristics like ability, productivity and quality. These theoretical strands will be discussed in the consecutive sections.

3.1 General price theory

Economics is the study of how individuals make choices in a way that maximises their utility (Marshall, 1920; Samuelson, 1980). A typical and particularly relevant example is that of potential students deciding whether to go to college or to take up a job. Every hour spent in college cannot be used for earning money (opportunity costs). Traditional economics suggests that people make decisions by comparing costs and benefits and that they may change their behaviour when the costs or benefits change. If the price of apples goes up then the demand for apples will fall. In other words, individuals respond to incentives (Friedman, 1962; Mankiw, 2001). In their economic behaviour, individuals are assumed to act rationally. This means that they try to attain the highest possible utility with the least possible costs using full information on opportunities and constraints. As such, rational actors optimise their behaviour (Wikipedia, 2005).

Education, being an increase in an individual's stock of skills, knowledge and understanding, also provides utility and thus can be considered a good in an economic sense. As is the case with all economic goods, the value of education is partly due to its scarcity. It is available in limited quantity and students only have limited resources to spend on it.

Drawing on the basic principles set out above, students ought to go to university if they believe that the benefits outweigh the costs and if they have the means to pay for all the associated costs, i.e. no liquidity constraint. As Finnie

(2004) puts it, students must want to go and be able to go.[19] This suggests that the distribution of costs and benefits of higher education has an impact on student demand. For example, reducing the price (costs) of education for students – e.g. by lowering tuition fees or by providing (more) grants – should increase demand for education. In contrast, raising students' price of education should, in theory, decrease the demand for education, unless we assume that education is a price-inelastic good, which we do not.[20].

A next step in this line of argument is to distinguish between students from poor and wealthier backgrounds (Heller, 1997). Based on *Gossen's First Law*[21], students from families with more financial resources are less sensitive to tuition and student support changes than poor students. That is, demand for higher education is more elastic for poorer students than it is for affluent ones. This is illustrated in Figure 3.1.

Figure 3.1:   *Higher education demand of poor and wealthy students*
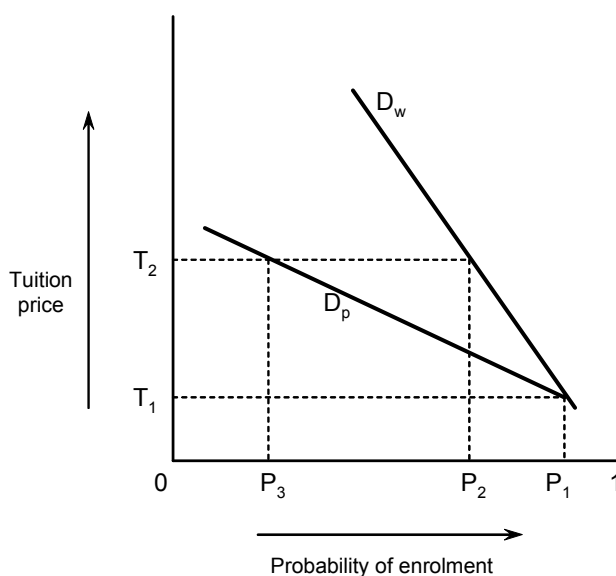
In this figure, D_p represents the demand curve for higher education of a poor student and D_w the demand curve for a wealthy student. At a low tuition price (T_1) both students have equal enrolment probabilities (P_1). If the level of tuition

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[19]   Of course there are also other conditions to be met, like that there are study places available and that the student is qualified to enter a study program.

[20]   Price-inelastic goods are goods that people keep on buying in about the same quantity if price changes. One can think of goods like bread, milk, potatoes, rice, etc., which people keep on consuming regardless of price increase ore price decreases.

[21]   *Ceteris paribus*, the marginal utility of additional portions of wealth decreases with the stock of wealth a person already owns (Mankiw, 2001)

rises to T_2, the new probability of a wealthy student enrolling (P_2) declines much less than for the poor student (P_3). In other words, poorer students are much more sensitive to tuition changes than wealthy students.

If individual students react to price changes then a system of student support may be useful to equalise the effects of price changes for different types of students. Student financial support can compensate for the differences in price-sensitivity between different groups of students. Of course this requires detailed knowledge about individual students' price sensitivity and the ability to fairly design (targeted) support policies. Do public authorities simply need to address liquidity constraints or is it also necessary to reduce the individual's net costs? Student loans only provide the means that enable students to meet educational costs and related living expenses, but do not reduce the net costs. Grants, however, not only provide students with the money they need, but they also reduce the net costs of study (Finnie, 2004).[22] Introducing student support (for poor students) into Figure 3.1 has the effect of shifting the demand curve of poor students outwards, which can be seen in Figure 3.2.

Figure 3.2:   Higher education demand, the effect of targeted support
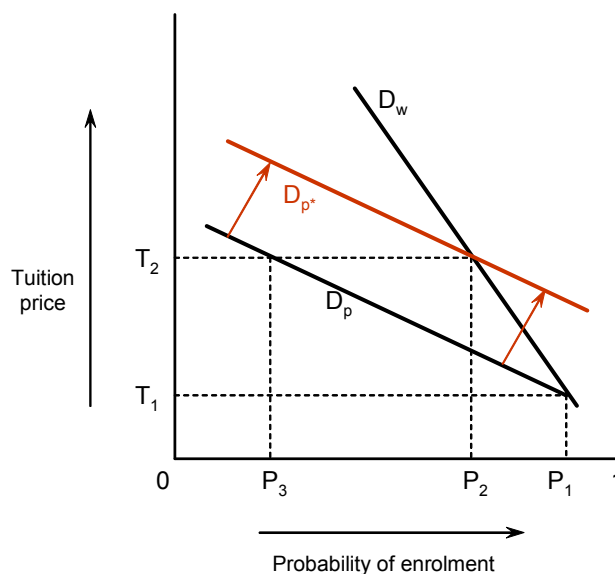
In this figure (D_{p*}) represents the demand curve for poor students who receive a subsidy (grant). As shown in Figure 3.2, providing poor students with financial support neutralises the differences in the probability of enrolment between students from different socio-economic status, though it does not change the

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[22]   Of course student loans can also include subsidies, like low or no interest being charged, grace periods and debt remission.

curve's elasticity. This implies that each tuition increase requires accompanying grant changes to maintain participation levels of poor students. However, this is not fully consistent with empirical evidence that tuition increases that are fully compensated with grants still may direct lower-SES students towards cheaper higher education institutions or programs (McPherson and Schapiro, 1998). That suggests that students are more sensitive to the negative impact of tuition fees than to the positive impact of grants.

Finally, it is necessary to take into account that the impact of price changes can be decomposed into income and substitution effects (Mankiw, 2001). If tuition prices drop a student's purchasing power increases. This enables him/her to buy more education and other goods (the income effect). However, with a reduced price of education, other goods become relatively more expensive and therefore an individual should buy less other goods and even more education (substitution effect). This is visualised in Figure 3.3.

Figure 3.3:   Income and substitution effects of decreasing HE costs
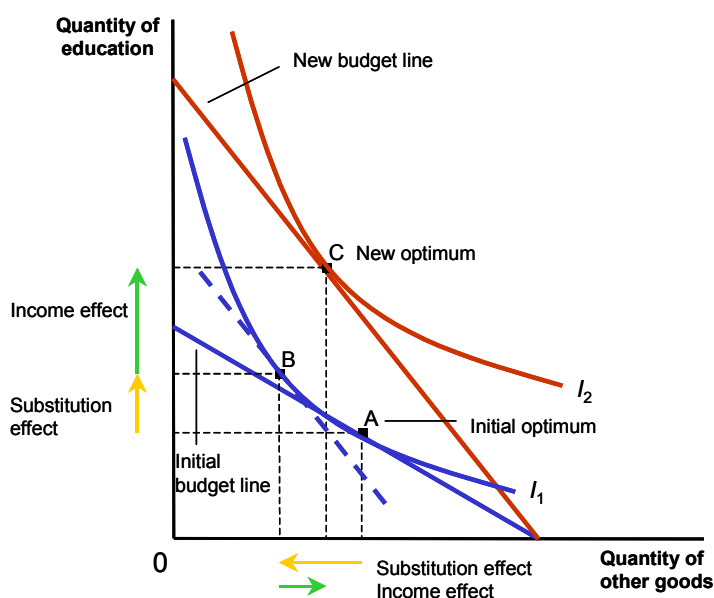
Figure 3.3 shows that student will buy more education after a drop in its price because students' wealth position improved and because the price of education decreased relative to other goods. The other way around, an increase in tuition fees can lead[23] to a reduction in the amount of education bought because of a

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23   Income and substitution affects not always have to reinforce each other. For inferior goods (if the
      price of the good goes up, people will consume more), the income and substitution effects work in

decrease in the relative wealth of students (income effect), but also because other goods become more attractive in terms of their relative price (substitution effect). Student grants can address the income effects of tuition changes but they cannot address the substitution effect. This suggests that tuition fees always reduce the consumption of education from poor (relatively price-elastic) students even if the extra costs are fully compensated with grants. To overcome the negative impact of the substitution effect, one would have to offer grants that are higher than the tuition increase.[24]

Reflecting on the general price theory approach to student choice, we arrive at a few shortcomings. These partly have to do with the theory itself and partly with the fact that education may not be considered as a fully normal economic good (as assumed before). Le Grand and Bartlet (1993) for example refer to education as a quasi-market good with both public and private characteristics. What is more, general price theory only takes a short-run perspective with regard to educational decision-making. It does not account for the difference between consumption and investment, which plays an important role in economics. Where consumption relates costs to short-run benefits, investment evaluates costs in the perspective of its long-run benefits. Education provides individuals with both kinds of benefits. In the short run, it directly satisfies specific student wants, like curiosity or the joy of learning and knowledge. In the long run it generates utility through increased lifetime earnings, lower probability of unemployment, higher status, and greater job satisfaction (Bowen, 1977). Furthermore, student choice involves decisions with long-run consequences because it often takes several years before one obtains a degree. In addition, student choices are faced with uncertainty. Individuals do not have full information on all education opportunities, whether they like a particular program, whether they will get a degree, and whether they will get a job that relates to their study and that will pay for the investments made. But this uncertainty also stems from the fact that it is the student him/herself who contributes to a successful study. This is reflected in the notion of a customer-input technology, where students are regarded as both consumers and producers of education (Rothschild and White, 1995; Canton and Vossensteyn, 2001). Finally, price theory does not explain why students from different SES groups have different slopes in their demand curves.

Altogether, it can be concluded that educational decisions are more complex than buying an apple and therefore they may demand a different theoretical treatment. A major advancement towards a new theoretical approach of education was made with the formulation of the human capital theory, which will be discussed in Section 3.3.

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opposite directions and the total result of a price change can be indeterminate (Nicholson, 1995). Education is not likely to be an inferior good.

[24] These stronger negative effects of tuition fee increases compared to the positive effects grants are discussed in Chapter 4 and 5 where, according to the behavioural economics model, financial incentives related to student choice are defined in terms of losses and gains.

3.2   Human capital theory

The idea of education as an investment emerged in the 1950s and 1960s. The development of human capital theory also brought about the "economics of education" as a specific field in literature (Becker, 1964; Psacharopoulos, 1987). Though Theodore Schultz (1961) was among the first to acknowledge that education could be regarded as an investment in *human capital*, the central thesis goes back to Adam Smith in *The Wealth of Nations* (1776):

> *"[A] man educated at the expense of much labour and time ... may be compared to one of those expensive machines."*

According to the human capital theory, education is an investment in the productivity of individuals and their environment.

Schultz (1961) was puzzled by why the pace of economic growth in Western societies could not be explained expansion of traditional factors of production such as land, labour and physical capital. Apart from the innate abilities of individuals, education came to be regarded as the major source of individuals' acquired abilities (Becker, 1964). In other words, besides the direct joy derived from education, education equips individuals with knowledge and skills and enhances their productivity in working life, which is expressed or formalised in a degree.

Productivity growth shows up in the quantity of goods produced, their quality and greater variety in the product mix (Bowen, 1977). In a well-functioning labour market, increases in an individual's productivity are rewarded with corresponding wage increases (Van Ingen and Vrancken, 1993). Thus, human capital theory is constructed around the idea that education is an investment of current time and funds in one's productive capacity for future pay. An individual who acquires more education becomes more skilful and productive and since productivity largely determines financial remuneration, education almost surely increases earnings in the labour market later (Barr, 2004). The investment characteristic of education is particularly expressed through the notion that costs and benefits both manifest themselves over a prolonged period of time. From this perspective, investment in education is not dissimilar to investing in a machine. Both improve people's performances at the workplace and their future returns are expected to exceed the outlay of time and money involved at purchase (Johnes, 1993). Of course it must be recognised that not all educational investments lead to high or satisfactory returns. Some graduates voluntarily or involuntarily end up unemployed or in low paying jobs.

The human capital model explains the demand for education in terms of its production (investment) and consumption benefits. Production benefits stem from the productivity gained from education, which lead to greater future income. Consumption benefits arise from the enjoyment of studying in the present and from non-monetary rewards in the future like personal development,

better working conditions and better health (Bowen, 1977). All of this can be put in a simple model of the Net Present Value (NPV) of a year of education[25], which is calculated by jointly evaluating benefits and costs over time (Barr, 2004):

$$NPV = \sum_{t=0}^{N} \frac{B_t - C_t}{(1+r)^t}$$

where:
B_t is the benefit to an individual from a year of education,
r is his personal rate of time preference (discount rate),
C_t is the cost of a year of education, and
N is the number of time periods (years).

All benefits and costs are expressed in monetary terms. This creates a straightforward decision rule: individuals will continue to invest in education as long as, at the margin, discounted benefits exceed discounted costs. Costs include both direct out-of-pocket expenses for tuition and study materials (books, computers, etc.) as well as foregone earnings.

From the model above a number of observations are evident (Schultz, 1961; Becker, 1964; Johnes, 1993):

- The longer the period of work, *ceteris paribus*, the greater the returns to education will be, since the returns accumulate over a longer period of time. As a result younger individuals should be more eager to invest in education than older people. Their period of returns will likely be longer, and older individuals already on average enjoy higher wages, resulting in higher foregone earnings and thus higher costs;
- The greater the returns to education, the larger the investment. If the earnings differential between educated and uneducated workers increases, then the demand for education should increase;
- The lower the net price of education for students, the larger the return and the greater demand will be;
- If the interest rate increases, then demand for education should drop because the net present value of the returns is reduced;
- If an individual is willing to wait for returns (due to using a lower discount rate than others) and the other opportunities are relatively worse then it is more likely that the individual will invest in education (Tamura, 1995).

Cost-benefit analysis is thus crucial to human capital theory. It leads to the calculation of a *rate of return to education*, which is discussed below.

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[25] It should be taken into account that the relative benefits of a completed study program are greater than that of only one additional year of education.

3.2.1   Calculating the rate of return to higher education

In order to compare the benefits to the costs of higher education, one must first define these concepts. The literature suggests a wide range of cost and benefits that stem from higher education (Bowen, 1977; Baum and Payea, 2004). These are usually divided into private and social components. Because we are primarily interested in individual student choice, focus here is given to the private costs and benefits.[26] Table 3.1 presents some of the most common components of the private costs and benefits of higher education.

Table 3.1:   The private costs and benefits of higher education

Costs	• Tuition fees, other fees and study materials • Foregone earnings
Monetary benefits	• Higher productivity and net earnings • Better job opportunities • Higher savings
Non-monetary benefits	• Educational consumption • Better labour conditions • Higher personal status • Higher job-satisfaction • Personal and professional mobility • Better health and life expectations • Improved spending decisions • More hobby's and value of leisure • Personal development

Source: Jongbloed & Vossensteyn, 2002; Worldbank 2002.

The table shows how higher education costs can be calculated in monetary terms. However, there is a long list of monetary and non-monetary benefits of higher education. Although these may be important to students in different degrees, many benefits also create measurement problems (Barr, 2004). First, benefits can be separated into two different categories: consumption (the enjoyment of the educational process), and investment benefits (higher pay, job security, job satisfaction, etc.). Not all can be measured according to one single measuring unit (e.g., in monetary terms) if they can be measured at all. Thus, non-monetary benefits complicate cost-benefit analyses of the rate of return to higher education. Furthermore, rates of return will differ between disciplines, institutions and individual students, which raises additional complications. As a result, most rate of return studies only include monetary costs and benefits in the equation (Psacharopoulos, 1987). The next section discusses the main results from the private rate of return analyses.

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[26]   The social costs for example include the operating costs of study programs, student support and national foregone production due to students. Social benefits for example include higher national productivity, higher tax revenues, flexibility of the labour force, increased social cohesion and social mobility, etc.

3.2.2 *Private rates of return to higher education: empirical evidence*

In principle, education benefits are measured over one's lifetime and are expressed as an annual percentage to the costs of the education investment (Blaug, 1990). In calculating the relevant costs and benefits most authors focus primarily on monetary aspects. This provides a baseline estimate of the pure economic value of education (Dolton *et al.*, 1997) but, in view of the many non-monetary benefits, the baseline rate of return analyses still likely underestimate the private rate of return.

The private rate of return can be defined as the discount rate that equates the net costs of education during the period of study to the net benefits from education over a lifetime (Blöndal *et al.*, 2002). This method involves identifying the proportion of an individual's earnings that can be attributed to the differences in his/her schooling investments, corrected for education costs. For estimating the proportion of earnings that can be related to schooling differences, most authors use the Mincerian earnings function (Mincer, 1974; Johnes, 1993). These empirical earnings functions use a method of least squares regression to estimate the equation parameters. The basic equation looks like the following:

$$\ln w = \alpha + \beta S + \gamma X + \delta X^2 + \varepsilon Z$$

where:
w stands for earnings,
S represents an individual's educational attainment,
X indicates the number of years of labour market experience and
Z represents all other variables.

The quadratic term expresses the non-linearity of the age-earning profile. It is assumed that β and γ are strictly positive, while δ is strictly negative (Johnes, 1993).

Numerous studies of the US generate roughly similar estimates of the private rates of return to college. The returns of different graduation cohorts between 1939 and 1980 showed mean estimates between 11% and 17% (Leslie and Brinkman, 1988). Clotfelter (1991) found private rates of return to a US college education in 1987 of 9.6% for males and 8.5% for females. Based on these outcomes, higher education is well worth its costs, even if participants have to pay the full costs of education (Baum and Payea, 2004). The College Board put the general message in one clear statement: "… the earnings gap between those with a high school diploma and those with a bachelors degree or higher exceeds $1.000.000." (College Board, 2003).

International comparative studies arrive at similar results. Early studies show private rates of return of approximately 12% in more advanced countries and in less-developed countries, even higher rates (Psacharopoulos, 1987). An OECD study (2001) showed private rates of return varying between 6.5% in Italy to

18.5% in the UK. Blöndal *et al.* (2002) presented similar results with private rates of return ranging between 7% in Japan, 12% in the Netherlands and 15% in the United States to 18% in the United Kingdom.

Data from Australia also show significant rates of return to higher education investments. Maglen (1993) calculated rates of 13% to 15% for university degree holders from 1985-86. More recently, Jaeger and Page (1996) and Surrette (1997) showed that college graduates have wage gains over high school graduates ranging between 11% and 60% (note that wage gains differ from rates of return as they are not corrected for costs).

In the UK, a study for the National Committee of Inquiry into Higher Education (the Dearing Committee) concluded that the private rate of return to UK higher education is between 11% and 14% (Steel and Sausman, 1997). Blundell *et al*. (2000) also addressed differences between bachelor and master degrees. They estimated private rates of return of 12% and 21% for male BA-degree holders and between for 8% and 16% for male MA-degree holders. Similar rates for female graduates were found to be considerably higher, ranging from 34% to 39% for bachelors and between 32% and 43% for masters. Steel and Sausman (1997) also found higher returns for women than for men.[27] Becker (1992) argues that the "gender gap" in earnings between full-time employed men and women decreased from 35% in the 1950s and 1960s to about 25% in the 1980s and 1990s. Given that women frequently interrupt their employment careers and more often work part-time than men, the human capital model suggests that women should have less incentive to invest in education and training.

With regard to the Dutch situation, Oosterbeek (1997) also estimates positive returns to education investments. Several authors have examined changes in the rate of return over time in the Netherlands (Hartog *et al.*, 1999; Leuven & Oosterbeek, 2000). After an initial decline in the return to higher education between 1960 and 1985, the rate stabilised until 1994 and then rapidly increased. One recent literature review of the Netherlands concluded that the rate of return to a year of education is between 6% and 8% (Groot & Maassen van den Brink, 2003). What is more, returns to years of education that do *not* lead to a degree are also substantial: 5% for male students and almost 10% for female students (Groot & Oosterbeek, 1994).

Altogether, the empirical evidence shows that private returns to higher education investments are generally positive, making higher education a worthwhile investment, particularly if non-monetary benefits of higher education, sometimes said to be at least as important as the monetary gains (Geske and Cohn, 1998), are also taken into account. Consequently, from the standpoint of human capital theory, students indeed have good reasons to invest in higher education. Regardless of their socio-economic status, higher education is a worthwhile investment as discounted future earnings on average easily outweigh discounted current costs.

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[27]   Nevertheless, the absolute earnings levels of females are still lower than for men.

Despite all positive findings from rate of return analyses, there are criticisms. Some scholars take a pessimistic view arguing that rate of return analyses look at the current position students who graduated in the past. They suggest that rates of return would not be as positive if one would account for the substantial growth in higher education participation and growth in private costs, like higher tuition fees (Ashworth, 1997). Second, rates of return to education may change over time, which may lead to substantial differences between student generations. Current differences in the earnings between graduates and non-graduates may not persist in the future.

Third, rate of return studies look at averages yet there are also major differences in the rates of returns between disciplines, subject areas, institutions, levels of programs and individuals. Ideally, these differences should be accounted for in the rate of return analyses, but to-date research that makes such distinctions has been relatively scarce. Given that variations in rates of return can be substantial between individuals, one would expect similar variation in individual education investment decisions. The fact that the differences between disciplines, subject areas and institutions are poorly researched, there remains a substantial degree of uncertainty in individuals' education investment decisions.

3.2.3   Critiques on the original human capital model

The basic and simple human capital model described so far contains many questionable assumptions. Maglen (1990) and Marginson (1993) refer to a number of major issues. [28]

First, the assumption that individuals are utility-maximising rational actors is suspect. In classical economics students are perfectly informed and evaluate all alternatives and choose the option that leads to the highest level of lifetime utility (Becker, 1976). However, in the real world, consumers' decisions are seldom the result of purely rational cost-benefit analysis because many decisions, including student choice, are highly complex and cannot be detached from social, economic and political influences. The number of educational alternatives is very large and the knowledge and information required to assess all alternatives in terms of consequences (costs and benefits) is often limited. What is more, students generally do not have clear goals and may be uncertain about their own capacities and about the consequences of their educational choices (Jongbloed, 2005). Simon (1957) suggests instead that individuals, at best, make their decisions based on the assumption of *bounded rationality*. Christie and Munro (2003) found that very few students make well informed or carefully weighed decisions about the probable balance between the costs and benefits of higher education before they enrol. Meijers (1995) for example argues that students rarely take into account labour market opportunities when choosing a college. They often rely on where their

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[28]   The next section discusses how the basic human capital model has been extended to overcome a number of the stated omissions.

friends go, prefer to stay close to home and prefer choosing popular studies, rather than selecting the best investment in terms of maximising lifetime utility. These notions indicate that students do not fully exploit available information. The concept of rationality may differ according to the decision maker's subjective perception of reality: also known as subjective rationality (Menon, 2004; Jongbloed, 2005). Importantly, subjective rationality does not imply that individuals behave irrationally.[29]

A second concern with the basic human capital model has to do with whether education determines productivity and to what extent productivity translates into earnings. This issue is particularly addressed by the screening hypothesis that is discussed in the next section. Other factors not captured in the basic model, such as social background, innate ability and informal learning are said to also influence productivity and earnings. These ideas are discussed further in Section 3.3.

Third, the assumptions about certainty about graduation, labour market prospects and future income are also questionable. The future in general is unpredictable and information on the nature and prices (including opportunity costs) of products or services is imperfect. Such concerns in higher education as well (Finnie, 2004; Jongbloed, 2005).

A fourth critique is on the assumption that the quality and additional value of schooling are constant. Varying degree structures, evaluation mechanisms and institutional rankings all provide evidence that there are certainly quality differences in higher education. These may very well lead to different earning profiles.

Two additional criticisms are in evidence. One assuming that schooling can be obtained in any quantity demanded is unrealistic. Many programs implicitly require students complete the full curriculum before they get an official degree, diploma or certificate. Two, human capital theory does not account for the fact that some students choose higher education for its consumption benefits like satisfying their own curiosity rather than for investment motives in terms of future monetary renumeration.

3.2.4   *Extensions to the original human capital model*

The major defence against critiques of the human capital model has been that no other approach can compete with rational choice theory (Becker 1992). Indeed, the simplicity of the human capital model, its wide areas of applicability – ranging from education, health, migration, human resources management, household decisions, to family relationships – and its substantial explanatory power and generality make it one of the most powerful social science models.

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[29]   Chapter 4 elaborates the concept of rationality and what mechanisms can make people to structurally deviate from full rationality.

Nevertheless, over the course of time the basic human capital model has been expanded in a number of ways. In his Nobel Lecture, Becker (1992) indirectly adjusted the assumption of rationality by stating:

> *"The economic approach I refer to does not assume that individuals are motivated solely by selfishness or gain. … The analysis assumes that individuals maximize welfare as they conceive it, whether they be selfish, altruistic, loyal, spiteful, or masochistic."*

The major step Becker took in extending the traditional analysis of individual rational choice was to incorporate more elaborated concepts of attitudes and preferences into the theory. This shift would suggest that the traditional meaning of rationality has moved into the direction of bounded rationality or subjective rationality. As a result, education decisions may also be viewed under the more flexible definition of rationality.

Webbink (1999) lists a number of ways in which the basic human capital model and rate of return calculations can and have been extended. For example, Becker included monetary equivalents of 'psychic' income in his 1967 model, which attempts to capture some of the non-monetary benefits. He also extended the model by looking at human capital decisions over time (Becker, 1967). Individuals' age, changes in the productivity of equipment and individuals over time, changes in the allocation of time and goods, and differences in wage rates over time were all incorporated and naturally changed the estimation of future benefits of education (Becker, 1992). He also addressed the phenomenon of "hyperbolic discounting".[30]

More recent rate of return studies also integrate some of the non-monetary benefits into the model by translating job status, career opportunities, employment conditions and challenging work into monetary equivalents (Becker, 1992; Webbink, 1999). Other authors integrate consumption benefits that make a distinction between present consumption – such as satisfying curiosity and the joy of studying – and future consumption, like enjoying art (Lazear, 1977; Kodde, 1985; Oosterbeek & Van Ophem, 1995; Webbink, 1999). Kodde also included uncertainty in the model, making a distinction between the uncertainty of getting a degree or dropping out, the uncertainty about future earnings and about employment opportunities. Overall, the basic model was largely extended by incorporating probability distributions for costs and benefits.

In addition, some argue that the human capital model would also have to account for dynamic elements in the decisions to invest in education. The fact that students may have part-time work besides study and that both human and physical capital depreciate over time (Johnes, 1993).

Finally, a number of authors address quality differences between levels and types of education. Becker (1967) had already made a start with this and others have since

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[30] Hyperbolic discounting states that individuals use unstable discounting rates with respect to costs and benefits that manifest themselves in the future.

elaborated the issue of quality differences between schools (Venti & Wise, 1982; Oosterbeek *et al.*, 1992; Avery & Hoxby, 2004). Quality differences are usually addressed by presenting different alternatives in terms of levels of costs and benefits. This results in separate kinds of human capital.

These developments show that human capital theory is a very flexible framework that is capable of incorporating many economic and non-economic insights (Webbink, 1999). Chapter 4 shows that a number of the extensions to the human capital model are also incorporated in the behavioural economics model. All extensions have in common that they affect the discount rates, and the magnitude and the distribution of costs and benefits related to schooling. As such, they change the balance in the cost-benefit analysis for schooling decisions. However, the general human capital rule remains firm: as long as the benefits of an educational investment outweigh its costs, a prospective student ought to invest in education.

3.2.5   *Reflection: human capital theory and student choice*

The fact that the human capital theory has been amended in reaction to criticism affects its original simplicity. The extended human capital model incorporates the notion that people rely on imperfect information and therefore sometimes seem to make irrational choices. As discussed before, (potential) students that make decisions based on imperfect information, uncertainty and biased preferences cannot be considered irrational, but rather bounded rational or subjective rational (Menon, 2004). In the extended human capital model, those who (subjectively) value the benefits of education higher than its costs will make the investment, irrespective whether this cost benefit analysis is based on one's current welfare situation, one's perception of costs or one's expectations about future returns.

However, human capital theory does not explain why individuals possess different types of imperfect information and therefore differ in their subjective rationality. As a result, the theory does not satisfactorily explain why students from different socio-economic backgrounds make different educational choices nor does it indicate why monetary incentives appear to have an impact on some but not on others. In other words, it does not explain why some groups of individuals capable of entering higher education do not invest in it although all possible (objective) indicators show that it is one of the most advantageous investments to make. This is particularly relevant in countries where most education costs are paid for by public sources and potential financial risks for the individuals (except foregone earnings) are reduced to almost zero through sometimes generous student support systems.

If one relates the human capital perspective to the results from price-responsiveness studies, some findings remain difficult to explain (Avery & Hoxby, 2004). The general insensitivity to price changes can be explained by the observation that the private rate of return to higher education in most countries is very high. In addition, if non-monetary benefits are also included, then rates of

return would be even substantially higher, which would make higher education an even more worthwhile investment. Potential students usually belong to the most educated / informed parts of the population and thus are expected to collect relevant information about the costs and benefits of getting a degree. Even in the extended human capital model – and acknowledging that some students have better access to information and funds than others – one would expect that students will invest in higher education, regardless of their family backgrounds.

The fact that students from lower socio-economic backgrounds are sensitive to price-changes that are negligible in terms of lifetime costs and benefits is more difficult to explain. The private rate of return is also high for them, particularly since they often receive substantial grants, scholarships, and/or loans with favourable repayment conditions. Nevertheless, low-SES students appear to act according to the principles of general price theory (if prices are raised, demand will fall), taking a short-run perspective towards educational investments. This price sensitivity suggests that low SES-students have much higher discount rates than other students.

Another issue that appears to be difficult to explain in the human capital perspective is the role student loans play in access to higher education. Student loans provide students the means to meet their expenses (overcoming short-run liquidity constraints) and generally include favourable conditions, like low or no (real) interest rates, grace periods and debt remission in case of low graduate earnings (Finnie, 2004). Regardless of the low risks, it was shown in Chapter 2 that students in many countries are reluctant to take up loans or indicate they are debt averse, in particular those from low-SES backgrounds. What is more, students often try to prevent taking up loans by taking part-time jobs (Vossensteyn, 2004). As such, they often delay the time to graduation. If the period of employment as a graduate is reduced, it substantially lowers lifetime earnings (graduates earn substantially more than students in part-time jobs). This does not fit in the human capital model, because taking up student loans and concentrating on study often leads to higher lifetime earnings compared to getting involved in low paying student jobs.

3.3   Screening hypothesis

Soon after the formulation of the human capital theory, an alternative explanation emerged for the positive correlation found between education and earnings. This competing theoretical perspective was called the *screening hypothesis* and essentially was a criticism of the assumption that education raises workers' productivity, and hence increases their lifetime earnings (Barr, 1998). It suggests that education may be associated with increased productivity but does not cause it, at least not once an individual has received a basic level of education. Educated workers' higher earnings are argued to reflect their superior ability, rather than the specific knowledge and skills acquired through education (Woodhall, 1989).

In short, education sends out a signal to (prospective) employers about an individual's abilities, and as such it serves as a filter or a screening device. Because a worker's productivity is usually not known when hired, education becomes a proxy or a signal (Arabsheibani and Rees, 1998).

Many attempts have been made to test the screening hypothesis by looking at wage differences between groups of workers with different educational backgrounds or by analysing revealed preferences (Layard and Psacharopoulos, 1974; Oosterbeek, 1992). It is also possible to distinguish between weak and strong versions of the screening hypothesis. In the weak version, starting employees with higher education credentials are paid relatively higher wages than the less educated. According to the strong version, employers continue to pay higher salaries to the more educated employees, even after observing them on the job. This latter behaviour would be irrational if education did not have a positive effect on productivity. The empirical evidence is mixed, even when more sophisticated estimation techniques are used that correct for biases in worker's ability (Arabsheibani and Rees, 1998). Horowitz and Sherman (1980) and Huffman (1981) tested the impact of education on productivity directly coming to a positive relationship.

The mixed findings suggest that screening may well account for a part of the observed differences between the earnings of high and less educated workers but it is very unlikely that an expensive (higher) education system would have survived if its main purpose was to act as a screening mechanism (CPB/CHEPS, 2001).

3.4   Conclusions

This chapter explored the value of the traditional economic perspectives for explaining why students from different SES groups respond differently to financial incentives. General price theory makes a distinction between the demand-elasticity of students from various SES groups – based on decreasing marginal utility for wealth – and shows that price changes lead to different enrolment decisions. However, except for differences in income and substitution effects, it does not explain *why* different groups of students have different sloping demand curves. Furthermore, it is only a short-run analysis: thus does not account for long term costs and benefits underlying schooling decisions.

Human capital theory takes a long-run perspective but only addresses tuition and student support, which only represent a relatively small part of the total long-run costs and benefits of higher education. The original human capital theory predicts that changes in tuition fees or student support will have only low effects on student choice, regardless of students' socio-economic status. In the more extended human capital model, imperfect (subjective) information is likely to change the balance between costs and benefits for different individuals. The theory however

still does not explain *why* students from different backgrounds have other – or more imperfect – information.

What mechanisms trigger imperfect or biased information? We know that poor rather than rich students feel limited by a lack of resources with regard to educational choices (liquidity constraints). They face more difficulties in paying the costs associated with enrolling and therefore may be more willing to not attend higher education as a result. However also for these students the returns to higher education in most developed countries are high. In addition, grants and student loans with favourable repayment conditions are widely available to students, solving their liquidity constraints and reducing the net price of the investments.

The same arguments and conclusions also hold for the screening hypothesis. It does not make a difference if individuals invest in higher education to enhance their productivity (human capital) or to distinguish themselves from others (screening). In both cases, education is still largely a worthwhile investment due to increased individual future income and non-monetary benefits.

What is more, debt aversion, which is believed to harm access, looks odd in the human capital perspective. Favourable repayment conditions and average high rates of return should offset debt aversion. As such, loans are expected to improve access, rather than harm it. In addition, students increasingly take on jobs while studying, among other things to prevent taking up loans. Yet doing so students extend their time before transitioning to graduate labour, which reduces their lifetime earnings.

If individuals make cost-benefit analyses according to the human capital model, then the big question remains why certain groups of students, particularly those from lower-SES groups, have biased information about the costs and/or benefits and why their educational choices do not correspond to the human capital model. These notions indicate that student choice is a very complex issue, involving many different factors and influences, such as uncertainty, subjective preferences, time constraints, tastes, attitudes, opinions of others and rules of thumb. Such factors may prevent (potential) students from making objectively rational student choices. Only some of these factors have been integrated into the human capital model, but further improvements still can be made. The next chapter explores a newer theoretical perspective addressing many deviations from rational theory in individual economic decision situations called *behavioural economics*.

4   Behavioural economics

This chapter focuses on an alternative perspective for explaining why students from different SES-groups appear to respond differently to financial incentives. As observed in the previous chapters, the differences in price responsiveness between groups of students can only be partly explained by student choice models, general price theory and human capital theory. As has been shown, other factors and particularly socio-economic background factors, have a greater impact on student choice behaviour than financial incentives.

In 2002, the founding fathers of this new theoretical perspective (Tversky and Kahnemann) were awarded the Nobel prize in economics (The Royal Swedish Academy of Sciences, 2002). Their theory, which is called *behavioural economics*, argues that human (economic) behaviour often deviates from rational behaviour, but in a systematic way. Behavioural economists like Kahnemann and Tversky (1979), Thaler (1991) and Rabin (1998) extended Herbert Simon's concept of bounded rationality by linking economics and psychology. Behavioural economics particularly addresses choice under uncertainty and student choice is characterised by a great deal of uncertainty and risk. This chapter focuses on general behavioural economics. The next chapter will make the transition to student choice.

4.1   The origins of behavioural economics

Behavioural economics was developed as a reaction to expected utility theory; one of the first theories for analysing decision-making under uncertainty. The expected utility theory as formulated by Von Neumann and Morgenstern (1944) is rooted in the tradition of the neo-classical economic utility theory based on "methodological individualism". One of the central assumptions is that individuals behave rationally.

The value of expected utility theory as a descriptive model for actual individual behaviour was contested almost from the beginning (Thaler, 1991). Herbert Simon (1957) argued that rational utility maximising behaviour is limited, for example by the idea of gradual satisfaction in cases of increasing wealth and by the principles of logic. This notion was translated into the premise of "*bounded rationality*" (Simon, 1957, p.198). In Simon's view, individuals look at a limited range of solutions in a given problem situation and accept the first satisfactory decision. This is known as "satisficing" behaviour.

Pointing at many examples in psychological and economic literature, Thaler (1991) summarised why the concept of bounded rationality holds and why full rationality should be seen as an "ideal typical situation". Bounded rationality

refers to the fundamental dogma of economics, namely the issue of scarcity. It struck Thaler that the economic trade-off between cognitive efforts and judgmental accuracy "… tends to be pushed out of sight in economics by the emphasis on unbounded rationality". Those supporting bounded rationality have come up with an increasing body of evidence that individuals do not behave according to the traditional laws of economic logic. Individuals make decisions on the basis of limited information, they show inconsistent preference patterns, and they use many rules of thumb to reduce uncertainty. In addition, he showed that bounded rationality strengthens economic models and study methodologies. All in all, individual behaviour to a large extent is influenced by the context of a decision situation (Antonides, 2004).

Regardless of the arguments for a bounded rational perspective, most economic theories, including those related to the economics of education (Johnes, 1993) still assume that individuals act as rational decision-makers solving problems according to objective standards. Bounded rationality is the starting point for behavioural economics.

4.1.1   Prospect theory

In their critique of utility theory, Kahneman and Tversky (1979) put forward an alternative model for describing decision-making behaviour called "prospect theory". This is a descriptive model of choice under uncertainty. Descriptive models differ from normative ones in the sense that they are concerned with what individuals actually decide (including beliefs and preferences) rather than what they should decide (based on rationality and logic reasoning). The descriptive approach is particularly useful in cases of uncertain or risky decision-making. It can reveal people's preferences, values and attitudes toward risk (Kahneman & Tversky, 2000).

Prospect theory as formulated by Kahneman and Tversky (1979) was based on ideas first postulated by Bernoulli (1738). He tried to explain why individuals are risk averse and why risk aversion decreases with increasing wealth. Bernoulli suggested that individuals do not evaluate the expected outcomes of a decision, but rather the expected *subjective* value of the outcomes. Kahneman and Tversky (1979) drew up a series of questionnaires designed to highlight discrepancies between individuals' actual behaviour and the expectations according to utility theory. The questionnaires consisted of a number of gambles or prospects[31] that paid out specified amounts based on associated probabilities.[32] Interestingly, the results from the choice problems showed that individuals' preferences systematically violated the rationality principle. People tended to deviate from rationality and did not objectively evaluate prospect outcomes.

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[31] Prospects are choice problems with monetary outcomes and stated probabilities.
[32] In expected utility theory, the utility of the outcomes are weighted by their probabilities.

One of the outcomes of the experiments was that individuals attached less value to probabilities relative to certain outcomes. This "certainty effect" suggests that individuals are risk averse in gains and risk seeking in losses. Certainty increases the aversion of losses as well as the desirability of gains.[33] What is more, the way in which a prospect is described is argued to have an effect on individuals' preferences when making a choice, the so-called "framing effect". Kahneman and Tversky (1979) found that different framing of the same prospects led to notable differences in choices. For example, defining a given problem's outcomes in terms of gains may lead to completely different answering patterns than when the same outcomes were formulated in terms of losses (Kahneman & Tversky, 2000). Also in consumer behaviour, the weight or wrapping of goods, like candy bars, has a substantial influence on individual purchasing behaviour (Bolger & Antonides, 2000). Framing effects then lead to perceptual illusions that violate the rational principle of invariance. Altogether, the major results of the questionnaires with actual choice problems revealed three patterns:

1. Gains are treated differently than losses. Except for very small probabilities, risk seeking is observed for losses and risk aversion for gains.[34]
2. Outcomes received with certainty are valued higher relative to uncertain ones.
3. The way in which a given problem is formulated has an impact on the choices.

Kahneman and Tversky (1979) formulated the prospect theory based on the outcomes of these experiments. The theory distinguishes between two phases in the choice process: an early editing phase in which individuals analyse and often simplify the prospect, and a subsequent evaluation phase in which individuals assess the edited prospect and choose the outcome with the highest value. Outcomes are perceived as gains and losses, rather than as final states of wealth. Particularly in the editing phase, individuals are sensitive to the misinterpretation of objective information.

The major difference between traditional utility theory and prospect theory is that the objective probabilities in utility theory become subjective decision weights in prospect theory. As a result, the utility function changes into a value function that represents the relation between objectively defined gains and losses (e.g., in monetary terms) and the subjective value a person places on such gains and losses (Arkes & Blumer, 2000). This value function has three basic characteristics (Kahneman & Tversky, 1979):

1. It is defined over *changes* in wealth rather than in terms of *absolute* wealth. The response is also dependent on the initial position. As such, the value function

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[33] For example, in a situation where individuals could choose among an 85% chance to lose $1000 (with 15% chance of losing nothing) and a sure loss of $800, the large majority preferred the gamble over the sure loss.

[34] A person is risk-averse if he strictly prefers a certain consequence to any risky prospect of which the expectation of the outcome equals that certainty. If someone's preferences go the other way he is a risk-preferrer. If he is indifferent between the certain outcome and a risky prospect he is risk-neutral (Hirshleifer and Riley, 1992).

focuses on the magnitude of a change relative to some reference point (e.g. asset position).

2. The function is concave for gains and convex for losses relative to the reference point. This reflects the psychophysical principle that the difference in the subjective value between €100 and €200 is regarded greater than the difference between €1100 and €1200. The marginal value of both gains and losses decrease with their magnitude, which is also known as diminishing marginal utility that is widely used in economics, dating back to Bernoulli (1738).

3. The function is steeper for losses than for gains. This expresses the intuition that a loss of €100 is more deterring than a gain of €100 is attractive. Stated differently, the negative feelings about losing a sum of money appear to be greater than the pleasure associated with gaining a similar amount of money.

In mathematical terms, a decision maker is assumed to evaluate each prospect (x, p ; y, q) that pays outcome *x* with probability *p* and outcome *y* with probability *q* according to the following value function:

$$V(x,p \; ; y,q) = \pi(p)v(x) + \pi(q)v(y)$$

In his head, the decision maker edits the objective prospect using two scales π and *v*, leading to the overall individual value of the prospect, denoted *V*. The first scale, π, associates with each probability *p* a decision weight $\pi(p)$. This decision weight reflects the impact of *p* on the overall value of the prospect (π is not a probability measure but a decision weight). Note that $p + q \leq 1$. The second scale, *v*, assigns to each outcome *x* a number *v(x)*, which reflects the subjective value of that outcome. Because outcomes are defined relative to a reference point, *v* measures the value of deviations from that reference point. Figure 4.1 shows a hypothetical value function with these properties.

Figure 4.1:   *A hypothetical value function*
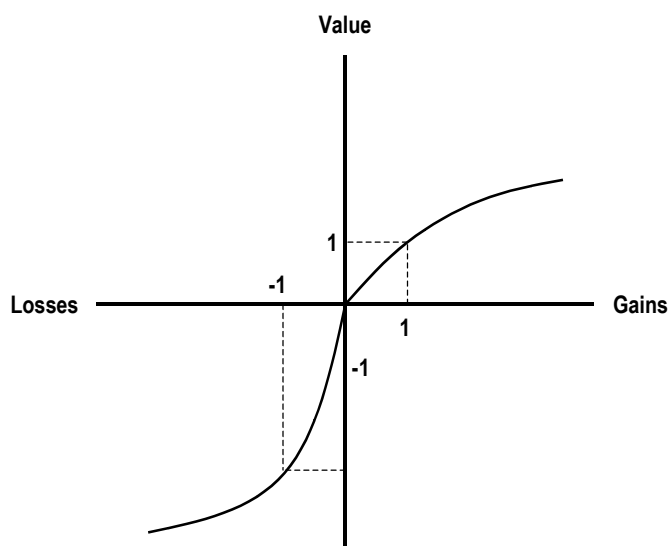
The S-shaped value function suggests that people are risk averse in the domain of gains and risk seeking in the domain of losses. Though this is not expected according to rational theory, these preferences are consistent with intuition about the subjective values of gains and losses.

Next to the value function, the prospect theory states that each outcome x and y) is multiplied by a decision weight. Thus in the value function above, the outcomes *x* and *y* are multiplied by decision weights π, with $\pi \in (0,1)$. Decision weights are not probabilities that follow a logic scale. They measure the impact of events in terms of prospects' desirability and not their likelihood. Based on a number of experiments, Kahneman and Tversky (1979) found that individuals' preferences tended to be lower than the events' probabilities.[35] This is called "subcertainty". However, because individuals are limited in valuing extreme probabilities, very low and very high probabilities are often misjudged. Very unlikely events are either ignored or overweighed, and at the same time the difference between high probability and certainty is either neglected or overestimated. As a result, prospect theory predicts that individuals in uncertain situations underestimate probabilities with the exception of overweighing low values because individuals overestimate the benefits of a change from no probability to low probability. These ideas are visualised in the hypothetical weighting function in Figure 4.2. The weighting function shows that preferences

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[35]   For example, people often overestimate the extremely low probability of winning big prizes (e.g. €1 million or more) in lotteries and they underestimate their higher chances on smaller prizes.

are not linear with probabilities. Here one can see how small probabilities are overestimated and moderate and high probabilities are underestimated. In addition, the sum of the weights does not fully add up to one whereas in normative theories they do.

Figure 4.2:   A hypothetical weighting function
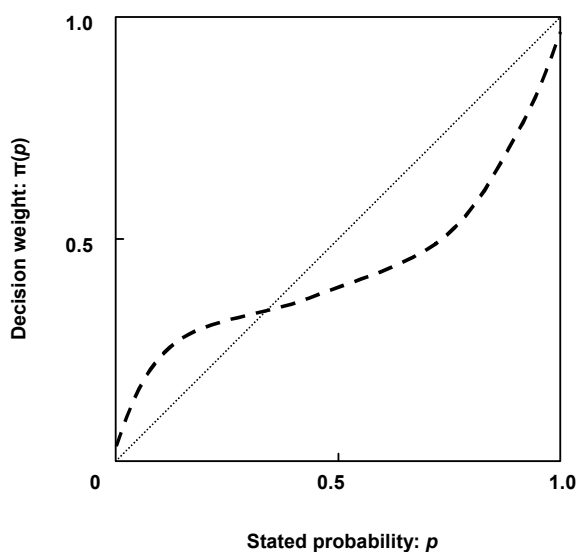
Altogether, the shapes of both the value function and the weighting function show how prospect theory describes and predicts actual economic behaviour rather than providing a framework for optimal behaviour as done by traditional economic models.

4.1.2   Critiques

The main criticism is that it is an inductive theory derived from analysing laboratory experiments. In addition, the theory depends on subjectively weighed probabilities and have only been developed in the context of simple choices in the selection of one 'gamble' or another, usually over pairs of prospects. Finally, it only deals with either 'positive' or 'negative' prospects and does not offer solutions for gambles which offer a mixture of gains and losses. As such, Ford (1987) questions whether the prospect theory can be applied to the usual array of choices that have to be explained under uncertainty in economic decisions.

For these reasons, some alternatives have been developed to overcome some of the problems with the prospect theory. Regret theory (Loomes, 1999) predicts that the pleasure associated with the outcome of a choice not only depends on the

nature of that particular outcome, but also on the outcome(s) of the alternative option(s). If the alternatives have more desirable consequences, then one feels *regret* reducing the pleasure derived from the original choice. Conversely, if the chosen option proves to be the most desirable outcome, this will generate additional pleasure (*rejoicing*).

Ford (1987) also developed an alternative approach, which he called 'perspective theory'. This theory tries to conceptualise decisions in situations of uncertainty where there are a full range of positive and negative outcomes. He postulated that an individual decision-maker takes an overview (or a *perspective*) of all the outcomes of a gamble and weighs them across the feasible range. In weighing the outcomes, the decision-maker also takes into account the likelihood or credibility of the individual occurrences. As a result high gains can be offset by a low degree of credibility.

Although the alternative approaches rightly point at omissions in prospect theory, the competing theories are still in their infancy. Prospect theory on the other hand, has been further developed in recent years.

4.1.3   Advances in prospect theory

Tversky and Kahneman presented a "cumulative prospect theory" in 1992. This revised version meets a number of the critiques to the original prospect theory. It now applies to uncertain and risky prospects with any number of outcomes (the original prospect theory only allowed a few outcomes). Decision weights can differ for gains and losses (Tversky & Kahneman, 1992). While different from the original theory, the cumulative one generally produces similar predictions as the original model.

All in all, the cumulative prospect theory argues that the rationality assumption in economic theory is questionable. Evidence shows that individuals can be successful in a competitive environment without acting fully rational. Most importantly the theory shows that, even abandoning rational behaviour can lead to orderly choices (Tversky & Kahneman, 1992).

4.2   Behavioural economics

Prospect theory led to a more general strand of research geared towards integrating concepts of other social sciences into economics. This is most developed in the "theory of economic behaviour", or behavioural economics, which focuses on questions of why individuals in various decision-making settings act in a seemingly non-economic and non-rational way. Like in prospect theory, behavioural economists also use many examples and experiments to structure and explain the quasi-rational behaviour of individuals. The theory focuses on decision-making in situations of uncertainty. The decision to attend higher education and to select a particular program is surrounded by much

uncertainty. Potential students are uncertain about the contents of a study program, whether they will get a degree and whether they will find a suitable job after graduation. Because students do not know what they are exactly buying, education is sometimes referred to as a service sold in a *trust market*: "Buying a college education is more like buying a cancer cure than a car or a house" (Winston, 1997).

Inspired by Herbert Simon's premise of "bounded rationality", behavioural economists state that the actual behaviour of individuals systematically differs from rational choice. Such systematic deviations are often called biases, heuristics or anomalies. As Thaler (1992) puts it: "An anomaly is a fact or observation that is inconsistent with rational theory." Anomalies are *systematic* deviations from rationality. But even if individuals are permitted to make systematic errors in their attempts to maximise their preferences, this can be misleading. A substantial amount of evidence suggests that people have difficulties evaluating their own preferences (Rabin, 1998; Hammond, 2000). Sippel (1997) showed in laboratory experiments that the axioms of revealed preference from the neo-classical theory are quite often violated. Consumers often do not maximise utility within the limits of a given budget constraint. People often buy cheaper but more energy consuming refrigerators than more expensive but low-energy refrigerators that turn out to be less expensive in the long run. Though this can already be explained by the adding of time preferences to traditional economic theory, such lack of coherence and rationality in human judgement pushed behavioural economists to develop a more positive theory of consumer choice that recognise systematic "errors" or anomalies in human reasoning.

Behavioural economics provides a number of quasi-rational explanations for why individuals systematically deviate from rational decision-making. They argue that individuals 'construct' preferences using easily available decision rules in conjunction with subconscious basic psychological principles to deal with decision-making (Loomes, 1998). This implies that, in deliberating on the costs and benefits of different alternatives, both material and mental costs and benefits ought to be involved. Besides monetary gains and losses, psychological feelings such as joy, grieve, loss and gain must also be taken into account. The key point of behavioural economics is integrating psychological phenomena with economic reasoning (Humphrey, 1999). Or as Rabin (1998) puts it: "Because psychology systematically explores human judgement, behavior, and well-being, it can teach us important facts about how humans differ from the way they are traditionally described by economists". In the current study this implies that describing and predicting individual student choice behaviour will require studying the points that prevent individuals from optimising behaviour.

Behavioural economics elaborates on prospect theory's focus on gains and losses. It uses a variety of psychological concepts and phenomena that explain human decision-making and its deviation from rationality. These concepts, which will be discussed in more detail later, include loss aversion, framing, overreaction, mental accounting, fairness and many others.

To discover how various concepts really work, behavioural economists rely mainly on experiments. Some criticise this approach because the problems used in experiments may not be familiar to the participants who then will use their own contextual frameworks to come to their decisions (Binmore, 1999). The counterargument is that all forms of thinking and problem solving are context-dependent and that individuals in experiments will make decisions that they think are expected from them (Loewenstein, 1999).

Regardless of these critiques, behavioural economics has produced a continuous flow of examples and experiments suggesting that human behaviour is shaped by many psychological phenomena (Kahneman & Tversky, 2000). The next section discusses a number of these phenomena of behavioural economics.

4.3 Psychological concepts

Some psychological phenomena have long been recognised in economic theory, such as diminishing sensitivity (changes in wealth are regarded less important if total wealth increases), the sunk-cost effect (past investments in a particular "project" legitimise current and future investments to prevent that past investments appear to be a waste) and time preferences (that individuals prefer immediate gratification over postponed (higher) awards). Not all of the concepts used by behavioural economists are directly relevant to student choice. This study focuses on the impact of financial incentives on student choice and thus is interested in concepts that have an impact on choices about attending higher education (or not), what type of course or institution to choose, where to live, whether to take up loans, and/or to work. As such we concentrate on factors that:

- involve monetary gains and losses;
- address the investment (versus consumption) characteristic of education;
- invoke student characteristics; or
- call on the context in which students make their decisions.

Table 4.1 provides an overview of important psychological phenomena used in behavioural economics to explain individual decision-making. It separates the concepts into those that are more or less relevant for student choice. Nine psychological concepts appear to be most relevant (left side of Table 4.1). These concepts are each discussed in the following subsections.

Table 4.1:   Psychological concepts affecting individual decision-making

Concepts relevant for student choice	Concepts not relevant to student choice
Reference levels,	Fairness
Loss or risk aversion	Love
Status quo bias (anchoring)	Envy, contempt, revenge, hatred
Endowment effect	Shame, guilt
Diminishing sensitivity	Religion
Mental accounting and fungibility	Framing
Rules of thumb	Etc.
Intertemporal choice	
Self-control	

4.3.1   Reference levels

A basic principle of prospect theory and behavioural economics is that individuals value changes in wealth with respect to a reference point (Thaler, 1991). In other words, "people are often much more sensitive to the way an outcome differs from some non-constant reference level (e.g. the status quo) than to the outcome measured in absolute terms" (The Royal Swedish Academy of Sciences, 2002). Thus, in given decision situations, individuals tend to use a reference framework for assessing a problem and its possible solutions. This comes very close to what is called "anchoring", referring to the fact that individuals use the current (or last) value of an object to assess whether changes are an improvement or a worsening of the state of affairs.

Consequently, it is not necessary to know what the most optimal choice in terms of objective judgement is. One instead focuses on the alternatives that best fit their reference framework (perception). As a result, it seems reasonable to incorporate information about habitual, expected or even favoured levels of consumption into utility analyses. The present (financial) situation or goals are often used as a reference point.

The concept of reference levels can be illustrated by an experiment where individuals had to choose between two policies proposed by two senators (Brown and Green) for a given country which were estimated to lead to particular levels of individuals' expected annual income (Quattrone and Tversky, 2000). For each policy, two economists gave their forecasts. Two samples of respondents were given the same choice problem, however each sample was given a different reference level in the form of expected annual income levels for a group of four other nations. The problem and distribution of voting results are presented in Table 4.2.

Table 4.2: Choosing policies on expected living standards (per year, US$)

	Brown's policy	Green's policy	Other four nations
Sample 1			
Forecast 1	$65,000	$51,000	$43,000
Forecast 2	$43,000	$53,000	$45,000
Voters distribution	28%	72%	
Sample 2			
Forecast 1	$65,000	$51,000	$63,000
Forecast 2	$43,000	$53,000	$65,000
Voters distribution	50%	50%	

The outcomes in the table show that just providing a different reference point (higher or lower expected annual income levels for the four other nations) produced a substantial difference in the distribution of respondents' votes in both groups.

4.3.2   Loss- or risk-aversion

Loss aversion refers to the situation that people are significantly more averse to losses than they are attracted to gains of the same magnitude (Kahneman, Knetsch & Thaler, 1991; Thaler, 1992). Tversky and Kahneman (1992) estimated that the displeasure from (monetary) losses is about twice as much as the pleasure of same-sized gains. One of the most important things to take away from loss-aversion is that the utility function for wealth is concave. On the utility scale (see Figure 4.1) the utility of $2x$ is less than twice the utility of x. This also implies that the marginal utility for additional units of wealth is lower for wealthy than for poor persons.[36]

Although risk aversion is found to be quite common in the domain of positive outcomes, the value function shows the opposite (Figure 4.1): in the domain of negative outcomes individuals tend to be risk seeking. The notion of loss aversion can be elucidated by a simple example. Most individuals are reluctant to accept a bet that offers an equal chance of winning or losing a certain amount of Euros. This is consistent with loss aversion, which implies that the pain associated with the loss exceeds the pleasure associated with the gain (Quattrone and Tversky, 2000).

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[36] Rabin (1998) showed that the concave economic utility function used to explain risk aversion cannot be used for small-scale and large-scale risk attitudes simultaneously. In models that do not hold for scale effects, even very little risk aversion over modest stakes would imply an enormous degree of risk aversion over large stakes. Therefore, Rabin (1998) argues that utility function require some type of reference-based link.

4.3.3   Status quo bias

Status quo bias is a special case of "reference levels" and "loss aversion" (Rabin, 1998). Actually, the status quo bias is an implication of loss aversion, because the disadvantages of leaving a situation loom larger than the advantages (Kahneman *et al.*, 1991). As such, status quo bias implies that individuals are hesitant to change because change may include uncertainty and loss. Even when the potential losses are offset by other gains, the uncertainty of a change remains unattractive. Put differently, individuals prefer certainty to uncertainty associated with change.

Hartman *et al.* (1991) did a survey of California electric power consumers. The respondents were asked about their preferences regarding service reliability and prices. They fell into two groups, one with much more reliable service than the other. Both groups of respondents were asked to indicate their preferences for six combinations of service reliability and price rates. One of the combinations was said to be the status quo. In their answers, 60.2% of the high reliability group picked their status quo as the first choice, with only 5.7% preferring the low reliability option at a 30% reduced rate that functioned as the status quo situation for the other group. In the low reliability group, 58.3% preferred their status quo situation over the other options, with only 5.8% choosing the high reliability option at the 30% higher rate. This is a clear example of the status quo bias. Individuals tend to cling to what they consider their starting situation and to what is considered to be "normal".

4.3.4   Endowment effect

A clear manifestation of individuals having asymmetric preferences is the anomaly of the *endowment effect* (Kahneman & Tversky, 1984). This effect, which is closely related to loss-aversion and reference levels, addresses the idea that the disutility of giving up an object is greater than the utility associated with acquiring it. As such, "once a person comes to possess a good, (s)he immediately values it more than before (s)he possessed it". Stated differently, "the minimum compensation individuals demand to give up a good has been found to be several times larger than the maximum amount they are willing to pay for a commensurate entitlement" (Knetsch, 1989). When it is more painful to give up an asset than it is pleasurable to obtain it, buying prices will be significantly lower than selling prices (Kahneman & Tversky, 2000, p.13). Some critics argued that the difference between buying and selling prices may be the result of ordinary bargaining habits in which individuals understate their willingness to pay and overstate the minimum acceptable price to sell a good (Knez *et al.*, 1985).

In economic terms, the endowment effect can be explained by the distinction between out-of-pocket and opportunity costs. Whereas out-of-pocket costs imply one has to make an actual payment when acquiring a good, opportunity costs concern the potential benefits in case one would sell a good one has at his/her disposal. In practice, individuals treat out-of-pocket costs differently from opportunity costs (Tversky and Kahneman, 1979). Behavioural

economics researchers find that out-of-pocket costs are regarded as losses and opportunity costs as gains. Because losses have a larger impact than gains, out-of-pocket costs are weighed more heavily compared to opportunity costs, which in fact is the endowment effect (Thaler, 1991).

The endowment effect has been sophisticatedly illustrated by a number of experiments (e.g., Kahneman *et al.*, 1991). One showed that the owner refused to sell a bottle of old wine for $200 but on the other hand would not pay as much as $100 to replace it. Another famous example concerns the experiment with the mugs (Thaler, 1991): "A group of students was randomly given a mug worth about $5 each. Then these students were asked about the minimum price to sell the mugs. This group of students were the 'sellers'. Another group of students not given a mug was asked the minimum amount of money they would have accepted if they would have the opportunity to choose between a mug or money (the 'choosers'). Economically, both groups, 'sellers' and 'choosers', faced exactly the same choice between money and mugs. However, the selling price of the 'sellers' appeared to be significantly higher than the price the 'choosers' preferred over getting a mug. This example shows that those given a mug treated the mugs as part of their belongings and considered doing without a mug as being a loss. Individuals not given mugs considered being without a mug as remaining at their reference point. Accordingly, individuals attached greater value to it as soon as it belonged to their endowment."

4.3.5   Diminishing sensitivity

Diminishing sensitivity refers to the psychophysical principle that effects of perceived well-being are greater for changes close to one's reference level than for changes further away. In other words, the marginal value of both gains and losses decreases with their magnitude. This can be seen in the shape of the value function (see Figure 4.1), which is concave for gains and convex for losses. Diminishing sensitivity is closely related to the issue of reference levels. It captures the basic psychophysics of quantity that are expressed in the traditional assumption of diminishing marginal utility (Bernoulli, 1738). The assumption of diminishing marginal utility of wealth is widely used in economics (as "Gossen's First Law"). Diminishing marginal utility of wealth may explain much of our aversion to financial risk. "We dislike vast uncertainty in lifetime wealth because the marginal value of a dollar when we are poor is higher than when we are rich" (Rabin, 2000).

4.3.6   Mental accounting

One of the basic principles of economic theory concerns the principle of fungibility: money is not supposed to have labels attached to it. Money for a holiday is the same money as the money for buying a car: it is substitutable. As a result, all components of wealth are collapsed into one single number. This is clearest in the *permanent*

income hypothesis, which states that individuals base their consumption level on what they consider their "normal" income (Friedman, 1962). As such, individuals attempt to maintain a fairly constant standard of living under varying income levels.

Mental accounting theory states that actors make their spending dependent on the *sources* of income (Allers, 2001); individuals treat different components of wealth as if it was stored in a system of mental accounts like a current income account, a savings account and a future income account. Different types of income are put into different accounts and different types of expenses are put into different budgets. This type of behaviour is what Thaler (1991) called *mental accounting*. He states that the extent to which a positive change in wealth is spent depends on the account where the growth takes place. This implies that individuals may be more or less willing to spend money on different types of purchases or investments. These budgets/accounts can be arranged in a hierarchy showing how tempting it is to spend money from that account. For example, it is most tempting to spend 'cash on hand', less tempting to spend money from the savings account and even less from stocks and bonds. Home equity accounts are even less tempting because most individuals prefer to pay off their mortgage. The least tempting category of funds is the 'future income account', including money that will be earned later in life and pension savings accounts.

Fungibility is often violated as shown in many examples from daily life (Thaler, 1992, pp. 113). For example, individuals save money for going on a holiday yet finance a new car through taking up high interest loans. Another example is the American academic institution of a summer salary (Thaler, 1992, p.113). Consider two professors (John and Joan) earning a similar wage of $55.000 annually. John's salary is paid in twelve monthly instalments, whereas Joan receives a base salary of $45.000 paid over twelve months and a guaranteed extra $10.000 paid during the summer. Standard life-cycle theory predicts that both employees will make similar saving decisions. But, the mental accounting formulation predicts that Joan will save more than John. Because her regular income is lower, her current consumption pattern or life-style will be tuned to that level. In addition, when the summer salary comes in a lump sum, it is likely to be entered into an assets or savings account from which normally individuals consume less than from a regular income account. The same argument goes for pension wealth. Within income categories, individuals saving in pension schemes are also show to have more money in other savings.

Based on such examples, individuals seem to pay for purchases through different (mental) accounts that are arranged like Maslow's hierarchy of needs. Table 4.3 lists several criteria.

Table 4.3:   Criteria to put various purchases in mental accounts

Criteria	Description
Need	One needs a place to live and one needs transport from home to work, education may not be regarded as a basic need.
Pleasure	One likes to drive a car, buying a house provides freedom in the usage of it, education can also derive pleasure but also inserts pressure.
Time	Buying a car or a house provides immediate user benefits, whereas educational investments show returns only after a (long) period of time.
Security	Estate provides a very secure collateral with a certain high return, whereas training is an uncertain investment.
Tangibility	Investment in houses, cars and appliances provide tangible or concrete goods, which is less the case for education.

As can be seen in Table 4.3, education investments are not regarded to be high priority needs, which makes expenses in this budget less attractive.

Finally mental accounting differs from the portfolio theory. Portfolio theory explores how risk-averse investors construct portfolios in order to optimise expected returns for a given level of market risk. It quantifies the benefits of diversification in order to reach the maximum possible expected return and to minimise risk. Mental accounting implies that individuals assign money and activities to different accounts to stay away from overspending rather than aiming at optimal returns.

4.3.7   Rules of thumb

The phenomenon of *rules of thumb* has been examined thoroughly in psychological and economic literature (Lettau & Uhlig, 1999). They can be defined as heuristics that are used to simplify a complex decision situation by comparing similar cases. Individuals sometimes focus on irrelevant aspects of relevant information when making a decision. Because many people's preferences are imprecise, rules of thumb allow them to make quicker and more consistent decisions (Loomes, 1998). Rules of thumb indicate what action should be undertaken in a given situation and thus are very much based on learning how to handle in routine situations. They provide standard reactions to repetitive or similar looking decision-situations.

Individuals adopt internally enforced rules of thumb to limit their behavioural responses. For example, some engaged in dynamic decision processes systematically disregard information to reduce complexity (Müller, 2001). Other individuals keep a threshold amount of money in their assets account. Still others do not borrow except for durable goods such as houses or cars.

In using rules of thumb, individuals tend to conform to two types of learning. First, choices that produced positive outcomes in the past are more likely to be repeated in the future, sometimes called the "law of effect" (Lettau and Uhlig,

1999). Second, individuals choose strategies that in the past on average produced maximal payoff rather than choosing what is optimal now. This is known as the "amelioration effect" and consistent with Simon's notion of "satisficing".

4.3.8   Intertemporal choice

Intertemporal choice concerns decision situations in which the costs and benefits are spread out over time (Thaler, 1992), as often happens with investments. Individuals come across a number of intertemporal choice situations during their lives, including important decisions like marriage, buying a house, investing in the stock market, saving for retirement, and investing in education. In all such cases, individuals have to simultaneously compare costs and benefits from several periods of time. Economists normally assume that a person's intertemporal preferences are time invariant implying that individuals discount streams of utility (and money) equally over time. Thus "a person feels the same about a given intertemporal trade-off no matter when she is asked" (Rabin, 1998). An investment that pays off at higher rates than the discount rate should lead to more investments whereas an investment that pays off less should be rejected. However, do individuals really make intertemporal trade-offs? Are they consistent in their choices and do they use similar discount rates over time?

Behavioural economists have identified violations of rationality and/or consistency in intertemporal choice situations based on observations of psychological research. For example, individuals' preference to pursue short-run gratification is inconsistent with long-run preferences (O'Donoghue & Rabin, 1999). In practice, present-biased preferences imply that individuals give relatively stronger weights to earlier rewards or costs (using very high discount rates). As a result, individuals tend to *preproperate* – impulsively not – if actions involve immediate awards and they *procrastinate* – wait when you should do it – if actions involve immediate costs. Put differently, individuals defer activities with direct costs and they seek immediate rewards (Thaler, 1992).

O'Donoghue and Rabin (1999) distinguish between two types of individuals: sophisticates and naïves. Sophisticates have present-biased preferences, but foresee that they will have self-control problems in the future. Naïves also have present-biased preferences but do not foresee any self-control problems. As such, naïves are only influenced by present-bias effects. Sophisticates always act sooner than naïves, irrespective of whether rewards or costs are involved. Being (justified) pessimistic about their future behaviour sophisticates find waiting less attractive. When costs are involved, sophistication alleviates procrastination whereas naïve persons are likely to repeatedly procrastinate on unpleasant activities. As a result, sophisticates are always better off in cases of immediate costs. The difference between sophisticates and naïves can, for example, explain why some individuals accept low or negative discount rates (reducing consumption capacity over time), as reflected in many taxpayers' preference for annual refunds from the national taxation office over a change in the monthly tax rate (Thaler, 1992).

Summarising, intertemporal choice problems arise for four reasons. First it is difficult to determine appropriate discount rates for preferences through time. Second, choices that may lead to future benefits often require self-control (see next section). Third, individuals tend to postpone (procrastinate) unpleasant tasks, making them cling to the status quo. Fourth, the tendency to procrastinate is stronger for naïves than for sophisticates. The latter better realise that they suffer from time inconsistent behaviour and take steps to deal with it.

4.3.9 Self-control

Self-control is an elaboration of intertemporal choice. It concerns the notion that individuals have a short-run tendency to pursue immediate gratification that is inconsistent with their long-run preferences (Thaler & Shefrin, 1981). The concept of temptation needs to be incorporated in the decision situation. Because individuals do not trust the way they will behave in the future, they are eager to manipulate future options. In doing so, they commit themselves to limiting their future choices or to protect themselves against future lack of willpower (Stigler, 1966; Elster, 1989). Individuals question their own ability to make rational, long-run choices. Well-known self-commitment devices are found in alcohol clinics, smoking clinics and Christmas funds.[37] Yet subtle rules of thumb that are also used by individuals can be accounted for under self-control, such as 'buying only small packages of tempting foods' so one will not overeat, or 'never drink alcohol' to prevent oneself from getting drunk (Thaler, 1992).

Thaler and Shefrin (1981) have modelled self-control by describing individuals as being *a two-self economic man*. In this model, "Individuals are assumed to behave *as if* they have two sets of coexisting and mutually inconsistent preferences: one concerned with the long run, and the other with the sort run." The former they call the *planner*, who protects long-run preferences, and the latter they call the *doer*, who tries to satisfy short-run, selfish consumption. As such, the concept of self-control resembles a principal-agent conflict. To prevent the doer from consuming the whole budget, self-control mechanisms can be used like rules and incentives. Rules include limitations of the options of choice, either forbidding particular alternatives or by using habits (e.g., rules of thumb as discussed before). Incentives concern positive and negative stimuli and monitoring behaviour. The attempts to control future behaviour indicate that individuals at least to some extent are aware of their time-inconsistencies. However, to what extent we do not know.

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[37] Christmas funds are saving accounts without giving interest from which one is not allowed to withdraw any money until Christmas.

4.4   Conclusions

Prospect theory and its elaboration in behavioural economics provides an interesting new approach to describing and explaining economic decision-making by individuals in situations characterised by uncertainty and risk. One important conclusion to be drawn from this chapter is that economic theory can be enriched for understanding individual choice by integrating psychological phenomena that influence individual's choice processes. A major lesson learned from behavioural economics is that the traditional notion of a stable preference order has to be abandoned in favour of a preference order that depends on a given reference level and that accounts for asymmetric weights attached to losses and gains. Moreover, when individuals evaluate decision situations they are influenced by a number of psychological mechanisms that form a mental framework that "colours" perceptions of the objective decision situations. Because all individuals have their own mental framework and perceptions (based on their individual reference levels, loss aversion, mental accounting techniques and time-inconsistencies), individuals value the returns and risks of particular purchases and investments according to their own value function. The shape of the value function is likely to differ between individuals, also leading to different choice patterns.

The major strength of behavioural economics, that it incorporates phenomena from other social sciences into economic reasoning, may also be its major weakness. In drawing on the enormous wealth of psychological insights for a better understanding of economic decision-making, behavioural economics runs the risk of becoming an overly complex theoretical approach. It looks like an overlapping multitude of psychological phenomena that all partially describe and explain various economic decision-making situations. Many psychological phenomena show partial overlaps. There are often only a few phenomena that are useful in explaining particular behaviour. This is why behavioural economics can be called an inductive theory. Its inductive characteristics have gradually become explicit through growth in empirical studies that add to the evidence in all kinds of specific decision-making situations (Novarese, 2005). This simply shows that behavioural economics is still in its infancy.

The inductive development of behavioural economics is the opposite of the human capital approach. Human capital theory is characterised by its very simple and transparent structure, its clear-cut assumptions about human rationality and its wide applicability. However, over the years, the human capital framework has been expanded by the integration of more elaborated concepts of bounded rationality, attitudes and preferences, like consumption benefits, unstable discount rates, uncertainty and quality differences in education.

Overall, behavioural economics offers many tools that can be used to study student choice. This can be particularly relevant for investigating the role of financial incentives like tuition fees, grants, and loans. Because behavioural economics is not necessarily a simple consistent theoretical framework, one cannot test whether the theory is useful for examining for students' financial

decisions. But particular elements of behavioural economics make sense in the formation of student choice. Therefore, an important outcome of this study is to indicate directions that may help increase the explanatory power of traditional theories used in student choice research.

In the next chapter, behavioural economics, or rather a small selection of its various elements, is applied to student choice. The result is a theoretical framework that subsequently will be used for empirical testing in later chapters.

5 Theoretical framework

This chapter translates the selected concepts of behavioural economics as discussed in Chapter 4 to the case of students' price responsiveness, thus giving rise to the theoretical framework for this study. Behavioural economics addresses the subjective individual interpretation of financial decision-making situations and therefore may help explain students' reactions to financial factors, like tuition fees and student support, that are difficult to explain with traditional economic theories (see Chapter 3).

Section 5.1 applies the behavioural economics phenomena to the case of higher education and student choice. In Section 5.2 the impact of financial incentives on student choice behaviour is modelled in a behavioural economic framework. Then the behavioural economic model of student choice is translated into a testable framework. Because some behavioural concepts are closely related, a more integrated application is presented with regard to particular student choice situations in Section 5.3, resulting in a number of potential hypotheses. Finally, the testable hypotheses are selected and formulated in Section 5.4. Together these steps address the second part of research question 3.

5.1 Behavioural economics and student price-responsiveness

In chapter one, student price-responsiveness was defined as the extent to which students react to financial incentives in the choices they make related to their enrolment behaviour or other study related issues. The empirical evidence presented in Chapter 2 showed that changes in tuition fees and student support generally do not cause major shifts in overall enrolment patterns (Leslie & Brinkman, 1987; Heller, 1997) even if substantial fees are introduced (Andrews, 1999; UCAS, 2003). This is expected from human capital theory. However, students from disadvantaged backgrounds (including students from ethnic minorities and low-income families) do appear to react to such price changes and female students are more sensitive to financial incentives than male students (Heller, 2001). The price sensitivity of particularly lower-SES groups does not show up in aggregate enrolment patterns, partly because these groups are heavily underrepresented in higher education and partly because the number of applicants for student places is often greater than the number of study places available.

As argued in Chapter 3, the question of why students with different background characteristics respond in different ways to financial incentives cannot be fully explained by traditional economic theories. For this reason behavioural economics has been put forth as an alternative explanatory

framework. The following sub-sections discuss how specific behavioural economic phenomena may help explain the price-responsiveness of different student groups.

5.1.1   Reference levels, status quo bias and rules of thumb

From behavioural economics (Section 4.3.1) we know that the key issue concerning reference levels is that individuals value the alternatives in a decision situation as gains or losses relative to a *reference point*. In addition, individuals may weigh alternatives differently if these are perceived as losses instead of gains. The reference point is normally the "current position" of the individual (or his family).

Status quo bias is a specific case of reference levels. Individuals tend to embrace the status quo because change involves uncertainty and may lead to sacrifices. Entering higher education represents a case of substantial change for prospective students. It is surrounded by uncertainty with regard to changing living situations, completing a degree and future employment or future income. The alternative of directly entering the labour market after completing secondary education is also a change. However, the consequences are easier to evaluate. Because they occur in the short-run, they are more certain, tangible and less risky.

Rules of thumb address individuals' tendency to employ standard responses in repetitive or similar looking decision situations, reducing complexity. An often quoted rule of thumb is: "do not borrow except for durable (physical) goods such as a house or a car". According to this rule of thumb, higher education is perceived less as an investment (or less as a primary need) than other durable goods. This suggests that individuals are more likely to borrow for houses and cars than for higher education. It may help to explain why students are reluctant to take up loans to pay for the costs of study. Rules of thumb can also be expressed through social norms. For some individuals it is expected that they will go to higher education because their social environment expects them to do so, regardless of the investment required. However, attending higher education may be considered (very) abnormal for others – for them it is not a social expectation.

Reference levels' relevancy to educational decisions is already acknowledged by studies addressing student choice in the sense that contextual factors like socio-economic background are regarded as crucial for explaining students' choices related to enrolment, continuation or drop out (Neumann, 1985; Tinto, 1987; Leslie and Brinkman, 1988; Heller, 1997, Hossler *et al.*, 1999). The behavioural economic phenomenon of reference levels specifies the relationship between the context of a decision situation (the socially expected level of education) and the observed behaviour, especially with relation to financial evaluations. Because student choices are surrounded by uncertainty, one could argue that contextual factors are more important for prospective students (candidates) and young students than for mature (old) students. Prospective

students have more uncertainty about their abilities, chances of success and future employment position.

Altogether, it appears that reference levels can be important for student choice in two ways:

- valuating costs and subsidies (an economic perspective);
- assessing the influence of peers (a sociological perspective).

5.1.1.1   Valuation of costs and subsidies

In view of the phenomenon of reference levels, it is likely that (potential) students value tuition fees and student support in relation to their actual income situation and that of their parents. This adds another dimension to the human capital perspective which suggests that present costs and subsidies are evaluated against discounted expected (net) lifetime earnings (Net Present Value method, see Section 3.2).

The concept of reference levels in conjunction with the (economic) principle of *diminishing sensitivity* points at additional explanations for differences in price responsiveness across students with different background characteristics. In terms of financial incentives related to student choice this implies that the marginal (dis)utility of tuition fees and grants is lower for students from affluent backgrounds than for students from poor backgrounds because students will take their actual income (and that of their family) as a reference for the evaluation of present and future costs and benefits of attending higher education. Thus, although the lifetime financial situation of students may be similar, they are likely to differ in their responsiveness to tuition fees and scholarships if their actual (current) income situation, or that of their parents, is different. Behavioural economics suggests that students from lower-SES backgrounds are more likely to overestimate present costs and benefits and to underestimate their future income relative to other students. Consequently tuition fees are likely to have a stronger negative impact on the enrolment decisions of low-income rather than high-income students, whereas grants and scholarships are more likely to persuade poor students to enrol in higher education. For the same reasons, in case of differential costs, poor students are expected to more often choose relatively cheap (low-tuition) higher education opportunities than richer students. Turning the argument around, the alternative of taking an "honest" job after secondary education instead of investing in higher education is likely to be perceived as more attractive by poor individuals compared to others. Christie and Munro (2003) argue that working class individuals do not consider going to higher education or living away from home. They found that families' social, economic and cultural capital was stronger than expected. If study costs would increase, the uncertainty and risks of higher education would also rise, leading to greater disparity between socio-economic groups.

Reference levels can also include the goals individuals have concerning their (working) career, including particular income levels. In such a perspective gender

may be an important factor in how students perceive higher education costs. Since women traditionally more often than men interrupt their career for family reasons, work part-time and end up in less prestigious jobs, the benefits of higher education are lower for women than for men. Financial incentives therefore are likely to have a stronger impact on female rather than male students even though the individual rate of return to higher education (graduates versus non-graduates) is found to be higher for women than for men (see Chapter 3).

Moreover, the status quo bias tells that, in case of tuition fees and student support, students are likely to be sceptic about or to object to change, including those changes that may improve students' situations. One can, however, expect variation in the magnitude of such reactions. It seems intuitive that students will react stronger to unexpected and/or substantial changes than to gradual and small (incremental) changes. Consequently, the introduction of a tuition fee will likely have a stronger impact on higher education participation than a rise in the level of existing fees even if that fee is meant to improve the quality in higher education! In the first case, students have to break with a situation of free higher education, in the latter students are already used to the idea of fees.

5.1.1.2   Influence of peers

Reference levels also touch upon the influence of peers in the decision-making process. Peers include parents, relatives, friends, classmates, teachers and counsellors at school/college. Students likely take into account the opinions of their peers in making their choices with relation to higher education participation and financing it (take up of loans, getting a part-time job, etc.). The reference for high-SES students may be higher levels of education, so if they do not attend higher education that may be regarded as a loss (by one's peers). However, for lower-SES students the reference may be lower levels of education, thus not enrolling in higher education may be seen as normal. From this view, students are more likely to attend higher education if their peers are positive about (encourage) such a decision or if those peers have also attended college. Entering higher education will then be regarded as a "smaller step". One can expect a positive relationship between the parents' level of education and college attendance.

Another reference level is formed by peers' occupational status. The (level of the) labour market position of a student's father or mother is likely to function as a reference position for the student's aims. Other things being equal, children from parents with higher ranking jobs are likely to have higher job ambitions and thus will be prepared to make greater educational investments than other students.

One can expect that children from traditionally underrepresented groups in higher education will have more difficulties enrolling in higher education than others. Moreover, regardless of their income situation they may be more likely to

overestimate the current costs of higher education and underestimate benefits than other students, because they are not generally aware of them.

Finally, reference levels are also likely to influence the decision to take up study loans. If a student's peers also take up (or took up) student loans, he may also be more likely to borrow. More generally, investing in higher education through tuition fees and/or loans may be perceived as being more natural for students from families who borrow for investing in houses or other long-run assets than for students from families that live in rented homes. They may perceive study costs as a smaller risk or as "part of the game".

5.1.2 Loss aversion and the endowment effect

Loss aversion refers to the situation that individuals are significantly more averse to losses than they are attracted to gains of the same size (see Figure 4.1). It predicts that students will be more deterred by study costs like tuition fees and loans than they will be attracted by subsidies like grants and scholarships. If one assumes that students attach greater value to costs (losses) than to subsidies (gains), then it can be expected that they will be less likely to attend high-cost institutions even when the added costs are fully compensated by student support (e.g., McPherson & Schapiro, 1998). In line with diminishing sensitivity and reference levels one can expect that loss aversion is much stronger for poor students than for rich students because the former are more sensitive to financial incentives than the latter. Behavioural economics predicts that in case of tuition fee differentiation students from low-income groups will be underrepresented in high-cost study programs and institutions even if they are (fully) compensated in terms of grants or scholarships for the cost differences with low cost programs and institutions.

Loss aversion can also partly explain the reluctance of students to take up loans. Such loans can be regarded as an investment in higher education where students use part of their future income to pay for current costs of study. However, it is not certain that a student will increase his lifetime income position through investing in higher education. Students run the risk of failing to obtain a degree or a "well-paying" job. As a result, they may end up with a low or no return on their investment. Since losses are perceived as being greater than similar-sized gains, students are likely to overestimate the risks of low returns and underestimate the chance of greater benefits from investing in higher education. Therefore, all students are expected to be reluctant in taking up loans.

Again, based on the phenomena of reference levels and diminishing sensitivity, one can expect that the reluctance to take up student loans (debt aversion) will differ across various socio-economic groups. The experienced displeasure from taking up a loan is stronger for students from lower-income groups compared to richer students. However, this expectation may be contradicted due to the fact that poor students are forced to take up loans to meet study costs (liquidity constraints) and richer students simply do not need them. If

poor students need to take up student loans, they are more likely to limit their risks by enrolling in less expensive study programs, programs with a relatively short duration, or programs that are perceived to be more easy to complete in time.

A special case of loss aversion is the *endowment effect*. In the case of higher education, the endowment effect manifests itself in the "basic" or "natural" right to free higher education, the right to maintenance grants or the right to free transportation. This situation is often encountered in countries where higher education traditionally has been free of charge but where the introduction of tuition fees is proposed. In such cases, students not only oppose to the proposed fees but also the idea that they will have to give up the right of free access.

This type of argument holds for all changes in tuition fees and student support that make higher education more expensive for students. The present state of affairs can be regarded as the student's endowment and policy changes that negatively influence this situation will be disproportionally opposed by both poor and rich students even though they can be well defended on 'equity' or 'efficiency' grounds. The traditional economic perspectives also predict that changes in the balance of costs and benefits of higher education may influence students' choices. However, the opposition to increasing costs can be expected to be substantially stronger in the behavioural economic perspective because losses (costs) are assumed to loom larger than gains (benefits) and because of the endowment effect.

5.1.3   Intertemporal choice and self-control

Intertemporal choice refers to the phenomenon that individuals attach relatively higher weights to short-run benefits and costs than to long-run ones. Time preferences lead to high discount rates as shown in Chapter 4. In addition, because individuals treat losses differently from gains, the discount rate for (future) gains is higher than for (future) losses (e.g. debt repayment). In contrast with the standard economic assumption of time-consistent preferences and constant discount rates, this implies that students have present-biased preferences. Consequently, in calculating the net present value of higher education, students will overestimate present costs (and benefits) and underestimate future benefits of higher education. This may lead to a reduced likelihood of investing in higher education.

Intertemporal choice also predicts that students will be less willing to take up loans compared to the willingness that might be expected on the basis of human capital theory because in the former perspective individuals use higher discount rates in comparing current costs and future benefits. In addition, because present costs loom larger for poor students than for others (because of reference levels and diminishing sensitivity) it can be expected that intertemporal choice effects will also be larger for poor students.

Due to the emphasis on present costs and benefits, students are more likely to prefer the direct benefits of part-time work over taking up loans. Many surveys have shown that students who work part-time delay their time to complete a degree (Heller, 2001; De Jong *et al.*, 1997, 2001; Hofman *et al.*, 2003). Because jobs held by graduates usually pay substantially more than jobs held while being a student, prolonged duration of study due to part-time work leads to lower lifetime earnings. It especially reduces graduates' highest-income period (at the end of their career).[38]

Self-control is a specific case of intertemporal choice that refers to the idea that individuals do not trust the way they will behave in the future. Therefore, they voluntarily restrict their range of (future) choices. In the case of higher education self-control mechanisms force students to reduce the likelihood of failure to get a degree and to find a well-paying job after graduation. Consequently, students may decide not to enter higher education at all, enrol in less expensive courses, enrol in shorter studies or in programs that are perceived as more easy to complete. This means that they may avoid medical, science and engineering programs. In addition, the self-control mechanism also predicts that students may take part-time jobs rather than student loans in order to limit the risks and potential repayment difficulties. Again, reference levels and diminishing sensitivity predict that low-SES students will face a stronger self-control effect than high-SES students.

Finally, students may treat higher education as a consumption good (for the joy of study and personal development) rather than as an investment. For these students, the costs of higher education are mainly evaluated in the perspective of present benefits. In extreme cases, they may even neglect the future benefits. In several studies (e.g. Webbink, 1999), consumption motives have been integrated in the human capital model (see Chapter 3.3.4).

5.1.4 Mental accounting

The traditional economic principle of fungibility states that money does not have labels attached to it and that money from one account will be spent just as often as from another (substitutability). *Mental accounting* suggests that individuals organise, evaluate and keep track of financial activities in different accounts and budgets.

In the case of student choice, mental accounting is best observed in students' aversion to debt. Taking up student loans implies that students postpone the payment for (part of) their higher education costs and thus spend money from their future income account. As argued more thoroughly in Chapter 4, drawing money from the future income account is being perceived as the most 'painful' compared to other types of accounts. Consequently, all students should be

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[38]　This in a human capital perspective students would rather borrow to limit the duration of study and to maximise their graduate employment period.

reluctant to take up loans. Again, in conjunction with the reference effect and diminishing sensitivity, debt aversion due to mental accounting will be greater for students from disadvantaged backgrounds.

The willingness to make use of mental accounts may also depend on the type of good or service that is being purchased. As argued in Section 4.3.6, the priority attached to higher education may be relatively low for a number of reasons: it is not regarded as a primary need, benefits only show up after graduation, students are uncertain about completing a degree and getting a job that compensates for study costs, or it is not a tangible good but rather an 'experience good'.

As such, higher education is likely to be regarded as a luxury good for which individuals may be less willing to make sacrifices through paying tuition fees, suffering foregone earnings and incurring debt.

5.2   Modelling the impact of financial incentives on student choice

This study examines the impact of financial incentives on student choice. In traditional economic perspectives (see Chapter 3) it is assumed that (prospective) students make rational cost-benefit analyses of all monetary (and non-monetary) consequences related to schooling decisions. As long as the benefits exceed the costs, they will undertake education investments.

However, as shown in chapter 2, the actual effects of financial incentives are found to be limited and non-monetary factors are often found to be of greater importance for explaining student choice. Financial factors only appear to be important for lower-SES students, and these students appear to be debt averse. A potential explanation for the unclear relationships between financial incentives and student choice can be that (prospective) students lack full information, have biased information, or do not use the information available for study choices (Christie and Munro, 2003; Meijers, 1995). In addition, students face uncertainty about getting a degree and about one's future labour market position and income.

As discussed in Chapter 4 and in the previous section, behavioural economics offers a framework for addressing a number of the complexities surrounding student choice. In the behavioural economic approach, the long-standing concept of "bounded rationality" is tied to the subjective interpretation students derive from the (limited) information about enrolment decisions. The psychological phenomena used in behavioural economics help explain why students with different background characteristics react differently to financial incentives when making study related decisions and why low-SES students appear to be debt averse even in cases where student loans have very favourable repayment conditions. Behavioural economics also suggests that individuals use a "mental framework" in making decisions where uncertainty is involved. With regard to students, this mental framework is particularly driven by psychological phenomena that surround student choice situations (discussed in the previous section). This mental framework affects students' evaluations of the costs and

benefits of higher education, resulting in *students' perceptions* of financial incentives related to student choice.

The final step in the argumentation is that the mental framework differs from person to person. It, and thus the perceptions of financial incentives, is influenced by a number of individuals' background characteristics that determine their reference levels and extent to which they are sensitive to psychological phenomena like loss aversion, diminishing sensitivity, intertemporal choice effects and mental accounting. Thus the relationships between financial incentives and student choice are conditioned by the mental framework, which produces perceptions of financial incentives. These perceptions act as intermediary variables in the process leading up to an individual's education decisions. The model is pictured in Figure 5.1. It primarily focuses on the most important variables for understanding students' price-responsiveness in a behavioural economic context. Other potential relationships have been integrated into the model with dashed lines.

Figure 5.1: The financial perceptions model of student choice[39]
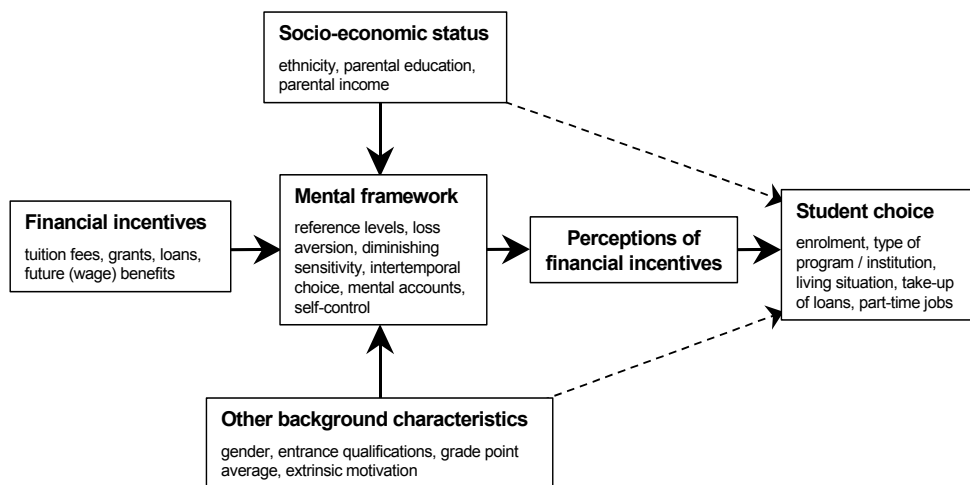
The model shows the theoretical argument that students' background characteristics are processed through individual mental frameworks and lead to perceptions of financial incentives that finally result in study related choices.

The major observation that can be derived from this model is that financial incentives do not have a direct influence on student choice but primarily work indirectly through students' mental framework.

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[39]   Note that the figure only includes variables used in the current study, but it could be extended with other variables.

Background characteristics are likely to influence the mental framework, and thus students' perceptions. For example, parents' income, education and occupation all colour students' perceptions of financial incentives related to study. In contrast to the conclusion of traditional college choice research that background characteristics are much more important than financial factors, the model here assumes that background characteristics indirectly influence the impact of financial incentives.

This model also distinguishes between two different relationships: the process in which objective financial incentives are transformed into subjective perceptions of these incentives, and the relationship between these perceptions and actual study related choices. The first relationship looks at the outcomes of the mental processes that take place as measured by students' perceptions of financial issues.[40] It focuses on whether the suggested behavioural economic concepts are at work. The second relationship refers to whether different perceptions of financial incentives (generated by the mental framework in conjunction with background characteristics) actually lead to differences in the actual choices students make.

A final observation based on Figure 5.1 is that the variables all work at the *individual* level. Regardless of the fact that the financial incentives may be similar for entire cohorts of students, individuals are confronted with individualised financial aid packages. In addition, behavioural economics suggests that all students have different views on costs and benefits because all have a different mix of SES variables. Therefore, the relationships between the different variables in the model here will need to be tested by using individual student data.

Because the behavioural economic concepts discussed above are closely related to each other and in some cases (partly) overlap, a more condensed version of a behavioural economic approach to student choice is laid out below.

5.3   An integrated behavioural economics approach of student choice

The impact of financial incentives on student choice from a behavioural economic perspective is mainly related to notions of imperfect information, uncertainty, and risk aversion. It is about whether and to what extent students use the information available to them, how they interpret information, how they judge uncertainties related to studying, to what extent they are risk averse, and to what extent they would like to insure themselves against perceived uncertainty and risk.

The focus of this section is on how behavioural economics can be operationalised for empirical analysis on student choice. Following Figure 5.1, the theoretical model addresses two types of relationships: the relationships between

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40   In a new field called "neuroenomics" people are exposed to economic problems wile getting a brain-scan to understand how individuals compute during their tasks (see: Mind games, in *The Economics*, January 13th 2005).

students' socio-economic background and their perceptions of financial instruments, and the relationships between background characteristics, financial perceptions and students' actual study-related choices. Therefore we also use a two-staged approach for analysing student choice.[41]

The following subsections present an integrated approach of analysing student choice under both relationships and clustered around groups of relevant behavioural economic phenomena. The description leads to potential hypotheses for each cluster.[42]

5.3.1   Stage 1: Socio-economic status and students' perceptions

The first stage of the analysis, the relationship between students' background characteristics and their perceptions of financial incentives adds an intermediary step to traditional economic research.

Costs, benefits and risks: loss aversion, reference levels and diminishing sensitivity

Loss aversion tells us that the marginal disutility of study-related costs exceeds the marginal utility attached to an equal amount of benefits. As a result, students' perceptions of the costs and benefits are expected to be biased. Reference levels suggest that students evaluate financial incentives on the basis of their current (income) position. Study costs (e.g., tuition fees) are thus being perceived as larger by poor students compared to others. Moreover, students from low-SES groups are less likely to have peers who attended higher education, which reduces their likelihood of attending as well. The income level of the peers of low-SES students leads them to underestimate the future benefits of higher education. The concept of diminishing sensitivity indicates that tuition fees and student support loom larger for poorer students than for richer ones. The same arguments can be used to explain why females perceive higher education as more expensive and risky than male students. Based on these notions a number of potential hypotheses that could be tested empirically are formulated.

Potential hypotheses

- Students from low socio-economic status groups are more likely to regard tuition fees as expensive than high-SES students;
- Low-SES students are more likely to regard grants as important compared to high-SES students;

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[41] In both stages we will control for "other variables" that are found to be very important in student choice: gender, qualifications, study achievements, and motivation.

[42] The potential hypotheses formulated are not an exhaustive list. In addition, some of them may also be explained with the traditional economic models.

- Low-SES students are more likely to regard the system of student support as insufficient than high-SES students;
- Low-SES students are more likely to regard higher education as a risky investment than high-SES-students;
- High-SES students will find higher education participation more "normal" (or socially expected) than low-SES students;
- Female students are more likely to regard higher education as more risky than male students;
- Students in later years of their study regard tuition fees as less expensive than students in earlier stages of study;
- Better academically prepared students (in terms of entrance qualifications and achievements) regard higher education as less risky than less prepared students;

Future gains and investment: intertemporal choice, self-control and loss aversion

Intertemporal choice suggests that students put higher emphasis on short-run costs and benefits than on long-run ones. More specifically, students underestimate the future benefits of higher education. These attitudes are strengthened by loss aversion; students overestimate the costs and risks and underestimate the (future) benefits of a higher education investment. Based on the ideas of reference levels and diminishing sensitivity, the underestimation of future benefits and the reduced willingness to borrow is stronger for students from lower socio-economic groups and for students with lower academic abilities than for other students. However, when students get in the later stages of their studies, they receive better information about their lifetime income position and thus are more willing to borrow. These factors give rise to a number of potential hypotheses.

Potential hypotheses

- Low-SES students have lower future income expectations than high-SES-students;
- Less academically prepared students have lower future income expectations than better-prepared students;
- Low-SES students are more debt averse than high-SES students;
- Female students are more debt averse than male students;
- Students in later years of their study are more willing to borrow than students in the early stage of study;
- Low-SES students are more likely to perceive part-time work as attractive than high-SES students;

5.3.2   Stage 2: SES, students' perceptions and actual choice

The second set of hypotheses addresses the relationship between student background characteristics, their perceptions of financial incentives and students' actual choices. Again, the hypotheses are clustered around the relevant behavioural economic phenomena.

Costs and subsidies: loss aversion, reference levels and diminishing sensitivity

Loss aversion tells us that students give more weight to negative impact of tuition fees (and other costs) than to the positive impact of grants (and future gains). The concept of reference levels suggests that study costs (e.g. tuition fees), but also grants, are perceived as larger by poor students than by others. Therefore poor students are more likely to try to reduce costs. Lower educational attainment and income levels of students' peers from low socio-economic backgrounds reduces their likelihood of attending higher education. On top of that, diminishing sensitivity indicates that the marginal (dis)utility of tuition fees and grants is lower for affluent students than for poor students.

  Though in a human capital model the differences between different SES groups may also be existent due to liquidity constraints, these are expected to be much stronger in a behavioural economic perspective because of the additional psychological phenomena not accounted for in the human capital model (particularly reference levels and loss aversion).

  The expectations based on these notions are reflected in the following potential hypotheses.

Potential hypotheses

- Low-SES students are more strongly deterred by tuition fees and more strongly attracted to grants than high-SES students;
- Low-SES students are more likely to live with their parents than high-SES students;
- Low-SES students are more likely to select higher education institutions that are close to their parents' home than high-SES students;
- If tuition fees differ across programs (or institutions), low-SES students more frequently enrol in low-tuition programs than high SES-students;
- Relative to high-SES students, low-SES students are less likely to attend institutions that combine high tuition fees with high levels of student support than institutions that use a low-tuition-low-aid strategy;
- Enrolment patterns that changed after a substantial net price increase of higher education for individual students will re-establish after a few years.

Student loans and part-time work: intertemporal choice, self-control, loss aversion and mental accounting

Intertemporal choice suggests that students underestimate the future benefits of higher education. Vice versa, by overestimating present cost and benefits, students are attracted to the immediate gratifications of part-time work during study even when this leads to a longer study duration of and reduces lifetime earnings. These attitudes are strengthened by loss aversion (overestimating costs and underestimating benefits). Therefore, students generally should be reluctant to take up student loans. The claim that students prefer part-time jobs over loans is sustained by the phenomenon of self-control, which predicts that students are likely to restrict their (future) costs and the risk of not being able to repay their debt even if it reduces their lifetime income. The preference for part-time jobs during study is further reinforced by the mental accounting device; students dislike using part of their future income, which borrowing essentially is. Finally, reference levels and diminishing sensitivity suggest that the above-mentioned reactions are stronger for low-SES students than for high-SES students. Expectations about student behaviour based on intertemporal choice, loss aversion, self-control and mental accounting lead to the following hypotheses about taking up of loans and work study.

Potential hypotheses

- Low-SES students are less likely to take up student loans than high-SES students;
- Low-SES students are more likely to be involved in part-time jobs while studying than high-SES students;
- Female students are more likely to be involved in part-time jobs while studying than high-SES students;
- Mature students are more likely to take up student loans than students in the early stage of their study program;
- Students in study programs that offer higher future income prospects are more likely to take up student loans than students in study programs with relatively poor future earning perspectives;
- Students are more likely to take up student loans under income contingent repayment conditions than under a mortgage-type repayment system;

Duration of study and perceived difficulty of programs: loss aversion and self-control

Together loss aversion and self-control suggest that students limit risks and future costs. Again, the reference effect and diminishing sensitivity indicate that these effects are stronger for low-SES students than for other students. Therefore low-SES students are more likely to limit the costs and risks of investing in higher education. With regard to program choice, low-SES students will be more likely

to enrol in programs with a short duration or that are perceived as easier or faster to complete. Furthermore, low-SES students will show more study progress than high-SES students. This leads to the following potential hypotheses.

Potential hypotheses

- Compared to high-SES students, low-SES students are more likely to enrol in study programs with a relatively short duration and programs that are perceived as less difficult;
- Low-SES students complete their degree in a shorter time than high-SES students;
- Female students are more likely than male students to choose study programs with a relatively short duration and programs that are perceived as less difficult;
- Female students complete their degree in a shorter time than male students;
- Compared to non-borrowing students, students taking up loans are more likely to attend study programs with a relatively short duration and programs that are perceived as relatively easy.

5.4   Selection of hypotheses

Time, data availability and relevance constraints make it impossible to test all of the hypotheses formulated in the previous sections. Therefore a limited number of hypotheses have been selected that will be empirically tested based on the theoretical model. The following criteria have been used for this selection:

1 *The scope of the study*: The scope of the empirical study is limited to the Netherlands. This situation is interesting for analysis particularly because Dutch students are exposed to many different financial incentives including tuition fees, grants, loans and opportunities for part-time work study. However, because Dutch students pay a flat rate tuition fee[43], no hypotheses involving situations of differential tuition fees can be tested.

2 *Availability of data and variables*: Data for the study come from an existing database (see Chapter 6). Because it was not possible to develop a unique survey and conduct fieldwork, the number and type of variables and hypotheses being addressed is limited. For example, there is no longitudinal data providing information on succeeding stages in the college choice process.

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[43]   Except for relatively small groups of part-time students and students who ran out of their student support entitlements.

3 *Clearness and reliability of variables*: In light of the variables available, do these actually provide suitable preciseness for what needs to be measured in this study? Questions asked in the survey should lead to answers that can be readily interpreted and that minimise response bias.

4 *Equal distribution and good coverage*: The theoretical framework focuses on two types of relationships: that between background characteristics and student perceptions of financial incentives, and that between these perceptions and the actual study-related choices students make. Therefore, the hypotheses need to address both relationships. The hypotheses should at least cover a few elements of the expected relationships.

5 *Uniqueness for testing the behavioural economic theory*: Maybe the most important criterion for selecting hypotheses is that they derive from the behavioural economic approach. They have to address situations in which theories based on the rationality premise, like human capital theory, would predict other outcomes.

6 *Focus on socio-economic background of students*: The central research question focuses on the differences between students from different socio-economic backgrounds. As a result, the selected hypotheses also primarily must distinguish between students from different SES groups. Because other background characteristics (e.g., gender or motivation) may also influence students' perceptions and actual choices, they too will need to be incorporated into such background characteristics.

Based on the criteria above and the information and variables available in the selected database, a limited number of hypotheses have been selected that address the relationships between the socio-economic status of students, their perceptions of financial incentives and the actual study-related choices made. Because the heart of this study is to explore whether students' perceptions of finances form an intermediary filter between background characteristics and choices, there are two stages in testing these relationships and thus results in two sets of hypotheses. The first set of five hypotheses addresses the relationship between students' socio-economic background characteristics and the perceptions they have about financial incentives.

Hypothesis 1:   Students from low socio-economic status groups are more likely to perceive higher education as a risky investment than high-SES students.

Hypothesis 2:   Students from low socio-economic status groups are more likely to be deterred by tuition increases or attracted to tuition decreases than students from high-SES groups.

Hypothesis 3:   Students from low socio-economic status groups are more attracted to grants or scholarships than high-SES students.

Hypothesis 4:   Students from low socio-economic status groups have lower future income expectations than high-SES-students.

Hypothesis 5:   The maximum amount that students are willing to borrow for investing in higher education is lower for low socio-economic students than for high-SES students.

The second set of hypotheses relates to the relationships between students' socio-economic background characteristics and actual choices made. Note that students' perceptions of financial incentives play an intermediary role here.

Hypothesis 6:   Students from low socio-economic groups are more likely to live with their parents than high-SES students.

Hypothesis 7:   Students from low socio-economic groups are less likely to take up student loans than high-SES students.

Hypothesis 8:   Students from low socio-economic groups are more involved in part-time jobs while studying than high-SES students.

Hypothesis 9:   Students from low socio-economic groups are more likely to attend higher education programs with a relatively short duration and programs that are perceived as less difficult than high-SES students.

Hypothesis 10: Students taking up loans are more likely to attend higher education programs with a relatively short duration and programs that are perceived as less difficult than students who do not take up student loans.

5.5   Conclusions

This chapter applied behavioural economics concepts to the case of student choice with an emphasis on the role financial incentives play in this relationship. It was argued that individual students view the financial incentives involved in study-related choices from the perspective of their individual background characteristics, including gender, socio-economic status, ethnicity, academic ability, motivation and religion. These background characteristics form the basis for students' individual mental frameworks through which they interpret and value the financial incentives related to study choices. The mental framework encompasses several distinctive behavioural economic phenomena like reference levels, loss aversion, and intertemporal choice, and results in the perceptions students have of financial incentives related to studying. Other things being equal, students make their choices based on their (biased) perceptions of (objective) financial incentives as was showed in Figure 5.1.

Figure 5.1 indicates that empirically testing the theoretical model requires two separate stages. The first stage looks at whether behavioural economic concepts really are at work in the area of student choice. Do students with different background characteristics hold different perceptions of financial incentives where rational choice theory does not expect/explain such differences? The second stage looks at whether differences in perceptions of financial incentives also lead to differences in actual student choices. For both stages a set of hypotheses have been formulated.

The next chapters (Chapters 6 and 7) present the research design for the empirical analysis of the study.

6 Research design: population and operationalisation

This chapter deals with preparing the empirically tests of the theoretical framework developed in the previous chapter. Section 6.1 discusses the population of this study. Section 6.2 deals with the selection of a database with survey information on individual students. Section 6.3 addresses the operationalisation of the hypotheses through specific variables.

6.1 Research population

The subject of this study is whether and how choices of students from different SES backgrounds are influenced by financial instruments. Student choices with regard to their education are made at the individual level and thus require appropriately disaggregated data. Like with most social science studies, it is aimed to generalise the findings of the study to aggregated levels of groups: *in casu* groups of higher education students, particularly distinguished by socio-economic background. Variables indicating background characteristics can be measured at the individual level as can students' perceptions and various choices. Indeed the behavioural economic approach often focuses on choices under uncertainty at the individual level.

As briefly indicated in Section 5.4, the empirical analysis for this study focuses on one country: the Netherlands. For applying behavioural economic concepts to student choice, the Dutch case provides a manageable and interesting case. Students pay flat rate tuition fees, most are eligible for basic grants, about one-third of the students receive supplementary means-tested grants (based on parental income), and practically all students qualify for student loans with favourable repayment conditions. In addition, the majority of students (about 80%) is involved in part-time jobs. Since the Dutch higher education system is relatively small, there is a high level of transparency (and uniformity) with regard to the quality of degrees and entrance requirements. Furthermore, entrance into higher education is open to anyone qualified, with the exception of a few specific programs like medicine, dentistry and architecture.

While it would be interesting to extend this such a study to more countries that would complicate this study because of difficulties in collecting similar data in multiple countries, which would require to control for unobservable country specific contexts and cultures. Interpreting and comparing the results from different countries for example needs to reckon with differences in educational structures, in student support and tuition fee regimes. All of this would require a

very labour intensive effort that lies outside the possibilities of the current study. The final chapter adds an international dimension in the conclusions and reflections.

6.2   The database

It is clear that the empirical testing of the model put forth in the previous chapter requires individual student level data. As a rule such data is not readily available because objective information about student choices, student support (entitlements and take-up), personal characteristics and family background is not collected in a single national database. Connecting various databases containing bits of the objective individualised data is often not possible (or legally allowed).

The most appropriate and efficient way of collecting such data is to survey the objects of study (Schreuder Peters, 2000). Questionnaires are often used in student choice research because they provide a lot of information in a relatively short timeframe. Surveys require substantial samples from the target population for making reliable generalisations. Moreover, the formulation of questions can already influence respondents' answers.

Setting up a survey requires substantial investments in design, database development, money and time. There already are a number of student surveys in the Netherlands. For these reasons, and not to duplicate work already done, this study draws upon the data from an existing database with survey data on Dutch students. Though secondary analysis of existing data may not allow a perfect match between the questions posed in the survey and our own research questions, existing survey data provides an extensive and satisfactory source of information for a first exploration of behavioural economics applicability for studying the relationship between socio-economic background, financial instruments and student choice.

There is a range of recent survey databases available on student choice in the Netherlands. Ideally, the study here requires longitudinal data that follow (prospective) students through the successive stages in the educational decision-making process, including entering higher education (or not), persisting, graduating and finally employment. There is one such panel study available in the Netherlands called Continuing to Study (*Verder Studeren*, De Jong *et al.*, 1997), but it contains only limited information on students' perceptions of financial incentives and therefore cannot be used for this study. Instead this study uses cross-sectional data.

In selecting a cross-sectional database a number of criteria were employed. The current study requires data on students' (socio-economic) background characteristics, perceptions of financial incentives, and the study-related choices made at different stages (e.g., with relation to the choice of a program, their living situation, the take-up of loans and involvement in jobs while studying). Therefore

any database needs to include students rather than prospective students.[44] Another criterion relates to the potential impact of students' the socio-economic status, which is likely to be stronger for younger students. Therefore the database also needs to include information provided by new entrants.

From the four databases on student choice the survey "Determinants of participation in higher education" (*Determinanten van deelname aan het hoger onderwijs*, DHO) best met the criteria formulated above and thus is used here as well.[45]

The DHO study was carried out by SEO (Foundation for Economic Research, *Stichting voor Economisch Onderzoek*) and SCO-Kohnstamm Instituut of the University of Amsterdam. The main aims of the study were to monitor student choices that are important for participating in higher education as well as to determine what factors influence these choices and study success. The DHO survey included two panels of students who enrolled in the first year of a higher education program: the 1995 and the 1997 cohort. This study employs only the 1997 cohort data. That survey included more information concerning students' perceptions of financial incentives and the respondents entered higher education just after the introduction of the *performance-related grant* system in 1996 which imposed substantial changes on the existing student support system.[46] Because the 1997 student cohort was the first to experience the new system, it is possible to evaluate students' price-sensitivity. A more detailed description of the sample is provided in chapter 7.

6.3   Operationalisation of the hypotheses: choice of variables

The hypotheses are operationalised in specific variables for each of the two stages of the empirical analysis.

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[44]   If one is only interested on the relationship between socio-economic background and students' perceptions of financial aspects related to study choices, it would make more sense to examine prospective students.

[45]   Other databases are *Verder Studeren* (Continuing to study) a panel study between 1991-1995 (De Jong et al., 1997); the Student Monitor (*Studentenmonitor*) an annual survey on student life (Hofman et al., 2001, 2002 and 2003); and the Student Choice Monitor (*Studie Keuze Monitor*, SKM), an annual survey among secondary education pupils qualifying for higher education (Korteweg et al., 2003).

[46]   Contrary to the previous situation, the 1996 'performance-related grant' (*Prestatiebeurs*) system made that all grants – basic grants as well as supplementary means-tested grants – are awarded as initial loans instead of gifts. The conditional loans (in the first year of study) can only be converted into non-repayable grants if students pass 50% of the exams. The grant portions of succeeding years only become a gift if students complete their degree within the nominal duration of the program plus 2 years (6 or 7 years in total).

6.3.1   Phase 1: SES and students' perceptions

The dependent variables in the model capture students' perceptions of financial incentives related to study. The independent variables relevant to the first set of hypotheses are students' background characteristics as well as a number of control variables that were identified in the literature as important for determining student choice (see Chapter 2).

The dependent variables

The presentation of the variables starts with an overview of the dependent variables. For each of the hypotheses there is a single dependent variable except for hypothesis 4 which has two: expected starting salary and expected top salary. The dependent perception variables are defined as follows:

1   *Study perceived as a risky financial investment (hypothesis 1)*: This dependent variable is there to explain whether students believe investing in higher education is financially risky. Students in the DHO study used were asked this question against the background of the introduction of the performance related grant in 1996 (see footnote 46). The actual question posed to students was: "To what extent do you agree that higher education has become a risky financial investment due to the introduction of the performance-related grant?" Students could answer on a scale from 0 (not agree at all) to 10 (fully agree). The performance-related grant was a major reform in student financing that imposed greater financial responsibility on students. This makes the information gained from the question a relevant indicator of students from various backgrounds perceptions of price and risk.

2   *Sensitivity to tuition fees (hypothesis 2):* This variable addresses whether students are sensitive to tuition changes and to what extent this differs among students from various socio-economic backgrounds. Students' perceptions of tuition fees can be measured by asking them how they would react to a substantial tuition change. Because students already enrolled in higher education were not deterred by the current tuition levels one can only ask about the hypothetical impact of a tuition increase. The only data available on the impact of tuition fees on student choice in the Netherlands is found in the DHO study. Students were asked whether they would enrol in science and engineering programs if tuition fees for all other programs were raised by €450, then NLG 1000, which actually reflected an increase of almost 40% at the time.[47] In addition, students were asked whether they would enrol in science and engineering studies if tuition in these programs was *reduced* by €450, and what they would do if tuition fees were fully abolished (only) for science and

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47   From NLG 2575 to NLG 3575 per year.

engineering programs. The answers to these questions were measured on a ratio scale (0 to 10) with students indicating the likelihood of enrolling in a science and engineering program (no=0 and yes=10). The analyses here employ a composite variable that integrates the scores on all three questions.

Our analysis is limited to 328 students that had not yet enrolled in a science and engineering program but were qualified to do so based on the types of courses they took in secondary education.

3   *Importance of grants and scholarships (hypothesis 3):* This variable addresses whether students are (can be) attracted by student grants to enrol in higher education. In the DHO study this variable was operationalised by asking students whether they would have also entered higher education without student support. This is an ordinal variable having four possibilities: 1=no, 2=probably not, 3=probably yes, 4=yes.

This dependent variable can only be measured for students who actually reported to have received grants, which included 1,419 respondents. These also include 124 students who both received grants and loans.[48]

4   *Expected starting salary (hypothesis 4):* The expected starting salary after graduation is designed to measure students' expected future income. Next to measuring whether students can make accurate (realistic) estimations of their prospective income situation, this variable can indicate whether various groups of students have different expectations. In the DHO database the expected starting salary was measured as the net monthly starting salary students expect to earn in their first job after graduation. This variable was measured and reported as a continuous variable (in euros).

5   *Expected top salary (hypothesis 4):* This variable is the second proxy for students' future income expectations. This variable can particularly indicate whether students with different background characteristics have different long-run perspectives about higher education's potential benefits. In the DHO database, the expected top salary was measured as the maximum net monthly income students expect to earn at some point during their working life. This variable was measured and reported on a continuous scale (in euros).

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[48]   Although the clearest way to measure the impact of grants would be to exclude students who also take up student loans, this might distort the objective of measuring the variation between students from different socio-economic groups. Because many of the students who took up loans were from less affluent backgrounds (of the 124 students with loans, 63 reported also to receive means-tested supplementary grants), excluding them would generate bias. In addition, this group is likely to include students who really need loans for making ends meet, such as handicapped students or ethnic minority students. Finally, students generally receive higher amounts of grants than they take up as loans implying that their answers are preliminary directed at what they would do if grants were abolished.

6   Willingness to borrow (hypothesis 5): This variable indicates to what extent students
      were prepared to take up loans for covering study costs, including fees, study
      materials and living expenses. In the DHO study the willingness to borrow (or
      the maximum acceptable amount of debt to accumulate) is reported as a
      continuous variable (in euros).

The independent variables

All hypotheses are tested using the same set of independent variables. The
student choice studies discussed in Chapter 2 revealed a considerable list of
potential student characteristics, including gender, parental income, parental
education, parents' occupation, ethnicity, entrance qualification, grade point
average, motivation (extrinsic and intrinsic), peer motivation, and religion
(Hossler *et al.*, 1999). It must be mentioned that socio-economic status is often
seen as a composite of two or more of the variables "parental income", "parents'
education", "parents' occupation" and "ethnicity". For explaining student price
responsiveness as a function of socio-economic background this study
discriminates between variables that indicate the students' socio-economic status
and control variables relating to other student background characteristics that
have shown to be important in student choice literature.

Concerning students' socio-economic background, Dutch data provides
information on parental education, parental income and students' ethnicity.[49]
These variables are also included in the DHO study and were measured as
follows.

1   Parental education: Parental education is defined as the highest level of education
     obtained by either of the parents. This is particularly important here because
     educational attainment levels serve as a reference for considering children's
     educational investments (see Chapter 5). In the Dutch surveys it is measured
     by asking students: "What is the highest educational diploma or degree
     obtained by either of your parents?" The multitude of potential qualifications
     were integrated into 4 clusters.[50]

2   Parental income: Parents' income may be regarded as an important reference for
     making financial decisions. The level of parental income serves as the "status
     quo" situation for students based on which they evaluate financial incentives
     in terms of gains and losses. It also serves as a proxy for family wealth, which
     partly explains sensitivity to costs and benefits. Parental income is usually
     strongly correlated with parental education. In Dutch surveys it is measured
     by the accumulated amount of the students' parents' monthly income (after

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[49]   Parental occupation is not a commonly used variable in Dutch student choice research.
[50]   1) lower secondary education (primary education/lbo/mavo/3 years of secondary education), 2)
       upper secondary education (mbo, havo, vwo), 3) professional higher education (hbo), and 4)
       university.

taxes). This variable is available as either a continuous or discrete (in income-brackets) variable.[51]

3 *Ethnicity*: The ethnicity variable groups students into different ethnic groups a student belongs. It often is strongly related to individuals' socio-economic class. In western societies individuals from ethnic minorities often work in lower-ranked positions and they often have problems to integrate in society. This becomes explicit through educational participation patterns. On average, ethnic minorities are strongly underrepresented in higher sectors of education systems.

In the Dutch databases ethnicity is measured by (one of the) parents' country of birth. Those whose parents are born in the Netherlands are called autochthon (*autochtoon*), those whose parents are born outside the Netherlands are called allochtonous (*allochtoon*). This means that only first- and second-generation foreigners are regarded as allochtonous (see CBS, 2005). For addressing cultural issues in Dutch societies, a distinction is made between foreigners from Western countries (*Western allochtonous individuals*) and those from non-western countries (*non-Western allochtonous individuals*). The latter group is generally treated as the ethnic minority group. This study uses the term allochtonous students to denote students of whom at least one parent is non-Western allochtonous. This implies that in our definition autochthon students include native students and foreigners with Western nationalities, such as those from Europe, Australia, Canada and the U.S. Generally about 53% of the allochtonous are foreign students from non-Western countries. The variable is dichotomous.

The second category of independent variables consists of a number of control variables and they are important because they make it possible to control for a number of extraneous factors that have proven to be important in prior student choice research. Within the Dutch context, the most obvious control variables to integrate are gender, entrance qualification, grade point average and extrinsic motivation (see Chapter 2). How these have been defined and measured in the DHO survey is elaborated below.

4 *Gender:* It is known from psychology and other research that males and females not only behave differently but also hold different opinions, attitudes and feelings, hence one can also expect gender to be an important variable in studying students' perceptions of financial incentives.[52]

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[51] With respect to the income level of parents, Dutch databases normally use the following six income brackets for this purpose: < €700, €700 - €1400, €1401 - €2100, €2101 - €2800, €2801 - €3500, > €3500.

[52] The private rate of return to higher education in many countries, including the Netherlands, is often found to be higher for females than for males because female graduates relatively earn much more than non-graduates (Blöndal et al., 2002).

5   *Entrance qualification:* The entrance qualification with which students enter higher education provides an indication of their academic ability. It is expected that students with different entrance qualifications will hold different perceptions of financial incentives and may attach different risks to obtaining a degree and a job afterwards.

In the Netherlands it is possible to enter higher education with a number of entrance qualifications. The *general upper secondary diploma* (HAVO) after five years of general secondary education allows students to enter higher professional education institutions (HBO). The *pre-university diploma* (VWO) allows students after six years of general upper secondary education to enter university (or a HBO-institution). The VWO-diploma is regarded as a higher level qualification than the HAVO-diploma. Students may also be admitted to a HBO-institution by having a *vocational secondary education* (MBO) *diploma* in the same area of study. In addition, students may enter Dutch higher education with foreign qualifications that are officially recognised as being equal to Dutch entrance qualifications. Some students may enter higher education with a "*colloquium doctum*" that, based on an entrance interview and/or examination, demonstrates if their working- and life-experiences qualify them to enter a particular higher education program. Finally, students can enter higher education programs on the basis of previous higher education experiences, either being a full (Bachelor or Master) degree or a *propedeutic* diploma (received after successful completion of a first year of study).

All in all, there are six potential qualifications to enter Dutch higher education: HAVO, VWO, MBO, previous higher education, foreign degrees or *colloquium doctum*. In order to secure a more homogeneous sample, students with foreign entrance qualifications and those with previous higher education experiences were excluded from our sample. As a result, the variable entrance qualification includes 4 categories: HAVO, MBO, VWO and max- MAVO *(colloquium doctum).*

6   *Grade point average:* This variable captures students' average grades in secondary education examinations and again provides insight into students' academic ability. Grade point average is likely to influence students' confidence about whether they are capable of completing a program.

Grade point average (GPA) in the survey is calculated as the average examination scores in secondary education on a scale from 0 (lowest) to 10 (excellent). Students require an average of at least 5.5 to obtain a degree.[53]

7   *Extrinsic motivation:* Extrinsic motivation measures the extent to which students believe a higher education degree to be important for getting a well paying prestigious job, providing leadership, power, satisfaction and work-

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[53]   In practice, students can report lower GPA scores than 5.5 if they report their most recent final examination results, while they already had another qualifying diploma.

autonomy.[54] Students who have a high extrinsic motivation are likely to be unresponsive to financial incentives because they really would like to get a degree for realising their ambitions. This variable is measured as a continuous variable ranging from 0 (lowest) to 10 (highest).

A number of background variables sometimes encountered in student choice research are *not* included in this analysis. A brief explanation of why these variables have not been included is provided below:

Parents' occupation: Parents' occupation concerns the highest level of working positions occupied by one of the student's parents. Dutch surveys generally do not include such information. In addition, this measure is expected to be highly correlated with parental income and parental education.

Peer motivation: Peer motivation is the extent to which peers (parents, relatives, friends or teachers) stimulate a student to enrol in higher education. There is however no suitable proxy in the Dutch surveys.

Religion: Students' religion may be an important individual background characteristic, but it is not likely to have a major impact on student choice. It also becomes a less common issue to be included in surveys.

Intrinsic motivation: Intrinsic motivation concerns the extent to which a student is driven to improve her/his knowledge and personal development for the sake of curiosity and interest in a particular field of study. One could argue that individuals with a high intrinsic motivation are probably not responsive to financial incentives, because they are highly motivated and want to develop their knowledge and skills in a particular area. However, students with high intrinsic motivation can *also* be argued to be the ones who study irrespective of future returns. Therefore, they may consider tuition and loans as unfair and deterring elements to higher education access. This duality makes it a difficult variable to include in the analyses. What is more, almost all students score very high on intrinsic motivation variables in surveys, showing only minor variation. This would not add much to the explanation of variance in price-responsiveness behaviour.

6.3.2   Phase 2: SES, students' perceptions and choices

The same independent variables as above are used to test the second set of hypotheses about the relationships between students' socio-economic background, their perceptions of financial incentives, and their actual study-related choices. Both the independent and dependent variables of the first phase of the empirical analysis will serve as independent variables in the second phase. As a result, the independent variables in the second phase include the socio-economic background variables (parental education, parental income and

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[54]   Intrinsically motivated students pursue higher education because they are interested in the subject and like to study.

ethnicity), the control variables (gender, entrance qualification, grade point average and extrinsic motivation), as well as the perception variables (study perceived as a financial risky investment, tuition sensitivity, importance of grants, expected future income and willingness to borrow). These variables are all measured according to the same definitions and techniques employed for the first set of hypotheses. Only for Hypothesis 10, which states that students who take up loans are likely to attend shorter and easier study programs, is an extra independent variable added: taking up loans (yes or no).

The hypotheses that explore whether differences in socio-economic background and perceptions of financial incentives result in differences in the actual choices students make relate to the following dependent variables:

1   *Living status of students (hypothesis 6):* Students' living situations can take many forms. They can live with their parents, with other relatives, in lodges, in a student apartment/flat or on their own. Although the DHO survey asked students to indicate their living situation in terms of one of these five options, all responses were clustered into two major categories: students living at home (with their parents) and students living away from home. This makes a distinction between students that are under direct and less direct influence of their parents, which is regarded as the most relevant distinction from the perspective of the current study.

2   *Taking up loans (hypothesis 7):* The first indicator to measure whether lower-SES students are less likely to borrow than high-SES students is whether students take up student loans. This is a dichotomous variable (yes or no). Implicitly, it measures whether students are prepared to incur student debt and to make a long-run financial investment in higher education. Because student loans can be taken up voluntarily in the Netherlands, it can be argued that the take-up of loans indicates potentially different perceptions and attitudes between students from various backgrounds.[55]

3   *Amount of loans (hypothesis 7):* Because the take-up of voluntary student loans is influenced by the need for money, a second variable is employed to measure the loan take-up behaviour of various groups of students. This variable concerns the monthly amount of loans students took up through the public student loans mechanism. The amount taken up is measured as a continuous variable, ranging from €45 to €350. For reasons of convenience, in some of the analyses the variable is clustered into two categories: low amounts of loans (up to €135 per month) and high amounts of loans (larger than €135 per month). This cut-off point is a natural distinction in the frequency distribution.

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[55]   It can also be argued that students from lower-income families may have a greater financial need to make use of the voluntary loans option (liquidity constraints). If loans are not that "voluntary" for these students, it may be likely that poorer students are overrepresented in the group of students taking up loans.

4   *Having a part-time job (hypothesis 8):* Students can substitute taking up loans with earnings from paid work. The first measure to test whether low-SES students are more involved in part-time work than high-SES students is to evaluate which is group more likely to hold (part-time) paid jobs. This variable is measured in the DHO survey by the question of whether students had paid work at the time the survey was completed (during term time).

5   *Job earnings (hypothesis 8):* The second measure of involvement in part-time work is the amount students earn through paid work. Because lower-income students are expected to have a greater need to substitute parental contributions or student loans (e.g. because they are more risk averse), lower-SES students should secure more funding through paid work than high-SES students. In the DHO survey, students were asked about their monthly net earnings from paid work (measured as a continuous variable). The values ranged from €4 to €2,085. Because the large variance in reported earnings, these were clustered into three brackets for some of the analyses: low ($\leq$ €91), medium (€91 < x $\leq$ €182), and high (> €182).

6   *Hours worked (hypothesis 8):* The third way of measuring job-involvement is through the number of hours per week students spend on paid work. Again lower-SES students should work more hours than higher-SES students. In the DHO survey students were asked indicate how many hours per week they spent on paid work. This variable was measured as a continuous variable, with responses ranging from one to 70 hours per week. These values were clustered into three brackets for some of the analyses: low ($\leq$ 8 hours), medium (9 $\leq$ x $\leq$ 13 hours), and high (> 13 hours).

7   *Type of institution (hypotheses 9 & 10):* Hypotheses 9 and 10 indicate that lower-SES students and those taking up student loans are more likely to choose shorter and easier to complete study programs. The first way to test these hypotheses is to look at the type of institution students attend. In Dutch higher education, students with a pre-university qualification can choose between universities or professional higher education institutions (HBO's).[56] Until the bachelor master structure was introduced in 2003, programs at both universities and HBO-institutions took normatively four years to complete. But HBO-programs are generally perceived to be less rigorous than university programs and in most cases also take a shorter actual time to complete (on average 4.5 years in HBO-programs as compared to about 6 years for a university degree in 1997).

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[56]   Students with a general upper secondary education qualification (HAVO) can only enter HBO-institutions. Therefore, these hypotheses can only be tested for students with a pre-university qualification.

8   *Science & engineering (hypotheses 9 & 10):* The second way of testing Hypotheses 9
    and 10 is to relate all independent variables to the discipline students choose
    to study, making a distinctions between science and engineering programs
    versus other programs. The former programs are generally regarded as more
    difficult than other programs, and at university level also take an additional
    year of study.[57] This variable is measured dichotomously (science and
    engineering or other programs).

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[57]   Medical programs are not included in the category of "difficult programs" because participation
       in these programs is traditionally strongly socially determined.

7 Research design: statistical methods and sample description

This chapter discusses the statistical methods used and the description of the sample employed for the empirical analyses. The statistical methods to be used depend on the type of relationships being tested. Section 7.1 outlines a model that makes explicit all hypothesised relationships between students' socio-economic status, financial perceptions and actual study-related choices. Section 7.2 discusses the most relevant statistical methods to test the relationships and the survey data used. Section 7.3 describes the sample selected for the empirical part of this study.

7.1 Modelling the hypothesised relationships

The structure of all hypotheses formulated in Chapter 5 is essentially the same. In the first set of hypotheses, addressing the relationships between socio-economic background characteristics and students' perceptions of financial incentives, the dependent variables are explained by a number of SES and control variables. The model takes the following form:

$$SP = \alpha + \beta_1 BC_1 + \beta_2 BC_2 + \cdots + \beta_n BC_n + \varepsilon$$

where SP refers to the students' perceptions of particular financial incentives and BC_i addresses the ith background characteristic of each student. Furthermore, β_i is the parameter to be estimated for the ith background characteristic and ε a normally distributed the random disturbance term.[58]

The actual model estimated for students' perceptions of financial incentives is:

$$SP = \alpha + \beta_1 PE + \beta_2 PI + \beta_3 ET + \beta_4 G + \beta_5 EQ + \beta_6 GPA + \beta_7 EM + \varepsilon$$

In this model, the dependent variable "student perception" is determined by the independent variables:

PE = Parental education
PI = Parental income

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[58] ε reflects that individual scores at a given level of the independent variables may differ from the expected mean due to random influences and the effects of variables not included in the model. The mean of ε is expected to be zero.

ET   = Ethnicity
G   = Gender
EQ   = Entrance qualification
GPA = Grade point average
EM   = Extrinsic motivation

The expectation is that all betas except β_3 and β_4 will have positive signs. That implies that higher levels of parental education (PE), parental income (PI), entrance qualifications (EQ), grade point average (GPA), and extrinsic motivation (EM) will lead to more positive perceptions of financial instruments. The greater the magnitude of the coefficients, the less likely the average student will perceive higher education as risky, more likely to accept higher tuition levels and debt ratios, and more likely to expect higher levels of future earnings. However they are expected to be less attracted by scholarships. The other parameters, ethnicity (ET) and gender (G), are expected to be negative. Ethnic minority students and females students are expected to have less positive perceptions of financial incentives, though they are more likely to be attracted by scholarships.

The model for the second set of hypotheses follows the same pattern. The dependent variables are students' actual choices (*SC*), including living situation, taking up loans, involvement in jobs and the type of institution or program attended. In addition, the perception variables – the dependent variables in the first phase – are now used as independent (intermediary) variables to explain students' choices. The perception variables are:

FR   = study perceived as a financial risk
TI   = tuition incentive
IG   = importance of grants
SS   = expected starting salary
TS   = expected top salary
WB   = willingness to borrow

Altogether this leads to the following basic model:

$$SC = \alpha + \beta_1 PE + \beta_2 PI + \beta_3 ET + \beta_4 G + \beta_5 EQ + \beta_6 GPA + \beta_7 EM$$
$$+ \beta_8 FR + \beta_9 TI + \beta_{10} IG + \beta_{11} SS + \beta_{12} MS + \beta_{13} WB + \varepsilon$$

7.1.1   *Potential relationships among the independent variables*

Looking at the independent variables, some are expected to be interrelated. This multicollinearity may lead to disturbances in estimating the betas. Below is a brief discussion about the three forms these interrelationships among the independent

variables can take and how they can influence the statistical analyses: covariance, interaction, and causality (Saris and Stronkhorst, 1984).

Covariance

Covariance is the tendency that high scores for one variable are often accompanied by high scores for another variable even though there is no reason to believe that the scores for the one variable influence the scores of the other.[59] Concerning the current analyses this means that if the independent variables only show *covariance* in their relationships, thus without impacting on each other, we could include all variables in a regression model without fears for multicollinearity.

Interaction

Interactions between variables may not only be *additive* to each other but also *multiplicative*. That means that the simultaneous presence of two variables will alleviate or reinforce the individual effects of the variables. Thus the movement in one variable may statistically differ for different categories of a dummy variable. For example, the mean clothing expenditure can significantly vary between graduates and non-graduates. However, this difference may be statistically different between female and male graduates.

Where interactions occur it is necessary to include "composite variables" that are the product of the two independent variables, showing the extent to which the variable strengthen or weaken each other's effect. Though this may lead to more information about subgroups, it may take away part of the relationship between an original set of independent and dependent variables.

This study is primarily interested in the impact of socio-economic background on students' perceptions. If the interactions between background characteristics and parents' education (PE) and parental income (PI) are incorporated into the regression model it would look like the following.[60]

$$
\begin{aligned}
SP = {} & \alpha + \beta_1 PE + \beta_2 PI + \beta_3 ET + \beta_4 G + \beta_5 EQ + \beta_6 GPA + \beta_7 EM + \\
& \beta_8 PE*PI + \beta_9 PE*ET + \beta_{10} PE*EQ + \beta_{11} PE*GPA + \beta_{12} PE*EM + \\
& \beta_{13} PI*ET + \beta_{14} PI*EQ + \beta_{15} PI*GPA + \beta_{16} PI*EM + \varepsilon_1
\end{aligned}
$$

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[59] For example: though people visiting bars often smoke, one cannot say that smoking leads to bar attendance.

[60] Since it is unlikely that the gender of students is related to parents' income or education, these potential interaction terms are left out of the model.

Chapter 8 discusses which interaction terms may be expected in the model here, what the potential effects may be and whether to integrate these interaction effects in the model.

Causality

In a causal relationship, changes in one variable produce (cause) changes in another variable (effect). For example: more smoking leads to more smoke. In such cases it is possible to speak of effects instead of relationships because of certainty about the direction of the relationships (Saris and Stronkhorst, 1984).

If *causal* relationships among the independent variables are expected, these should be specified in the model. Using such a causal model has the advantage that it provides a clear indication of the direct and indirect effects of our variables on the dependent ones. Within a multivariate model this prevents one from not recognising any indirect effects of one independent variable on the dependent variable that may go via a second independent variable. As such, it provides richer information. The disadvantage is that the analyses become more complex.[61]

In the case of our model for explaining students' perceptions of financial incentives, it is possible to specify the relationships in the following way. The socio-economic status (SES) variables (parental education, parental income, and ethnicity) and gender are *exogenous* variables that are expected to have a direct impact on students' perceptions, but can also have an indirect impact through students' academic ability (or preparation in secondary education) and their motivation. For example, many studies (e.g., De Jong *et al.*, 1997 and 2001) show that high-SES pupils do better in secondary education than others. In addition they are more motivated to attend higher education, either because they are very interested in a particular subject (intrinsic motivation) or because they aim at getting a good career (extrinsic motivation). Because average grades in secondary education and students' motivation have a direct effect on students' perceptions of financial incentives it is possible to draw up a sub-model as depicted in Figure 7.1.

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[61]   Using path analysis or structural equation modelling.

Figure 7.1:   Students' background characteristics and perceptions
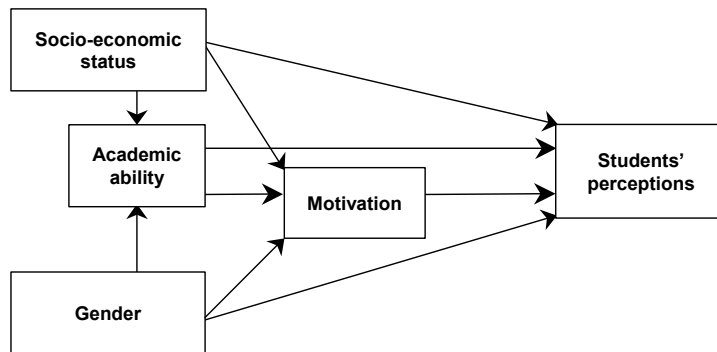
A more complex model like this, including intermediary variables such as student motivation requires more advanced statistical methods like factor analysis or structural equation modelling. The advantage of such complex methods is that it allows one to define the significant statistical outcomes in terms of both the direct and indirect effects within the model. A more elaborated model including both stages of our empirical analysis is presented in the next section when we discuss the statistical methods used in our analysis.

7.2   Statistical methods used

The empirical analysis is organised in two stages. The first stage explores the impact of students' socio-economic status on their perceptions of financial incentives, and the second stage analyses whether all of this leads to differences in actual study-related choices. Both stages follow a similar pattern in using statistical methods to analyse the data and expected relationships.

7.2.1   Step I: descriptive statistics

The sample used for this study is described on the basis of a number key variables like gender, type of higher education institution, age, mode of study, living status and student support. For each of these variables some statistics are provided: the number of observations, the relative frequency distribution over intervals, the mean scores, and the standard deviation. This sample description is presented in Section 7.3. Based on some general statistics about the Dutch higher education student population we then determine whether our sample is representative for the entire student population. A similar type of description is given for all dependent variables used in the empirical analysis.

7.2.2   Step II: bivariate variance analysis

The second step involves analysing the bivariate relationships between the individual independent and dependent variables.[62] The bivariate analysis explores whether the dependent and independent variables are related and whether these relationships are statistically significant. The bivariate analysis does not imply causal relationships. As such, bivariate analysis provides a first indication of the potential relationships. Based on the outcomes of the bivariate relationships, one option is to cancel insignificant explanatory variables from the model. However, testing the theory requires a statistical analysis of the total model including the dependent and independent variables and the potential composite effects among variables, implying that the outcomes in terms of statistically significant relationships may be different from the bivariate analysis. Therefore the outcomes of the bivariate analysis are not be used to change the model, but just to indicate whether the explanatory variables show relationships with the dependent ones that are consistent with the hypotheses.

In selecting a statistical method for the bivariate analyses, it is important to notice that most of the dependent and independent variables use a considerable variety of measurement scales (ordinal, interval and ratio). Therefore a standard crosstabs-analysis would lead to many cell-scores with a great variety. Such large crosstabs tables, however, too easily generate statistically significant Chi-square[63] scores for associations between the analysed variables. Instead a variance test is used that primarily focuses on comparing the variables' means (reducing the number of table-cells compared to the crosstabs method).

Using a variance test, there is a choice between a standard *t-test* and a composite *F-test*. The F-test is preferred because it looks at both the variance between groups and within groups, whereas the *t-test* only looks at the variance between groups. To determine the F-values for the tested relationships and their significance a One-Way ANOVA test is used. This test calculates the F-values as the Mean Squares Between Groups divided by the Mean Squares Within Groups.[64] If an ANOVA F-test is finds a statistically significant relationship between two variables this implies that the null hypothesis (H_0, no relationship between the variables) can be rejected.

Finally, the direction of the relationships has to be inferred from the patterns in the sample scores on the different intervals for the dependent and independent

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[62] Note that the term "relationship" indicates that two variables show related patterns in their values. The term "correlation" is reserved for the statistical Pearson correlation measure.

[63] The Chi-square measures to what extent the actual cell scores differ from the expected / hypothesised ones.

[64] The One-Way ANOVA is an analysis of variance between groups and within groups. The Sum of Squares Between Groups is calculated as the square of the difference between every group-mean and the overall mean multiplied by the number of cases within the group. If H_0 is true, then the sum of these squares should be zero. The Sum of Squares Within Groups is calculated as the square of the difference between each individual score and the group-mean. The Mean Squares in the One-Way ANOVA analysis is the sum of squares divided by the degrees of freedom.

variables. These results can be found in the detailed statistical tables presented in Appendices I and IV.

7.2.3   Step III: regression analysis

The next step is to test the fully specified model. This allows to determine whether all of the independent variables (together) can explain any of the variance in the dependent variable. One of the simplest ways to do this is multivariate regression analysis where one estimates or predicts the average value of a dependent variable on the basis of the values of the explanatory (independent) variables (a population regression function) (Gujarati, 1995). Such an approach may lead to different outcomes, in terms of significant relationships, than those found in the bivariate analyses.

One can distinguish between linear regression and non-linear regression models. In linear regression models parameters are always raised to the first power. In non-linear regression models one or more explanatory variables is raised to a higher power. This implies that the relationship between the dependent variable and the predictor variables *cannot* be described by a linear curve (Brightman and Schneider, 1992). Based on previous research (De Jong *et al.*, 2001), it is unnecessary to use a non-linear model.

To test the full model for each of the dependent variables, two types of regression techniques are used. For the continuous dependent variables (amount of loans, job earnings and number of working hours) a standard multiple regression model was estimated. For the other variables – with only two or three intervals – a multinominal logistical regression method is used, which is the most appropriate regression method for cases when the dependent variable takes on few interval values (Moore en McCabe, 1997).

The final step in the regression analysis is to explore whether the model outcomes are influenced by interaction effects (see Section 7.1.1). Interactions can affect the hypothesised relationships (Moore and McCabe, 1997). For example, if an increase in parental income is associated with greater students' willingness to borrow, it may be that this association is much stronger for males than for females. Here then is an (expected) interaction between parental income and students' gender. Such potential interaction effects are addressed and explored in Chapter 8 (Section 8.4).

7.2.4   Step IV: structural equation modelling

The final step is to use a more advanced technique to test a full causal model in which all direct and indirect effects are explicitly taken into account. Structural equation modelling (SEM) is a technique for exploring whether a relatively complex theoretical model, including direct and indirect relationships, fits with the dataset used to test the theory (Kelloway, 1998).

Structural equation modelling is not much different from multivariate regression analysis, but it estimates a set of multivariate equations simultaneously in an integrated model. SEM therefore does not identify other relationships than the regression models but may lead to different interpretations of effects. A SEM analysis adds to a multivariate analysis in the sense that it draws up a multi-causal model that can specify the (indirect) causal relationships between the independent variables. The relationships now can be phrased in terms of direct and indirect causal effects. This implies an additional stage to be integrated into the theoretical model drawn up in this study.

SEM-analysis provides three advantages compared to multiple regression analysis (Kelloway, 1998):

1) First, because it runs all specified equations simultaneously, it cannot hide any effects between any of the variables in the model. As a result, it shows all direct and indirect effects between the model's variables in the statistical outputs. Multiple regression analysis only shows the effects of the independent variables on the dependent ones.

2) Second, in a SEM analysis the program makes a backward check by (reversibly) calculating a correlation matrix based on the estimated structural parameters in the model specified. It then compares this new correlation matrix with the original standard correlation matrix and looks whether these fit together. This means that the program tests whether the assumed causal relationships (together) fit with the dataset being used. This not only provides an additional statistical output but also allows for fine-tuning of the statistical model applied to the data. The statistical program provides suggestions for model improvement by minimising the differences between the implied and observed correlation matrices.

3) The third advantage of SEM over multiple regression analysis is that it provides a convenient tool for building a theoretical (path) model with intermediate layers of independent variables. Because SEM is based on the idea that the theory should be able to explain or reproduce the patterns of correlations found in the empirical data. Therefore, the structural relations within a theory are depicted as a path diagram linking the variables with unidirectional arrows representing causal relationships. It is a simplified way of doing path analysis.

There are various software packages for SEM analysis of which LISREL and AMOS are the most popular. Both are equivalent and especially designed to solve sets of structural equations. In this study the AMOS package is used (Arbuckle, 1995).

Structural equation modelling requires relatively large samples. It is recommended that the ratio between sample size and estimated parameters is at least 5:1. The sample here (between 328 and 1974 observations) easily satisfies this

criterion because the model only includes 8 parameters in the first phase and 12 in the second.[65]

To estimate the relative fit of the model to the data, the SEM technique uses various indicators (Kelloway, 1998). The first is the chi-square, which is aimed to be as small as possible. A low and non-significant chi-square implies that there is no significant discrepancy between the correlation matrix implied by the theoretical model and the correlation matrix of the sample data. The chi-square is particularly important in relation to the *degrees of freedom* because a change of one degree of freedom (adding or removing one relationship to/from the model) will only improve the model if the chi-square changes by at least 3.84 (see a standard chi-square-table for 100 cases and more). The second fit-measure is the P-value (significance level). In SEM analysis, higher P-values indicate a better relative fit of the model. The third fit-measure is the RMSEA (root mean squared error of appropriation). Developed by Steiger (1990), it is based on a residual analysis where smaller values indicate a better fit with the data. Values below 0.10 indicate a good fit, values below 0.05 a very good fit and values below 0.01 an outstanding fit with the data. The fourth and final fit-measure is the NFI (normed fit index) defined by Bentler and Bonett (1980). The NFI indicates the percentage improvement in fit over the baseline independence model that assumes no relationships between the variables composing the model. In other words, a NFI of 0.9 means that the model is 90% better fitting than the *null model*. The NFI ranges from 0 to 1 with values exceeding 0.9 indicating a good fit (Kelloway, 1998).

Next to all the fit measures that indicate whether the data of the research population confirm the hypothesised relationships in the theoretical model, the SEM analysis produces a range of outputs that indicate the absolute and standardised effects between all model variables. One of the strengths of SEM-analysis is that it makes it possible to split up the *total effect* of a given independent variable into *direct* and *indirect effects*.[66] This distinction allows the researcher to draw relatively firm conclusions about the causal relationships (effects) within the model. The indirect effects basically are a multiplication of the direct effects on the indirect routes between variables. For example, it can be seen in Figure 7.2 that the indirect effect of ethnicity on grade point average occurs via parental income and via parental income and entrance qualification.

When testing a theoretical model with SEM-analysis one can use various strategies. First, one can run a SEM-analysis for the full theoretical model and see whether this fits with the data. Depending on the outcomes, the model has to be rejected or approved. The second strategy could be to start with a basic model in

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[65] For the SEM analysis in the second phase the expected future income variables (start salary and maximum salary) have been integrated for reasons of simplicity and the variable "tuition sensitivity" has been removed from the model. This is further explained in Chapter 9.

[66] Next to the direct and indirect effect, one could also distinguish joint effects, which are composite effects of various variables together. If such joint effects become significant, they should be integrated in the model as interaction effects, which is not the case in this study (see Sections 8.3 and 8.4).

which the exogenous variables are assumed to only have an indirect effect on the dependent variables (students' perceptions and actual choices).[67] This provides an optimal opportunity to reject the hypotheses that students' socio-economic background has an impact on their perceptions of financial incentives that further have an impact on the actual study-related choices they make. In this strategy, the basic model can be improved afterwards by adding any direct effects from the exogenous variables on the dependent variables. Furthermore, all insignificant relationships between endogenous, independent and dependent variables can be removed. All of these changes lead to an optimised adjusted model. This then indicates all direct and indirect effects within the model. All of this results in a basic model for the SEM analysis (Figure 7.2).

Figure 7.2:   A basic model for the structural equation analysis[68]
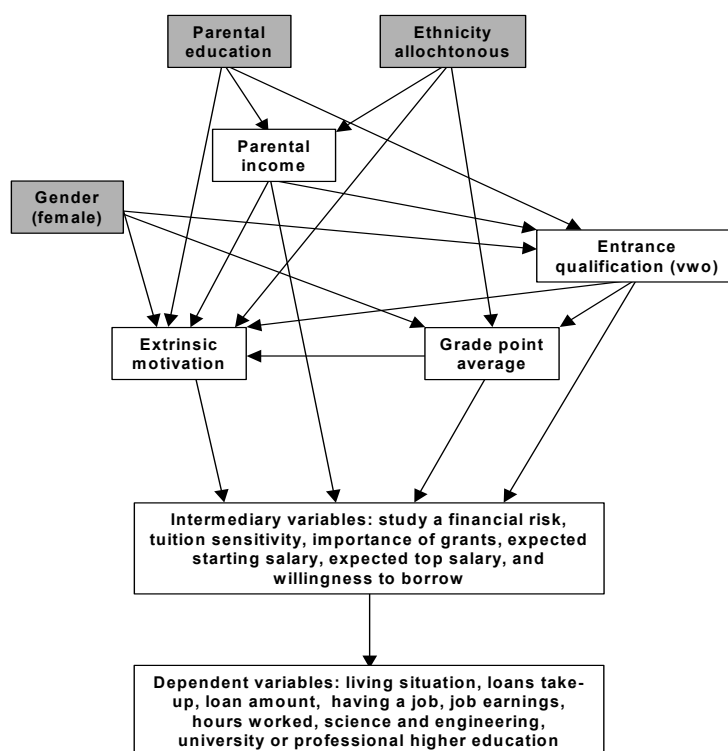
7.3 Sample description

The sample for this study is based on the "Determinants of participation in higher education" (DHO) study. The 1997 student cohort was selected because they entered higher education just after the introduction of the performance-related grant (in 1996). As discussed in Section 6.3 this arrangement implied greater financial risks for studying. Therefore one can expect this student cohort was very conscious about the costs and benefits of higher education and as a result more likely to show relatively clear signs of price sensitivity compared to other cohorts. In addition, the 1997 survey included questions that come closest to the issues addressed in the current study. This cohort thus provides a relatively good sample for testing the impact of financial incentives on student choice in the Netherlands.

To create a relatively homogeneous sample and to prevent possible other factors that may influence the relationships between socio-economic background and students' perceptions of financial incentives, the research sample includes only new entrants. Mature students are excluded from this analysis. Focusing on new entrants has the further advantage that these students have the greatest uncertainties about their (academic) abilities and future prospects.

The questionnaire consisted of two rounds in which students were surveyed in November 1997 and again in November 1998. The 1997 panel included 4,306 respondents in the first survey (2,173 from *hogescholen* and 2,133 from universities) of whom 2,708 also responded to a second survey. Only the students that filled out both questionnaires were selected, reducing the sample to 2,708 cases. The sample was further reduced to 2,598 by cancelling cases where students did not respond to the questions related to the dependent variables. Finally, the sample was restricted to students who had no previous higher education experience, which made the sample more homogeneous and reduced the sample by another 624 cases (24%) to finally 1,974 valid cases.

The sample can be described on the basis of a number of basic characteristics, including the background characteristics used as independent variables and some of the dependent variables. Table 7.1 provides this sample description showing its composition for different intervals per variable, mean scores[69] and the standard deviation.

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[69]   With regard to the mean scores, note that these scores refer to the values of the intervals for each variable, as indicated by the values in parenthesis.

Table 7.1:   Basic sample characteristics

	Intervals	Frequency	Percent	Missing	Mean	Std. dev
Gender	Male (0)	1,040	52.7		0.47	0.50
	Female (1)	934	47.3			
Type of institution	HBO (0)	971	49.2		0.51	0.50
	University (1)	1,003	50.8			
Age	16-18	1,101	56.7	30	19.00	2.86
	19/20	638	32.8			
	>21	205	10.5			
Mode of study	Fulltime (0)	1,890	96.4	13	0.04	0.19
	Part-time (1)	71	3.6			
Science &	No (0)	1,254	63.5		0.36	0.48
engineering	Yes (1)	720	36.5			
Living status	With parents (0)	1,004	51.0	6	0.49	0.50
	Away from home (1)	964	49.0			
Grants	No (0)	444	23.8	111	0.72	0.45
	Yes (1)	1,419	76.2			
Loans	No (0)	1,831	92.8		0.07	0.26
	Yes (1)	143	7.2			
Part-time job	No (0)	737	37.3		0.63	0.48
	Yes (1)	1,237	62.7			
Second. ed.	unknown/lbo/mavo (1)	36	1.8		3.44	0.76
qualification	Mbo (2)	221	11.2			
	Havo (3)	555	28.1			
	Vwo (4)	1,162	58.9			
Grade point average	up to 6,0 (1)	153	7.8		2.99	1.03
	6,1 – 6,5 (2)	491	24.9			
	6,6 – 7,0 (3)	655	33.2			
	7,1 – 8,0 (4)	574	29.1			
	8,0 and higher (5)	101	5.1			
Parental income	<1500 (1)	38	2.2	235	3.84	1.38
(in NLG)	1500-3000 (2)	261	15.0			
	3000-4500 (3)	504	29.0			
	4500-6000 (4)	367	21.1			
	6000-7500 (5)	278	16.0			
	>7500 (6)	291	16.7			
Parental education	lo/lbo/mavo (1)	544	27.6		3.39	1.08
	mbo/havo/vwo (2)	490	24.8			
	hbo/ho unfinished (3)	562	28.5			
	universitair (4)	378	19.1			

Table 7.1:   Basic sample characteristics (continued)

	Intervals	Frequency	Percent	Missing	Mean	Std. dev
Ethnicity	autochthon (1)	1,831	92.8	0	1.07	0.26
	allochtonous (2)	143	7.2			
Extrinsic motivation	0 - 3.75 (1)	224	11.3	0	3.67	1.59
	4 - 5.75 (2)	320	16.2			
	6 - 6.75 (3)	315	16.0			
	7 - 7.75 (4)	443	22.4			
	8 - 8.75 (5)	367	18.6			
	9 - 10 (6)	305	15.5			

One can see from Table 7.1 that for most of the sample indicators, of which most are used as independent or dependent variables in our analyses, all 1,974 cases had valid scores. Only parental income and grants had substantial numbers of missing cases. The standard deviations for all independent variables are lower than the mean divided by two, which indicates that the variables are likely to be normally distributed.

Our sample consists for 47.3% of female students while the real proportion of female students in the total higher education population was 51.4% in 1997 (CBS, 2005). This implies that female students are slightly underrepresented in our sample. This can be partly explained by the fact that our sample includes a relatively large proportion of university new entrants (50.8%) compared to only 29.1% in the whole population of Dutch new entrants in 1997. According to official statistics, the proportion of female new entrants in universities (48.6%) was lower than in the HBO-sector (52.5%) in 1997. The overrepresentation of university students in our sample partly relates to the fact that 5,113 questionnaires were sent to HBO-students and 4,380 to university students and partly to a higher response rate among university students. In reality, about two-thirds of the student population are in HBO.

With regard to the age structure of the sample the majority of new entrants are between 16 and 18 years-old (56%), which is the traditional age at which students enter higher education. The proportion of older students (21-years and older) is relatively low at 10%, compared to about 32% in the total student population in 1997 (CBS, 2005). This is partly because in our sample students with previous higher education experiences were filtered out.

Only 76% of the students in the sample reported receiving a grant (either a basic grant or also supplementary grants), thus 444 students reported not getting grants. The proportion of grant recipients looks relatively low if one considers that all fulltime students under the age 28 in the Netherlands were entitled to basic grants in 1997. Also other surveys report proportions of grant recipients between 77% and 82% (e.g. Hofman *et al.*, 2002). If one considers that students with previous higher education were excluded from our sample – of whom it is

likely that some already lost student support entitlements – then a figure of 76% can be regarded as low. An alternative explanation for the low proportion of grant recipients is that our sample includes student groups that are not entitled to student support. The sample includes 1.8% of students older than 27 years; 3.6% enrolled as part-time students; and 5% reporting an income level above the student support eligibility thresholds. Altogether this implies that 10.4% of the sample is not entitled to grant support. That roughly corresponds to the 1,854 students (94%) reported to have a public transport pass (*OV-kaart*), which is only available to students who are entitled to loans and/or grants.

In the sample, 143 students voluntarily took up loans (7.2%). This figure is rather low compared to the official statistics that show a percentage of about 13% of the students taking loans in the same period (15% of the university students and 12% of the HBO-students). However, the sample includes many young students, which may partly explain the difference. The proportion of borrowers is often found to be lower among new entrants than among students in later years of their study (De Vos & Fontein, 1998).

Within the sample, 51% of the students reported living with their parents.

The majority of the students in the sample entered higher education on the basis of a general upper secondary education diploma (HAVO, 28.1%) or pre-university qualification (VWO, 58.9%). Those represent the typical way into higher education. Official statistics for new entrants show that 33.2% had pre-university qualifications, 28.3% had a HAVO diploma and 23% had an upper secondary professional qualification (MBO) degree (CBS, 2005).[70] This difference in the number of students with a pre-university qualification can be explained by the overrepresentation of university new-entrants in our sample, which also explains the relatively low number of respondents with a MBO qualification (11.2%). The data on the entrance qualifications also indicate that some of the university-qualified candidates were enrolled in professionally oriented HBO-programs.

Grade point average scores of the students in our sample show that most students enter higher education with average secondary education examination scores between 6.6 and 8.0, which suggests in the Dutch context that they are well prepared for undertaking higher education studies.

With regard to students' socio-economic background most come from families with middle-class incomes ranging from €1,361 to €2,722 (net) per month in 1997. The mean sample score is €2,093.[71] This is a bit lower as is reported in most other surveys (Hofman *et al.*, 2001, 2002 & 2003), but these surveys are also more recent. The average parental monthly income reported by new entrants in those studies was €2,451 in 2000, €2,488 in 2001 and €2,871 in 2002. Again the sample includes relatively young students, which may also explain lower parental income scores. Many surveys show significantly higher amounts reported by students in later years of their studies.

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[70] These numbers combined the data for HBO and university new entrants in 1997/1998, excluding students with previous higher education experiences.

[71] This is €1802 for HBO students and €2375 for university students.

Concerning the highest level of education attained by students' parents, there is an almost uniform distribution across the four different levels. Though educational qualifications of university students' parents generally tend to be higher than for HBO-students, the sample distribution comes close to what is found in other surveys (Hofman *et al.*, 2001, 2002, 2003).

With regard to students' ethnicity the sample includes 7.2% allochtonous students. Other surveys often find similar proportions, ranging between 5% and 8.5% (Hofman *et al.*, 2001, 2002 & 2003). Official statistics show a proportion of non-Western allochtonous individuals in the total Dutch population at 7.8% in 1997.

Extrinsic motivation reflects the extent to which students are driven by getting a degree in order to obtain good opportunities for jobs with relatively good earnings, status, job satisfaction and power. The average score of the students on a scale from 0 (no extrinsic motivation) to 10 (strong extrinsic motivation) was 6.3. The table shows that the values are fairly evenly distributed over the different brackets. Other surveys showed higher average scores on extrinsic motivation between 7.0 and 7.5, maybe due to the fact that our sample includes relatively many university students who have lower extrinsic motivation scores. (Hofman *et al.*, 2001, 2002 & 2003).

The sample here is not fully representative of the total population of new entrants in the Netherlands in 1997. This partly is due to the overrepresentation of university students. This deviation is not regarded as that problematic for the current study for the following reasons:

- it is not our aim to provide an accurate description of the Dutch student population;
- it does not aim to estimate effect of financial incentive policies on national enrolment patterns and the composition of the student body;
- it does not aim to explore which groups of students are responsive to (what) financial incentives and which groups are not. Our sample includes satisfactory numbers of students from the various groups of students that are regarded important in this study. Therefore it will be *possible to generalise the findings* of the statistical analyses concerning the relationships between socio-economic background, students' perceptions of financial incentives and study choices.

8 Students' perceptions of financial incentives

This chapter tests the hypotheses that deal with the expected relationships between students' socio-economic status and their perceptions of financial incentives related to higher education choice. The main question is whether students from various SES backgrounds have different views on financial incentives. As such, the first set of hypotheses formulated in Chapter 5 (Section 5.4) are empirically tested here.

This chapter has the following structure. Section 8.1 provides a basic description of the dependent variables used to operationalise students' perceptions of financial incentives. Section 8.2 presents the results from the bivariate analysis of the relationships between each of the dependent and independent variables. The potential interaction effects among the independent variables are discussed in Section 8.3. In Section 8.4 the results from the multiple regression analysis are presented. Section 8.5 deals with the results from the structural equation modelling. The chapter concludes with a brief overview of the major outcomes of the first stage of the empirical research in Section 8.6.

8.1 Description of the dependent variables

The dependent variables are the financial risk students attach to higher education investments, their sensitivity to tuition changes, their attitudes to grants, the expected future income (starting salary and top salary) and their willingness to borrow. In Table 8.1 these variables are described on the basis of their frequency distribution, mean, standard deviation, number of valid cases and missing cases. Because most dependent variables are measured on an interval or ratio scale we condensed the number of intervals for this presentation.

Table 8.1:   Description of dependent variables

	Categories	Frequency	Percent	Missing	Mean	Std.dev
HE as a financial risk	0=disagree	129	6.6	9	6.4	2.8
N = 1,965	1 to 3	194	9.9			
	4 to 6	579	29.5			
	7 to 9	721	36.7			
	10=agree	342	17.4			
Sensitivity to tuition change	0=no	93	28.4	0	3.2	2.8
N = 328	1 to 3	86	26.2			
	4 to 6	109	33.2			
	7 to 9	34	10.4			
	10=yes	6	1.8			
Study without support	No	164	11.6	13	2.5	0.8
N = 1,419	probably no	450	31.8			
	probably yes	661	46.8			
	Yes	138	9.8			
Expected starting salary	1000 to 1999	365	18.5	0	2,861	1,103
N = 1,974	2000 to 3062	920	46.6			
	3063 to 5124	610	30.9			
	> 5125	79	4.0			
Expected top salary	1000 to 1999	26	1.3	0	5,087	1,790
N = 1,974	2000 to 3062	236	12.0			
	3063 to 5125	850	43.1			
	> 5125	862	43.7			
Maximum acceptable debt	0	264	13.4	134	3.9	3.1
N = 1,840	<5000	487	24.7			
	5000 to 10000	451	22.8			
	10000 to 15000	257	13.0			
	15000 to 20000	153	7.8			
	>20000	228	11.6			

Study a financial risk

The first dependent variable relates to the question "to what extent students agree that higher education is a risky financial investment". With answers ranging from 0 (fully disagree) to 10 (fully agree), the frequency distribution shows that many students consider studying to be a relatively risky choice. The mean score is 6.4.

Sensitivity to tuition changes

To measure students' sensitivity to tuition changes, students were asked whether they would choose a science and engineering program in the case of a substantial tuition change. Students were given three hypothetical situations for which they could indicate their likelihood of choosing a science and engineering program on a scale from 0 (absolutely not) to 10 (certainly yes). These three hypothetical situations were:[72]
- if tuition in other programs increased by 50%;
- if tuition in science and engineering programs declined by 50%;
- if tuition in science and engineering programs was abolished.

The answers to these three situations were merged into one composite variable as an indicator of students' attitudes to tuition changes. With a Cronbach's α of 0.86 this appears to be a reliable indicator.[73] Another advantage of such a composite variable is that it compensates for potential inconsistencies in students' reactions to the three situations. The frequency distribution on this variable and the mean of 3.2 show that students are not likely to be persuaded to study a science and engineering program based on its relative price.

Importance of grants

The importance of grants/scholarships for enrolling in higher education was addressed by the question whether students would also enrol in higher education in the absence of a student support system. This is an ordinal variable with four categories: 1=no, 2=probably not, 3=probably yes, 4=yes. Because the interest is in the perceptions of grants only respondents who actually reported to have received grants (basic grants and/or supplementary grants) were selected (1,419). The frequency distribution in Table 8.1 shows that about 43.5% would probably or certainly not have entered higher education if no student financial support were available. This indicates that they find grant support important. That means that about 3 out of 5 students said that grants were not important.

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[72] To indicate that the focus was on the impact of tuition changes, note that students were also asked whether they found science and engineering programs dull, difficult, or a "male type of study". In addition they were asked whether higher grants, higher future earnings, job certainty, or more attractive study materials could persuade them to choose a science and engineering program.

[73] Cronbach's α measures how well a set of items (or variables) measures a single unidimensional latent construct. When data have a multidimensional structure, Cronbach's α will usually be low. Technically speaking, Cronbach's α is a coefficient of reliability (or consistency). Cronbach's α can be written as a function of the number of test items and the average inter-correlation among the items. A reliability coefficient of .80 or higher is considered as "acceptable" in most Social Science applications (Reynaldo and Santos, 1999).

Expected starting salary

The net starting salary students expected to earn per month in their first job after graduation was used as one indicator of expected future income. Respondents answered by indicating their salary expectations on an interval/ratio scale ranging from NLG 1,000 (€450) to NLG 8,000 (€3600). For the presentation in Table 8.1 the original 17 intervals were compressed into four intervals though for the analyses the original intervals were used. The frequency distribution showed that the majority of first-year students expected net starting salaries between NLG 1,875 (€850) and NLG 3,250 (€1,475). The mean value was €1,298 (€1,187 for HBO students and €1,406 for university students).

To put these expectations in perspective, data from the graduate monitors (ROA, 1999; VSNU, 2001) show that HBO-graduates on average earned about €1,035 net per month as their starting salary in 1998 and university graduates €1,250.[74] This means that first-year students slightly overestimated their future starting salaries and thus the benefits of higher education. This is important information because behavioural economics suggests that individuals are likely to require disproportionally high future gains for current investments due to the high discount rate used (see Chapter 5).

Expected maximum salary

Concerning the expectations of first-year students about their maximum net monthly salary at some point in their working life, the answers of the respondents ranged from NLG 1,125 (€510) to NLG 8,000 (€3,600). The frequency distribution shows that students had considerably higher expectations about their future maximum income than about their starting wages. The mean score was €2,312, about 1.8 times higher than the expected starting salary. This pattern can be partly explained by "common sense" about growing wage patterns. It is striking to see that almost 15% of the respondents expect to earn high net top salaries of NLG 8,000 (€3,600) or more.

Willingness to borrow

Willingness to borrow was addressed in the survey by asking respondents what they believed the maximum acceptable amount of study debt to accumulate through student loans (for tuition costs and living expenses) would be. This variable was measured in 17 debt intervals, which were condensed to 11 intervals for our analysis by clustering all categories at the upper end. The clusters ranged

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[74] Because the HBO-monitor started in 1998 and the WO-Monitor only in 2000, these figures come closest to the actual figures for 1997.

from zero Guilders with incremental steps of NLG 2,500 (€1,135) up to NLG 25,000 (€11,350) and over. The frequency distribution in Table 8.1 is further condensed and shows that the sample scores are left skewed. The mean score of 3.9 (out of 11 intervals) implies that the average "acceptable" debt was about €3,290. As such, the average acceptable debt is lower than average student debt of those who graduated in 1997 (about €3,850 for students living with their parents and (€5,450) for students living away from home (De Vos en Fontein, 1998b). The low debt acceptance rates reported may be the result of debt aversion.

8.2 Bivariate relationships between dependent and independent variables

The bivariate relationships between the individual dependent variables and each of the independent variables were all analysed. For this analysis a variance *F-test* (One-Way ANOVA) was employed (see Chapter 7). If the F-test is found to be significant there is a relationship between the two variables tested but it does *not* test for causality and does not indicate the direction of the relationships. These directions can be inferred from the patterns of the mean sample scores for the different intervals, which are presented in Appendix I. The results from the bivariate analysis are presented in Table 8.2.

Table 8.2: Bivariate relationships, phase I (F-tests)

Dependent variables Independent variables	Financial risk	Attitude to tuition changes	Attitude to grants	Expected starting salaries	Expected maximum salaries	Willingness to borrow
SES-variables						
Parental income	NS	**	***	***	***	**
Parental education	**	NS	***	***	***	***
Ethnicity	**	NS	*	NS	NS	***
Control variables						
Gender	NS	NS	+	***	***	***
Entrance qualification	***	NS	***	***	***	***
Grade point average	***	NS	NS	**	***	***
Extrinsic motivation	NS	NS	NS	***	***	+

Significance levels: ***=0,001; **=0,01; *=0,05; +=0,1; NS=not significant

Table 8.2 shows that in most cases at least two out of three independent *SES-variables* have a statistically significant relationship with the dependent variable, particularly parental income and parental education. This is consistent with the first set of hypotheses formulated in Chapter 5. Students from low income families are more sensitive to tuition fees and grants, they expect lower future earnings and are less willing to accumulate student debt than students from high income parents. All of these patterns are consistent with the hypotheses. The

same patterns are visible if one looks at parental education except that students with lower educated parents also more often perceive higher education as a financial risk than other students. In addition, parental education is not significantly related to tuition sensitivity.

Ethnicity takes a more ambiguous position and is only statistically significant in three of the six cases. It is not significant for tuition sensitivity, expected starting wage and expected maximum wage. As expected, allochtonous students perceive higher education as financially riskier, find grants more important and accept significantly higher debt levels than autochthon students. The latter finding is contrary to the expectations. Other research suggests this is due to differences in culture (De Jong *et al.*, 2001).

Altogether, the bivariate relationships show that the SES-variables to a large extent appear to support the hypotheses, except for Hypothesis 2.

With respect to the *control variables* we arrive at the following findings. Gender, entrance qualification and grade point average are significantly related to most of the dependent variables, showing that they may be important for determining students' perceptions of monetary incentives. Extrinsic motivation appeared to be less important and only had a significant relationship with expected future earnings and, weakly, with willingness to borrow.

Finally, there are some *interesting results*. First, allochtonous students have similar future income expectations as autochthon students. This is also found by others but Berkhout (2004) also found that allochtonous students are much more uncertain about actually finding a job. Second, students with low-income parents show surprisingly high debt acceptance levels. Pawson (2003) relates this to the group of "chaotic budgets" (e.g., including students from divorced single parent families). Third, female students expect lower future earnings than male students but female students do not attach greater financial risks to higher education investments. Finally, higher extrinsically motivated students, those aiming at "better" jobs, expect higher future earnings but are less willing to borrow.

8.3   Potential interactions among the independent (explanatory) variables

As explained in Chapter 7, interactions can affect the hypothesised relationships in the model (Moore & McCabe, 1997). For example, if one expects that high parental income leads to a higher willingness to borrow of students, it may be stronger for males than for females, thus creating an interaction between parental income and gender.

8.3.1   *Potential interactions among SES variables*

With regard to the socio-economic status variables, a number of potential interactions might exist. Parental income and parental education are not expected to interact because they are positively correlated. Individuals with higher incomes

often have higher educational qualifications, as expected by both human capital theory and the screening hypothesis (Schultz, 1961). Thus there is no reason to believe that this leads to major changes in the perceptions of financial incentives for students from different subcategories.

With regard to the potential interactions between parental income or parents' education and ethnicity, the theoretical framework suggests that allochtonous students are more sensitive to financial incentives than autochthon students but, due to the reference level effects, thought to be less for allochtonous students with higher educated or higher income parents. Based on this it is likely that interaction may exist between ethnicity (allochtonous) and parental education, and ethnicity (allochtonous) and parental income in the regressions.

8.3.2   *Potential interactions of SES- and other independent variables*

Concerning the potential interactions between the socio-economic background variables and other background characteristics, we can argue as follows. Females may be more influenced by their socio-economic background than male students in their reactions to financial incentives, particularly because females have lower expected future earnings (and occupational) profiles than males. Therefore it is worth including interaction terms between gender (female) and parental income. Based on the same argument it is also useful to include an interaction variable for gender (female) and parental education and for gender and ethnicity. The stronger expected responsiveness to financial incentives by allochtonous students than autochthon students may be expected to be stronger for females than for males because allochtonous females often have a subordinate position compared to men in most of their cultural traditions.

Based on previous research (e.g. Hofman *et al.*, 2001) parental income and parental education are positively related to students' entrance qualifications. Although higher values on each of these three variables are expected to be associated with lower price-responsiveness, it is not likely that any strong deviations from this pattern for any subcategories of students with relation to these variables exist. The same argument can be used for grade point average in secondary education. It is also unlikely that different levels of extrinsic motivation in combination with variation in parental income or parental education will lead to substantially different price perceptions.

Though ethnicity and scholastic aptitude are both expected to influence student' price perceptions, there is no reason to believe that allochtonous students with lower entrance qualifications or lower average grades are more price sensitive than autochthon students with similar abilities.

8.3.3   Potential interactions among the other background variables

Looking at the four control variables, a number of potential interaction effects may exist. As for the relation between gender and entrance qualification in their relation to price perceptions females may expect lower (absolute) benefits from higher education than males and therefore may be expected to be more sensitive to prices. But this difference between males and females is not likely to change for students with different entrance qualifications. For both males and females, the chances of successfully completing in higher education may decrease with lower entrance qualifications. The same argument can be made for the relationship between gender and grade point average or gender and extrinsic information.

In addition, entrance qualification and grade point average are also not likely to interact with relation to students' price perceptions. Both entrance qualifications and grade point average tell something about the preparation level and students' ability. The higher the level of preparation, the more confident we expect students to be about their study success. As a result, better prepared students are expected to be less sensitive to financial incentives than less able students. But there is no reason to believe that students with high grades and a lower entrance qualification have significantly stronger price perceptions than students with high grades and a high entrance qualification (they can choose a HBO-program instead of an university program).

Finally, academic preparation and extrinsic motivation are also not likely to interact. Though higher qualified students may have different extrinsic motivation levels than less qualified students, the impact of extrinsic motivation on price perceptions may not vary strongly with different entrance qualifications or grade point averages.

Altogether, the following interaction terms can be integrated into the multiple regression model:
- ethnicity (allochtonous) * parental income;
- ethnicity (allochtonous) * parental education;
- gender (female) * parental income;
- gender (female) * parental education;
- gender (female) * ethnicity.

8.4   Multiple regression analysis

The hypotheses state that the students' socio-economic background influences their price perceptions. As explained in Chapter 7, multivariate regression is used to test the combined effects of SES variables and other (control) factors on students' price perceptions. This provides a more thorough test of the (first set of five) hypotheses than the bivariate relationships explored in the previous section.

The multiple regression analysis was executed in two ways. First, the straightforward simple model without interaction terms was tested for each of the

dependent variable. In a second step this basic model was extended by including all the interaction effects from Section 8.3. Although the explained variance in the dependent variables (R^2) in most cases increased slightly (not substantially) when interaction terms were added, most of the interaction variables proved to be statistically insignificant. In addition, some of the basic explanatory variables lost their significance in the extended model like parental education.[75] The logical conclusion is that there is no substantial evidence of interaction effects. For these reasons, the basic regression model proved to be the most reliable model in the analyses.[76]

The major outcomes from the multiple regression analysis are presented in Table 8.3 and the detailed results for each dependent variable in Appendix II.

Table 8.3:   Main outcomes from multiple regression analysis, phase I

	Hyp. 1	Hyp. 2	Hyp. 3			Hyp. 4a	Hyp. 4b	Hyp. 5
	Fin. risk	**Tuition**	**Grants** (all vs "yes")			**Start wage**	**Max wage**	**Debt**
			def. not	no	maybe			
SES variables								
Parental income			+++	+++	+++	+	+++	
Par. ed. max MAVO vs WO			++	+++	+	- -	- - -	- -
Par. ed. max VWO vs WO	++		+++	+++	+++	- -	-	
Par. ed. max HBO vs WO	+			++				-
Ethnicity (allochtonous)	++						+	+++
Control variables								
Gender (female)				++	+	- - -	- - -	- - -
Entr. qual. MAVO vs VWO	- -	-					- - -	- - -
Entr. qual. MBO vs VWO						- - -	- - -	- - -
Entr. qual. HAVO vs VWO						- - -	- - -	- - -
Grade point average	- - -						+++	+++
Extrinsic motivation			-	-		+++	+++	
Fit measures								
Adjusted R²	0.022	-0.006				0.116	0.274	0.071
Pseudo R² (Nagelkerke)				0.148				
F-value / χ²	***	NS		***		***	***	***

Significance levels: +++/--- = 0,001; ++/-- = 0,01; +/- = 0,05

Note: With regard to grants, all outcomes are opposed to the highest interval: "yes". With regard to parental education, all outcomes are opposed to the highest interval: "university" (WO). With regard to entrance qualification, all outcomes are opposed to the highest interval: "VWO".

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[75]   An alternative would have been to only incorporate the significant interaction terms. However, different interaction terms showed to be significant in relation to different dependent variables. That would require to make different explanatory models for each of the dependent variables.

[76]   The potential effects between the independent variables will be further explored in the structural equation modelling analysis in Section 8.5.

The model is statistically significant for almost all dependent variables. This suggests that the socio-economic background variables together with the control variables form a good model for explaining students' price perceptions. Only for students' perceptions of tuition changes was the model's explanatory power very limited.

If the major findings are related to the hypotheses as formulated in Chapter 5, then the following conclusions can be drawn. Overall, socio-economic status characteristics are shown to be significantly related to students' perceptions of financial incentives related to study choices. Within the multivariate regression model, parental education and parental income show strong relationships with most dependent variables. Students with higher educated parents and higher family income levels prove to be less price sensitive in their perceptions compared to students from families with lower educated parents and lower income levels. The first group of students regard higher education investment as less risky, they attach less value to grants, they expect higher future income levels, and they have higher debt acceptance levels. These findings support the theoretical model and hypotheses. However, ethnicity seems to play a more ambiguous role in students' price perceptions. Allochtonous students do not significantly differ from autochthon students in their views on higher education as a risky investment. Contrary to expectations, they expect higher future income levels and have a higher debt tolerance than autochthon students. Altogether, Hypotheses 1, 3, 4 and 5 cannot be rejected though ethnicity importantly plays an ambiguous role.

However, the results from the multivariate regression analysis do not support Hypothesis 2, which states that lower-SES students are more sensitive to tuition changes than higher-SES students. Not only is the F-value of the regression model statistically insignificant, but most of the independent variables also have a insignificant relationship with tuition sensitivity. This suggests that students from various SES-backgrounds do not differ in their perceptions of tuition fees.[77]

In terms of the control variables, female students are shown to have more price sensitive perceptions than male students, as predicted in previous research and *human capital theory*. Females particularly have lower expectations concerning their future income and they (therefore) also show less debt tolerance than male students. Students with lower entrance qualifications have significantly lower future income expectations than those holding a VWO-diploma and they also accept substantially lower debt levels. Unexpectedly, students with the lowest entrance qualifications perceive higher education not as much as a financial risk as VWO-diploma holders do. This may be explained by the fact that these students are likely to have to have entered higher education on the basis of previous work

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[77] It should be acknowledged that a very specific situation was used for testing the tuition hypothesis (as discussed in Section 6.3). In addition, science and engineering programs are heavily debated in the Netherlands (and in Europe). They are less popular because they have a long duration and are viewed as difficult, dull, male-type of studies, as in many other European countries (European Commission, 2003).

experience. Grade point average also in most cases has a strong significant relationship with the (dependent) perceptions variables. The signs are as expected: higher grade point averages go hand in hand with lower risk attitudes, higher debt tolerance and higher future income expectations. Finally, the effect of extrinsic motivation is ambiguous. Though higher extrinsically motivated students have significantly higher future income expectations, they unexpectedly see higher education as more risky and they have lower debt acceptance levels than less motivated students.

8.5   Structural equation modelling

The final test for our hypotheses is performed with structural equation modelling (SEM) analysis as explained in Chapter 7. SEM analysis uses a complex path model, which is presented in Figure 8.1. This is a replicate of Figure 7.2 but now includes the magnitude and direction of direct effects between the independent variables only (ranging between -1 and 1). These direct effects are required later to calculate the indirect effects of the independent variables on the dependent (student perception) variables (see Section 8.5.2).

Figure 8.1:   Basic structural equation model, phase 1
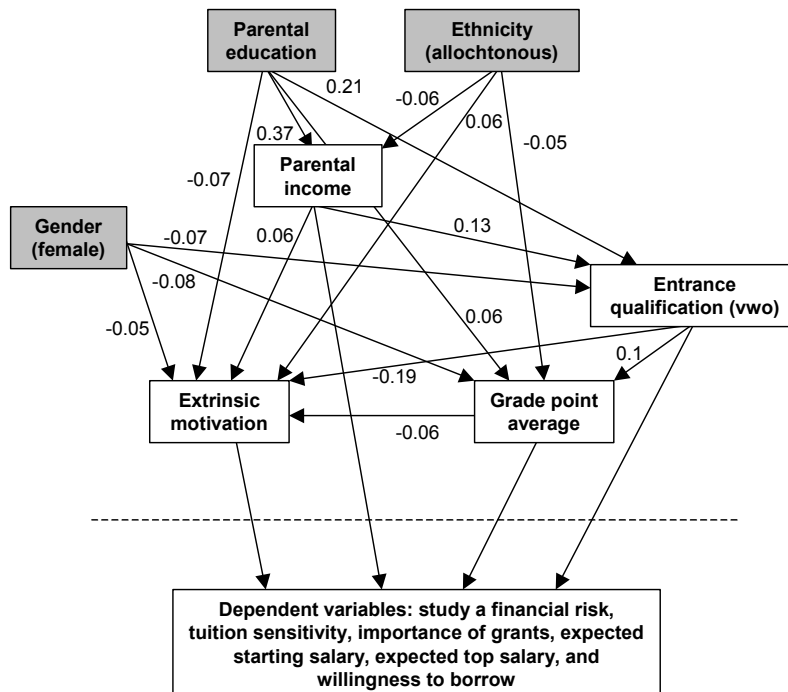
As explained in Chapter 7, the *basic model* (see Figure 8.1) assumes that all the effects of the exogenous variables (parental education, ethnicity and gender) only have an indirect effect on the dependent variables. The next step is to explore whether any direct effects of the exogenous variables on the dependent perception variables can improve the "relative" fit of the model, resulting in an *adjusted model*. This strategy provides an opportunity to reject the hypotheses as well as to specify the most efficient/optimal model for each of the dependent variables. The final analysis presents a full model of the first phase of the analysis that only includes statistically significant relationships between the independent and all dependent variables. This model serves as the starting model for the second phase of the empirical analysis where students' perceptions are used as an intermediary layer of variables to explain the potential connections between socio-economic background and students' actual choices.

The results from the SEM-analysis are presented in two stages. The first part explores the relative fit of the full model with the data from our sample. The second studies the significance, magnitude and direction of the effects within the model, distinguishing between the direct and indirect effects.

8.5.1   Relative fit of the theoretical model with the sample data

One of the basic outcomes of the structural equation modelling technique is to see how well the theoretical model fits with the sample data when a set of multiple regression equations are run simultaneously. The model fit outcomes are presented in Table 8.4 for the each of the dependent variables. To indicate the relative explanatory power of our model, Table 8.4 shows for each dependent variable the R^2. As discussed in Chapter 7 the major measures for model fit include the chi-squared, the degrees of freedom, the P-value, the NFI and the RMSEA as discussed in Chapter 7.

For most of the dependent variables, the basic model has to be extended to include the effects from the exogenous variables (parental education, ethnicity and gender) on the dependent ones. That implies that the exogenous variables in question also have a direct influence on students' perceptions of financial incentives. In most cases the explained variance (R^2) in the dependent variables does is relatively low, ranging from 1% to 28%. Thus the model explains only a part of the variance in students' perceptions of financial incentives. One explanation is that there are many other factors that influence students' perceptions that are not included here.

Table 8.4:   SEM Fit measures, phase 1

Model	R²	χ^2	df	P	NFI	RMSEA
Study as a financial risk						
Basic model		10.30	5	0.067	1.000	0.023
Adjusted model including direct effects of: ethnicity	0.02	3.00	4	0.558	1.000	0.000
Tuition incentive						
Basic model	0.01	3.94	5	0.558	0.999	0.000
Importance of grants						
Basic model		19.56	5	0.002	0.999	0.048
Adjusted model including direct effects of: parental Education	0.12	4.82	4	0.307	1.000	0.013
Expected start wage						
Basic model		101.56	5	0.000	0.997	0.099
Adjusted model including direct effects of: gender, parental education	0.12	1.36	3	0.715	1.000	0.000
Expected maximum wage						
Basic model		224.88	5	0.000	0.994	0.149
Adjusted model including direct effects of: gender, parental education	0.28	4.40	3	0.221	1.000	0.015
Willingness to borrow						
Basic model		29.16	5	0.000	0.999	0.490
Adjusted model including direct effects of: gender, parental education and ethnicity	0.06	0.46	2	0.794	1.000	0.000

With respect to the extent to which higher education is regarded as a financially risky investment, the basic model fits the data rather well. But the direct effect of ethnicity on this perception variable further improves the model to having an outstanding fit with the data. Gender and parental education do not have a direct effect on students' risk perception.

The estimates for students' sensitivity to tuition changes are outstanding for the basic model and cannot be improved by including the direct effects of the exogenous variables, which can be concluded to not have a significant direct effect on tuition sensitivity. But the R² is only 1%.

Regarding students' perceptions of the importance of grants the basic model already provides a good fit. It can however be substantially improved if the direct effect of parental education on the importance of grants is included. With an RMSEA just above 0.01 the fit can be said to be very good.

Concerning the expected starting wage, the model fit-scores show that the basic model already provides a good fit with the data. However, including the direct effect of parental education and gender improves the model to an outstanding fit. The chi-square is greatly reduced and the RMSEA-score is reduced to zero.

The basic model with regard to the expected maximum wage does not show a good fit. It does, however, strongly improve if the direct effects of parental education and gender on expected maximum wage are included.

Finally, the basic model has a poor fit with the data for the maximum debt students regard as acceptable for investing in higher education, but including all three exogenous variables improves the model to an outstanding fit with the data.

In sum, the basic model without the direct effects of the exogenous variables on the dependent perception variables generally does not fit the data very well, except for tuition sensitivity. In most cases, the direct effects of parental education, ethnicity and/or gender have to be included to get a good or outstanding fit of the model with the data. As far as parental education and ethnicity are concerned, this is a first indication that the analysis supports our hypotheses. But whether the hypotheses are supported or falsified also depends on the magnitude and direction of the effects, which are explored in the next subsection.

8.5.2   *Magnitude and direction of the effects*

The second step in the SEM-analysis is to assess the magnitude and direction of the effects of the independent variables amongst each other and on the dependent variables. The best way to analyse the effects is to distinguish between standardised measures of the direct and indirect effects. The indirect effects between variables in the model, for example, make it possible to indicate how parental education can influence students' willingness to borrow directly and through its effects on other variables like entrance qualification or extrinsic motivation. This can be seen as a form of path analysis. An indirect effect actually is a multiplication of the direct effects on the indirect routes between variables. Recalling Figure 8.1, it can seen that the indirect effect of ethnicity on entrance qualification runs via parental income and can be calculated as -.06 * .13 = -.007. The indirect paths can also be more complex. For example, the indirect effect of ethnicity on extrinsic motivation runs via parental income and grade point average, but also via parental income and entrance qualification, and via parental income, entrance qualification and grade point average. In such cases there can also be joint effects, which generally are negligibly small.

The standardised direct and indirect effects are presented in Table 8.5. It only presents the effects on the dependent variables because that is the central interest. The effects among the independent variables are presented in Appendix III. The effects vary between –1 and 1 showing the magnitude and direction of the effects. Only effects larger than 0.05 are generally considered to be worthwhile to mention (Kelloway, 1998).

Table 8.5:   SEM standardised effects, phase 1

Variables	Total effect	Direct effect	Indirect effect
HE as a financial risk (N=1974)			
Ethnicity (allochtonous)	0.07	0.06	0.01
Parental education	-0.02	0.00	-0.02
Parental income	-0.01	-0.01	-0.00
Gender (female)	0.01	0.00	0.01
Entrance qualification (vwo)	-0.05	-0.03	-0.02
Grade point average	-0.09	-0.09	-0.00
Extrinsic motivation	0.04	0.04	0.00
Tuition sensitivity (N=322)			
Ethnicity (allochtonous)	0.00	0.00	0.00
Parental education	-0.03	0.00	-0.03
Parental income	-0.08	-0.08	0.00
Gender (female)	-0.00	0.00	0.00
Entrance qualification (vwo)	0.02	0.02	0.00
Grade point average	0.02	0.03	0.00
Extrinsic motivation	0.03	0.03	0.00
Importance of grants (N=1262)			
Ethnicity (allochtonous)	-0.02	0.00	-0.02
Parental education	0.25	0.12	0.13
Parental income	0.27	0.26	0.01
Gender (female)	-0.01	0.00	-0.01
Entrance qualification (vwo)	0.03	0.04	-0.01
Grade point average	0.03	0.03	0.00
Extrinsic motivation	0.06	0.06	0.00
Expected starting wage (N=1974)			
Ethnicity (allochtonous)	0.00	0.00	0.00
Parental education	0.12	0.07	0.05
Parental income	0.08	0.05	0.03
Gender (female)	-0.23	-0.21	-0.02
Entrance qualification (vwo)	0.15	0.18	-0.03
Grade point average	0.03	0.04	-0.01
Extrinsic motivation	0.16	0.16	0.00
Expected maximum wage (N=1974)			
Ethnicity (allochtonous)	0.00	0.00	0.00
Parental education	0.18	0.07	0.11
Parental income	0.16	0.11	0.05
Gender (female)	-0.33	-0.29	-0.04
Entrance qualification (vwo)	0.27	0.30	-0.03
Grade point average	0.07	0.08	-0.01
Extrinsic motivation	0.20	0.20	0.00
Willingness to borrow (N=1974)			
Ethnicity (allochtonous)	0.09	0.09	-0.01
Parental education	0.12	0.06	0.06
Parental income	0.04	0.02	0.02
Gender (female)	-0.09	-0.07	-0.02
Entrance qualification (vwo)	0.16	0.15	0.01
Grade point average	0.08	0.08	0.00
Extrinsic motivation	-0.02	-0.02	0.00

Based on this table a number of conclusions about the effects of SES-variables and control variables on students' perceptions of financial incentives can be drawn.

Higher education a financial risk: Table 8.5 shows that only ethnicity, entrance qualification and grade point average have a significant impact on the extent to which students perceive higher education as a financial risky investment. Students with higher entrance qualifications and grade point averages hold lower risk perceptions. Allochtonous students attach greater financial risks to higher education investment than autochthon students. This implies that the other variables, parental income, parental education, gender and extrinsic motivation have no statistically significant effects in this model. The table also shows that all indirect effects on the dependent variable are very small. Although the entire theoretical model shows a good fit with the data, only the effect of ethnicity supports Hypothesis 1.

Sensitivity to tuition changes: Regardless of the good fit-measures of the basic model, only parental income shows a substantial effect (-0.075) on tuition sensitivity, implying that students from higher income backgrounds are less sensitive to tuition changes. None of the other SES variables or control variables seem to have an effect. Altogether, this means that the model does not provide a good explanatory framework for explaining students' perceptions of tuition changes. This means that Hypothesis 2 is not supported.

Importance of grants: Table 8.5 shows that parental education and parental income have clear effects on the importance of grants. The positive effect means that students whose parents have higher education attainment levels and higher income levels would also enrol in higher education if no student support were available, whereas other students would be less likely to enrol. About half of the effect of parental education is indirect through other variables like parental income, entrance qualification, and grade point average. In addition, higher extrinsically motivated students are more likely to enrol than less extrinsically motivated students in case no support is available. The other variables have no significant effect. These outcomes support Hypothesis 3.

Expected starting wage: In Table 8.5 it can be read that students from higher educated and better earning parents expect higher starting wages. Ethnicity does not have an effect. However, the strongest effect comes from gender, with females expecting much lower starting wages than male students. In addition, students with higher GPA scores and with higher levels of extrinsic motivation expect higher starting wages. These outcomes support Hypothesis 4.

Expected maximum wage: Again parental education and parental income have strong positive effects on the dependent variable. Ethnicity does not have a significant effect, but all control variables have an effect on the expected future maximum wage. Particularly female students have much lower wage expectations than male students. Students with higher entrance qualifications, higher GPA-scores and higher levels of extrinsic motivation expect significantly higher top salaries. These outcomes support Hypothesis 4.

Willingness to borrow: With regard to the willingness to borrow, parental education again has a strong positive effect. Students from better-educated parents are more willing to borrow than students from less educated parents. The

effect is equally distributed between direct and indirect effects. Contrary to expectations, allochtonous students accept higher debt levels than autochthon students. Parental income does not have a significant effect. Regarding the control variables, female students are more hesitant to borrow than male students. Students with higher entrance qualifications and higher GPA-scores are more willing to borrow. Extrinsic motivation does not have an impact. Only the effect of parental education supports Hypothesis 5.

The table shows that indirect effects play a minor role in our model. Nevertheless, such effects exist, particularly the indirect effects from parental education and in a few cases from parental income, gender and entrance qualification. Of particular interest are the indirect effects of parental education. The finding that parental education has the strongest indirect effects is consistent with the outcomes of previous research that parental education is very dominant in the student choice process (see Chapter 2). As can be seen in Appendix III (Table III.1), most of the indirect effects of parental education run via entrance qualification and primarily play a role in the perceptions students have about the importance of grants, future income expectations, and about the willingness to borrow.

A final interesting phenomenon is that the magnitude of some of the independent variables' direct effects on the dependent ones are reduced by indirect effects with an opposite sign. In Table 8.5 this happens for the effect of entrance qualification on the importance of grants and on expected future income, for the effect of grade point average on future income expectations, and for ethnicity on the willingness to borrow.

8.5.3   General conclusions from the structural equation modelling

Acknowledging that SEM-analysis accounts for all possible effects within the model, the following major conclusions emerge with respect to the hypotheses tested in this first stage of the empirical analysis.

Altogether the theoretical model for explaining students' perceptions of financial incentives provides a good or outstanding fit with the sample data. The fact that the best possible fit was only reached when the direct effect of some of the socio-economic status variables were included in the model provides support for most of the hypotheses. The indicators for socio-economic background generally supported expectations. Higher levels of parental education and parental income generally have a positive effect on students' perceptions of financial incentives. Finally, ethnicity leads to ambiguous effects. Only in one case does its effect confirm expectations (study a financial risky investment), and in one case the effect was contrary to expectations (willingness to borrow). Adding all of this up, we find evidence that supports 4 of our 5 hypotheses. Students from various socio-economic groups have different perceptions of financial incentives. Only Hypothesis 2, which states that lower-SES students are more sensitive to tuition changes than higher-SES students, has to be rejected based on the analysis.

The analyses also show that not all independent variables have the same relative impact on students' perceptions, and the effects of single individual independent variables can also differ for various dependent variables. Based on all the effects found in the SEM-analyses for the first phase of the empirical study, a final model of the significant relationships between socio-economic background variables, control variables and students' perceptions of financial incentives can be developed. This model is depicted in Figure 8.2.

Figure 8.2:   SES and students' perceptions, final model
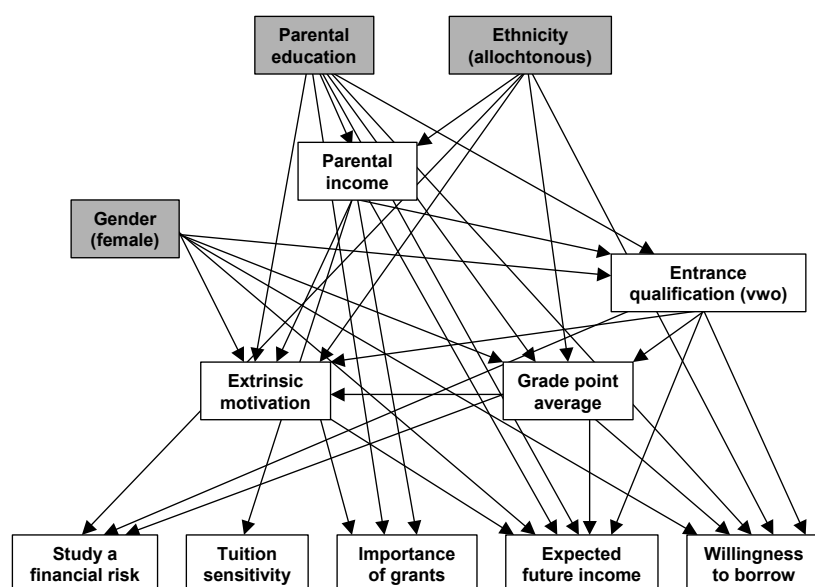
This model at first sight looks more complex than Figure 8.1 because it distinguishes between all dependent variables. But it basically reduced the number of potential effects to only those that proved to be significant. This model, representing the major outcomes from the first phase of the analysis is used as a starting model for the second phase SEM analysis in which students' perceptions are treated as intermediary variables in the relation between socio-economic backgrounds and actual student choice.

8.6   Overall conclusions phase I: connecting the three analyses

Overlooking the results from the three steps in the statistical analysis of the relationships between socio-economic background and students' perceptions of financial incentives related to study, the following conclusions can be drawn. The results from the bivariate analysis, the multivariate regression analysis and the

structural equation modelling largely coincide in terms of the significant relationships between the independent and dependent variables. Only in a few cases there were significant relationships in the bivariate analysis that were not significant in the regression or SEM analysis. For example the impact of parental income on tuition sensitivity disappears in the regression model. Furthermore, the signs of the effects turned out to be identical in the three analyses, also for the unexpected outcomes. In all analyses allochtonous students were found to have significantly higher debt acceptance levels than autochthon students. Finally, the SEM analysis was shown to have added value, because its shows the magnitude of the effects and the difference between direct and indirect effects. As for the latter, parental education is the only independent variable with substantial indirect effects on students' perceptions. This corresponds with the strong impact often found for parental education in other student choice research (see Chapter 2).

Altogether, the evidence provides support for 4 of the 5 hypotheses in this first stage. Students from different SES backgrounds hold different perceptions of financial incentives related to study, including the financial risk of higher education investment, the importance of grants, expected future income, and the willingness to borrow. Only Hypothesis 2 has to be rejected, implying that students from various socio-economic groups do not differ in their sensitivity to tuition changes. Finally, the general conclusion that students from different SES backgrounds have other perceptions of financial incentives can be called an added value from using behavioural economics compared to the traditional economic perspectives used to analyse student choice. These positive outcomes make it worthwhile to explore whether different financial perceptions also lead to differences in student choice.

9 Socio-economic background, perceptions and choice

This chapter discusses the second part of the empirical research, concentrating on the relationships between students' socio-economic status, their perceptions of financial incentives and the actual study-related choices they make. As such, it explores whether students from different SES-groups with different price perceptions also make different choices. These choices can include enrolment decisions, taking up student loans or being involved in part-time work. Testing the second set of hypotheses takes a central position in this chapter.

This chapter is structured as follows. In Section 9.1 the dependent variables of the second phase of the empirical analysis are described. These include where students live, whether they take up student loans, whether they have part-time jobs, the choice for science and engineering study programs, and the choice for university or professional higher education. Section 9.2 discusses the bivariate relations between the dependent and independent variables. The outcomes from the multivariate regression analysis are discussed in Section 9.3. Section 9.4 deals with the results from the structural equation modelling analysis. The overall conclusions from the second phase of the empirical analyses are presented in Section 9.5.

9.1 Description of the dependent variables

The second phase of the empirical analysis starts with a brief description of the dependent variables for testing the second set of hypotheses. These hypotheses are about the relationships between students' SES, their perceptions of financial incentives and their actual student choices. The dependent variables are: students' living status (living with their parents or away from home), the take-up of study loans, involvement in part-time work, and the choice of programs and institutions. These variables were defined in Chapter 6. The frequency distribution of the sample scores on these variables, the mean scores, the standard deviation, and the number of missing cases are presented in Table 9.1.

Table 9.1:   Description of dependent variables

	Categories	Frequency	Percent	Missing	Mean	Std. dev
Living status	With parents (0)	1004	51.0	6	0.49	0.50
	Away from home (1)	964	49.0			
Loans	No (0)	1831	92.8		0.07	0.26
	Yes (1)	143	7.2			
Amount of loans	Low (<300) (0)	57	39.9	1831	0.60	0.49
(NLG per month)	High (>299) (1)	86	60.1			
Part-time job	No (0)	737	37.3		0.63	0.48
	Yes (1)	1237	62.7			
Job earnings	Low (<201) (1)	459	43.6	921	1.76	0.76
(NLG per month)	Medium (201-400) (2)	386	36.7			
	High (>400) (3)	208	19.8			
Hours worked	Low (<9) (1)	824	48.3	268	1.72	0.78
(Per week)	Medium (9-12) (2)	529	31.0			
	High (>12) (3)	353	20.7			
Type of institution	HBO (0)	971	49.2		0.51	0.50
	University (1)	1003	50.8			
Science & engineer.	No (0)	1254	63.5		0.36	0.48
	Yes (1)	720	36.5			

Notes: With regard to the type of institution only data for the 1162 students with a pre-university
          qualification were used because only thy can choose between HBO (171) or university (991).
          The intervals for loan amounts, earning amounts and working hours have been chosen on
          "natural" breakpoints in the sample distribution over the more detailed intervals.

Table 9.1 shows that for all dependent variables the number of cases in each
interval is large. Only the number of students taking up loans (143 or 7.2% of the
sample) is limited but still enough for statistical analysis. In the multiple
regression analysis and the structural equation modelling the total number of
cases was been reduced to 1,820 and 1,810 respectively because of missing values
implied.

9.2   Bivariate relationships between dependent and independent variables

The first step of the empirical testing of the hypotheses includes a bivariate
analysis of the relationships between the individual dependent and independent
variables. Again a variance test (the One-Way ANOVA) to determine the F-values
for the tested relationships and their significance is used (see Chapter 7). The
results are presented in Table 9.2. The direction of the relationships can be
inferred from the patterns of the mean sample scores for the different intervals,
which are presented in Appendix IV.

Table 9.2: Bivariate relationships, phase II (F-tests)

	Hyp. 6	Hyp. 7a	Hyp. 7b	Hyp. 8a	Hyp. 8b	Hyp. 8c	Hyp. 9/10	Hyp. 9/10
Dependent variables Independent variables	Living situation	Loan take up	Loan amount	Job yes/no	Job earnings	Working hours	Science & Eng	HBO/ WO
SES-variables								
Parental income	***	NS	NS	NS	NS	***	NS	***
Parental education	***	NS	NS	***	***	***	*	***
Ethnicity	NS	NS	*	NS	**	***	**	NS
Control variables								
Gender	**	NS	*	*	NS	NS	***	***
Entrance qualification	***	NS	NS	***	***	***	***	-
Grade point average	***	NS	*	***	***	***	***	***
Extrinsic motivation	***	NS	NS	***	*	**	+	***
Taking up loans	X	X	X	X	X	X	NS	NS
Perception variables								
Risky investment	NS	NS	NS	NS	NS	NS	NS	NS
Tuition incentive	NS	NS	NS	NS	NS	NS	-	NS
Importance of grants	NS	***	NS	NS	NS	*	NS	NS
Expected start wage	NS	NS	NS	NS	NS	+	***	***
Expected top wage	***	NS	*	+	NS	*	***	***
Willingness to borrow	***	***	**	***	***	*	***	***

Significance levels: ***=0,001; **=0,01; *=0,05; +=0,1; NS=not significant

Notes: Because the F-test is a variance test the directions of the relationships are not shown. These can be inferred from the detailed tables in Appendix IV. Taking up loans is only used as an explanatory variable for Hypotheses 9 and 10. Perceptions of tuition incentives are left out of the analysis for choosing science and engineering because measuring tuition sensitivity was already limited to students who could be persuaded to choose a science and engineering program.

Table 9.2 highlights a number of intermediary conclusions about the relationships between the independent and dependent variables. These are discussed below for the SES variables, the control variables and the perception variables.

The SES variables

With relation to the socio-economic background of students, Table 9.2 shows that for 7 of the 8 dependent variables at least one but mostly two SES variables are statistically significant.

Parental education is the strongest explanatory variable having a significant relationship with 6 of the 8 dependent variables. Students from higher educated parents are more likely to live away form the parental home and to choose university, they are less involved in part-time work and are less involved in jobs than other students. All these findings are consistent with the hypotheses.

Although parental education is significantly related to the choice for science and engineering, the pattern is diverse. Students from parents with a university degree or with upper secondary education more often choose science and engineering than students from parents with a lower secondary education qualification (or lower) or with higher professional education.

Parental income shows three significant relationships with the dependent variables. As expected, students from wealthier families more often live away from home, work fewer hours and more attend university than students from less affluent backgrounds.

Ethnicity is significant for four of the eight dependent variables but these relationships are ambiguous. As expected, allochtonous students substantially earn more, work more hours and are less likely to choose science and engineering programs than autochthon students. Unexpectedly, allochtonous students take up significantly higher amounts of loans than autochthon students.

Altogether, the SES variables do not support Hypothesis 7, which states that lower-SES students are less likely to take up student loans than higher-SES students. However, the SES variables appear to be supportive for Hypothesis 6 (students' living situation), Hypothesis 8 (particularly job earnings and the number of hours worked), and Hypothesis 9 (university or professional higher education. The SES variables are more ambiguous with respect to having a job or not (Hypothesis 8) and choosing science and engineering (Hypothesis 9).

The control variables

The control variables show many significant relationships with the dependent variables. All control variables are significant for students' living situation, having a job or not, choosing science and engineering (or not) and choosing university of professional higher education. In addition, none of the control variables show any significant relationships with loan take-up behaviour.

Gender is not related to taking up student loans, job-earnings and the number of hours worked. As expected, female students less often choose university and science and engineering programs than male students and more often have part-time jobs. Unexpectedly, female students are significantly more often living away from their parents and take higher amounts of loans than males.

Entrance qualifications show expected relationships with most dependent variables. Higher qualified students more often live away from their parents, are less involved in part-time work and more often choose science and engineering programs.[78] The same pattern appears for grade point average. In addition, students with higher grades in secondary education are more likely to choose university instead of HBO.

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[78]   Entrance qualification could not be tested for the choice between university and HBO because basically only students with a pre-university qualification can be admitted to university.

As expected, more extrinsically motivated students are more often in part-time work than less motivated students. Unexpectedly, more extrinsically motivated students are more likely to live with their parents and to choose a HBO rather than university programs.

Finally, whether students take up loans is neither significantly related to choosing a science and engineering program nor to choosing university or HBO. These findings do not support Hypothesis 10.

The perception variables

The results related to students' perceptions of financial incentives are disappointing. The bivariate analyses only reveal a small number of significant relationships with the dependent variables. Only students' willingness to borrow has statistically significant relationships with all of the dependent variables. All of these relationships support the hypotheses, implying that students who accept higher levels of student debt more often live away from home, more often take up loans and higher amounts, and more often choose science and engineering as well as university programs. Students who are more averse to borrowing are more involved in jobs than other students. This is expected and implies that they are more eager to offset borrowing with job earnings.

Expected top salary is also related to most of the dependent variables. Students expecting higher top wages are more likely to live away from home, borrow higher amounts, more often choose science and engineering as well as university programs and are less likely to be involved in jobs next to studying.

Students who are more sensitive to grants more often take up student loans than students who indicated to be more insensitive to grants.

Conclusion and some interesting results

All in all, the evidence shows no support for Hypothesis 7 (loan take-up behaviour) and Hypothesis 10 (the impact of loans on choosing shorter and easier programs). There is substantial empirical support for Hypotheses 6 (living situation) and 9 (choosing science and engineering and university programs or not). With respect to Hypothesis 8 (involvement in part-time work) the outcomes are ambiguous. Nevertheless, an important finding is that a select number of student perception variables have significant relationships with a number of student choice variables. In the next sections the full model will be tested with regressing analysis and structural equation modelling.

9.3   Multiple regression analysis

As explained in Chapter 7, the first way of testing the full theoretical model with regard to the relationships between students' SES, their perceptions of financial

incentives and their actual study choices is with multivariate regression analysis. The first phase of the analysis (Chapter 8) found no significant interaction effects between the independent variables. Therefore, in stage 2 the basic regression model without interaction terms is employed. Two types of regression techniques were used: standard multiple regression for the continuous dependent variables (amount of loans, job earnings and number of working hours) and multinominal logistical regression for the variables measured by a few intervals (see Chapter 7). The major results from these analyses are presented in Table 9.3.

Table 9.3:   Main outcomes from multiple regression analysis, phase II

	Hyp. 6	Hyp. 7a	Hyp. 7b	Hyp. 8a	Hyp. 8b	Hyp. 8c	Hyp. 9/10	Hyp. 9/10
	Living situation	Loan take up	Loan amount	Job yes/no	Job earnings	Working hours	Sc& Eng	HBO/ WO
SES variables								
Parental inc. (x 1000 NLG)							-	
Par. ed. max MAVO vs WO	+++			+++	++	+++	-	- - -
Par. ed. max VWO vs WO	+++			+++	++	+++		- - -
Par. ed. max HBO vs WO	+++			+++				- -
Ethnicity: allochthonous			++			++	-	
Control variables								
Gender: female	- - -		++				- - -	
Entr. qual. MAVO vs VWO	- - -				+++	+++		
Entr. qual. MBO vs VWO			++	+	+++	+++		
Entr. qual. HAVO vs VWO	+++					++		
Grade point average				+		-	+++	+++
Extrinsic motivation	++		+	+++				- - -
Perception variables								
Financial risk				+	- -			
Tuition incentive			-	++				
Importance of grants	++	+++		-	+++	++		
Exp. start wage (1000 NLG)					+		++	
Exp. top wage (1000 NLG)								+++
Willingness to borrow	- - -	- - -	+++	+++				++
Taking up loans								
Fit measures								
Adjusted R²			0.204		0.222	0.079		
Pseudo R² (Nagelkerke)	0.204	0.163		0.088			0.275	0.221
F-value / χ²	***	***	***	***	***	***	***	***
N	1810	1816	134	1816	972	1573	1820	1093

Significance levels: +++/--- = 0,001; ++/-- = 0,01; +/- = 0,05; N=1810

Based on Table 9.3 and the more detailed regression results presented in Appendix V, a number of conclusions can be formulated. These are presented for each of the dependent variables in the sections below.

9.3.1 Students' living situation

Hypothesis 6 states that students from low socio-economic backgrounds are more likely to live with their parents than high-SES students. This is argued because low-SES students are expected to show more cost-containing behaviour than high-SES students. The outcomes from the regression analysis show that the full model is significant and explains 20% of the variance in the dependent variable.

Concerning the SES variables, parental education has a strong significant relationship with students' living situation. Students whose parents do not have a university qualification are more than twice as likely (Exp. B - value) to live with their parents as students whose parents hold a university degree. This finding supports the hypothesis. However, parental income and ethnicity do not show a significant relationship with students' living situation.

With regard to the control variables, gender, entrance qualification and extrinsic motivation have a significant relationship with students' living status. Female students are less likely to live with their parents than male students. Students with a HAVO entrance qualification are 2.5 times more likely to live with their parents than university-qualified students. Part of this can be explained by the fact that HAVO-qualified students cannot directly enter university and thus mainly study in HBO-institutions. Because there are four times as many HBO-institutions as there are universities it is much more likely that HBO-students will find a suitable institution close to their parents' house. Students with an entrance qualification up to the MAVO level, those admitted on the basis of work- and/or life experience (*colloquium doctum*), are much less likely to live with their parents, which is expected. Finally, the data show that students that are more career oriented (higher extrinsic motivation) are more likely to live away from home. Grade point average in secondary examinations is not related to students' living situation.

Concerning the perception variables, only the importance of grants and willingness to borrow has significant relationships with students' living situation. Students who are more attracted by grants are also more likely to live with their parents, which shows cost-containing behaviour. The likelihood that one will remain living at home is lower for students who have higher levels of acceptable debt. The other perception variables do not show significant relationships with the dependent variable, and in this stage, do not support the hypothesis.

All in all, the data provide ambiguous results with relation to Hypothesis 6. Only one SES variable and one perception variable are significantly related to students' living situation.

9.3.2   Role of student loans

Hypothesis 7 states that low-SES students are less likely to take up loans than high-SES students. This is tested in two ways. The first concerns whether students are taking up loans and the second addresses the amount of loans taken up.

Taking up loans or not

The result from the regression analysis is that the theoretical model is significant and explains about 16% of the variance in taking-up loans not. However, none of the socio-economic background variables have a significant relationship with the dependent variable, which is a result that is also found in other studies (De Jong *et al.*, 2001; Hofman et al, 2003). Regardless of the fact that taking-up loans is voluntary in the Netherlands, low-SES students often must borrow in order to meet ends.

In terms of the control variables, no significant relationships between the independent variables and the take-up of student loans were found.

As for the perception variables, the importance of grants and willingness to borrow are significantly related to taking up loans. Students who are more sensitive to grant support are more likely to take up loans than those who are insensitive to grants. Surprisingly, students with lower debt acceptance rates have a smaller chance of not taking up loans (are more likely to borrow) than students who are more open to student borrowing. This may be explained by lower-SES students being more averse to loans and having to take loans to meet ends. All in all, the results suggest that Hypothesis 7 has to be rejected.

The amount of loans taken up

The multiple regression results show an R^2 that explains about 20% of the variance in the amount of loans taken up by students. The number of valid cases for this regression model was 134 (143 borrowing students minus 9 students who had missing values on other variables).

Except for ethnicity, the SES-variables do not show significant relationships with the amount of loans taken up by students. Allochthonous students borrow higher amounts than autochthon students.

With regard to the control variables, female students borrow more than male students. Students with an MBO entrance qualification also borrow more than students with a pre-university qualification. Finally, students with higher extrinsic motivation levels significantly borrow more than less extrinsically motivated students. The other variables are not significant.

Two perception variables show significant relationships with the amount of loans taken up. Students who are more sensitive to tuition changes borrow smaller amounts than other students. In addition, students with higher debt acceptance levels are found to borrow at higher levels. These findings do not support Hypothesis 7.

9.3.3   Involvement in part-time work

Hypothesis 8 states that students from lower-SES backgrounds are more likely to be involved in part-time work than students from higher-SES backgrounds because they are more likely to be attracted by the short-run gratifications of part-time employment and less likely to borrow. This hypothesis is tested in three ways: whether students have a part-time job, the earnings from employment, and the time invested in work.

Having a job or not

The regression model is statistically significant, but the R^2 shows that the model explains only 9% of the variation in the dependent variable. Concerning the socio-economic background of students, parental income and ethnicity are not significantly related to having a job. Parental education has a significant relationship with having a student job. Students from lower educated parents are more likely to have a job next to their studies compared to students whose parents have a university degree. This result supports Hypothesis 8.

With regard to the control variables, students with an MBO-qualification have significantly more often a part-time job than students with a VWO-qualification. Students with higher examination scores are less likely to have a job than students with lower examination grades. Finally, higher extrinsically motivated students more often hold part-time jobs.

The perceptions of financial risk, tuition incentives, the importance of grants and the willingness to borrow have significant relationships with the likelihood of having a job. The data reveal that the chance of having a job is smaller for students who regard higher education as a financially risky investment, for those who are more sensitive to tuition incentives as well as for those who are sensitive to grants (all contrary to expectations). Finally, students with higher debt tolerance are less likely to have a job (supportive). The other perception variables are not significantly related to having a job. Altogether, the regression outcomes ambiguously support Hypothesis 8.

Job earnings

The regression model explains 22% (R^2) of the variation in the income from student jobs. From the socio-economic background variables, only parental education shows a significant relationship with income derived from work. Students from lower educated parents significantly have higher earnings than students from parents with a university degree.

Concerning the control variables entrance qualification and, to a lesser extent, grade point average show statistically significant relationships with student income from jobs. Students with lower entrance qualifications (MAVO, MBO or HAVO) earn more than students with a pre-university (VWO) qualification. In addition, students

with higher examination results in secondary education earn less than students with lower examination grades. Thus better prepared students earn less, which confirms expectations. Gender and extrinsic motivation are not related to the amount of earnings from students' jobs.

Of the perception variables, financial risk, importance of grants and expected start salary are significantly related to the amount students earn through jobs. Students who consider higher education as a financial risk have lower earnings from jobs than other students (contrary). Students who are less sensitive to grants and those with higher expectations about their future start salary earn more than other students.

Though the SES-variables support Hypothesis 8, the perception variables show a more contradictory picture.

Number of hours worked

The time investment in student jobs is measured by the number of hours worked per week. The regression model is statistically significant and shows an R^2 that explains only 8% of the variance in the dependent variable.

From the socio-economic background variables, ethnicity and parental education show significant relationships. Allochtonous students and students from lower educated families work more hours compared to autochthon students and students from parents with a university degree. These findings support the hypothesis.

Regarding the control variables, students with lower entrance qualifications work more hours than students with a pre-university qualification. Students with higher grade point averages in secondary education examinations work less hours than students with lower grades. Gender and extrinsic motivation do not show statistically significant relationships with the number of hours worked.

The perception variables show no significant relationships with the number of hours worked except for the importance of grants. Students who find grants less important work more hours than others, which contradicts expectations.

All in all, the three dependent variables used to explore whether lower-SES students are more involved in part-time work compared to higher-SES students are partially supported by the regression results concerning the SES-variables. However, the intermediary role of the perception variables is less supportive and in a number of cases contradicts expectations.

9.3.4   Type of program

The final hypotheses being tested relate to the expectation that students from lower socio-economic backgrounds and those taking up student loans choose easier study programs and programs with a shorter duration. These hypotheses (9 and 10) are tested in two ways. The first concerns the discipline students choose, measured by choosing science and engineering (including agriculture) or other studies. In the

Netherlands it is commonly known that students regard science and engineering programs as relatively difficult and that the nominal duration (in the university sector) is longer than for other programs (De Jong *et al.*, 2001; Hofman, 2003). The second is to look at whether university qualified candidates choose university or professional higher education study programs. The HBO-programs are generally perceived to be easier and requiring less time to complete a degree.

Type of discipline

As for the SES variables, parental income, parental education and ethnicity provide significant relationships. In contradiction with Hypothesis 9, students from more affluent families are less likely to choose science and engineering programs. But allochtonous students and those with the lower educated parents are less likely to study science and engineering, which supports Hypothesis 9.

Concerning the control variables, gender and grade point average have statistically significant relationships with the discipline chosen. Expectedly, females are less likely to choose science and engineering. Students with higher grades in secondary examinations more often choose science and engineering. Students' entrance qualifications and extrinsic motivation do not make a difference.

It must be noted that tuition sensitivity was not included in the analysis because it is measured as the likelihood of choosing science & engineering in case of a tuition change. From the other perception variables, only the expected starting wage shows a significant relationship with the discipline being chosen. Students who expect higher starting salaries are more likely to choose science and engineering programs. Finally, students taking up loans do not differ from students who do not take up loans in choosing science and engineering or not.

Type of institution

Only students with a pre-university qualification can choose between university- and HBO-programs. The hypotheses therefore can only be tested for students that qualify for a university program, which reduces the sample to 1,093 cases. This also means that entrance qualification is not used as an explanatory variable in this regression model.

The regression results show that parental education is strongly related to the type of institution students choose. Students from less educated parents more often choose an HBO-institution than students from higher educated parents. This confirms Hypothesis 9. Parental income and ethnicity are not related to the choice of institution.

With regard to the control variables, gender does not make a difference for the type of institution one enrols. But grade point average and extrinsic motivation are significantly related to the institution of enrolment. Students with higher grades, more often enrol in university than in professional higher education.

However, students with a higher extrinsic motivation more often prefer higher professional education over university.

Concerning the perception variables, only expected top salary and willingness to borrow are significantly related to institution type. Students who expect higher maximum wages and those who accept higher levels of debt more often choose university education instead of HBO.

Finally, the results from the regression analysis do not show any differences between students who borrow or those who do not borrow in the choice of institution. As such, Hypothesis 10 is not supported.

Altogether, if we take into account both ways to test whether lower-SES students choose study programs that are perceived as easier to complete and that require a shorter duration, the SES and perception variables support Hypothesis 9. Both analyses, however, indicate that Hypothesis 10 should be rejected.

9.4   Structural equation modelling

The final test for the second set of hypotheses is a structural equation modelling (SEM) analysis. This technique has been discussed in Chapter 7. Because it shows all causal effects in the model and provides an overview of the direct and indirect effects, it is suitable for investigating the intermediary role of students' perceptions of financial incentives between SES and actual study-related choices.

The SEM-model tested in the second phase is based on the final results of the SEM-model of phase I (Figure 8.2), showing only the significant effects of SES and control variables on students' perceptions of financial incentives. However, two adjustments are made to the model here. The first is to account for potential effects among the perception variables. Based on common reasoning, the results from student choice literature and preliminary tests with the model, the following expected effects among the intermediate perception variables were included in the model:

- Study as a financial risk → the importance of grants: if students find studying financially risky, they are likely to find grants more important;
- Expected future income → study as a financial risk: students who expect higher future earnings are likely to find higher education less of a financial risk;
- Expected future income → willingness to borrow: students who expect higher graduate earnings are likely to accept higher debt levels;
- Entrance qualification → importance of grants: students with higher entrance qualifications find grants less important (a previous insignificant relationship now showed to be significant again).

Second, to simplify the model, the number of student perception variables were reduced in two ways. The two expected future income variables were integrated because they were measured according the same scale and showed common

patterns of results. In addition, the variable indicating students' perceptions of tuition fees was removed. The major reason being that the variable is only applicable to a relatively small number of respondents (322 students who are qualified to enter a science and engineering program but did not do so), which would limit the whole analysis to only this small group of respondents. If all cases are included then the nature of the variable tuition sensitivity changes. In addition, the phase 1 analyses have shown that the model is not a good predictor for tuition sensitivity. Taking into account these adjustments, the basic SEM model for the second phase is drawn up as depicted in Figure 9.1.

Figure 9.1:   The basic model for structural equation analysis
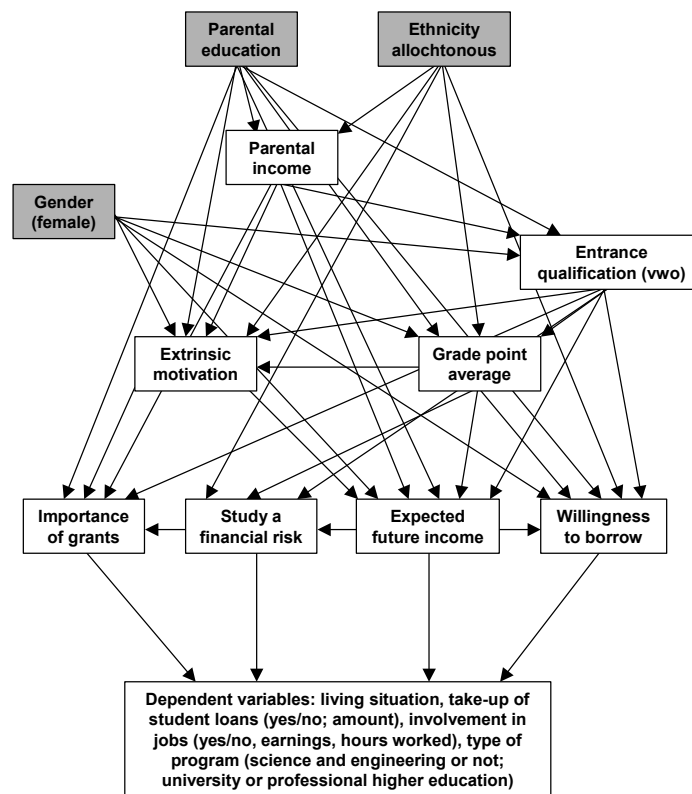
As explained in Chapter 7, the SEM analysis was first applied to the *basic model* that assumes that all the effects of the exogenous variables (parental education, ethnicity and gender) and control variables only have an indirect effect on the dependent variables (students' actual choices). The next step explores whether any direct effects of the exogenous and control variables on the dependent variables can improve the relative fit of the model leading to an *adjusted model*.

The results from the structural equation modelling analysis are presented in two stages. In Section 9.4.1 the relative fit of the full model to the sample data is explored. In Section 9.4.2 the significance, magnitude and direction of the effects within the model are presented, also showing the direct and indirect effects.

9.4.1   Relative fit of the theoretical model with the sample data

The model fit outcomes are presented in Table 8.4 for the each of the dependent variables. To indicate the relative explanatory power of our model, Table 9.4 shows for each dependent variable the R^2. As discussed in Chapter 7 the major measures for model fit include the chi-squared, the degrees of freedom, the P-value, the NFI and the RMSEA.

Table 9.4:   SEM Fit measures, phase II

Model	R^2	χ^2	df	P	NFI	RMSEA
Students' living situation						
Basic model		157.05	22	0.000	0.996	0.058
Adjusted model including direct effects of: gender, parental education, entrance qualification, and extrinsic motivation	0.13	23.02	18	0.190	0.999	0.012
Taking up student loans or not						
Basic model	0.07	23.75	22	0.361	0.999	0.007
Amount of student loans						
Basic model		27.36	22	0.198	0.990	0.043
Adjusted model including direct effects of: ethnicity, gender and extrinsic motivation	0.22	6.75	19	0.995	0.998	0.000
Having a job or not						
Basic model		86.19	22	0.000	0.998	0.040
Adjusted model including direct effects of: parental education, entrance qualification, grade point average, gender and extrinsic motivation	0.05	21.46	17	0.206	0.999	0.012
Job earnings						
Basic model		79.32	22	0.000	0.996	0.052
Adjusted model including direct effects of: parental education, ethnicity and entrance qualification	0.10	18.24	19	0.507	0.999	0.000
Hours worked						
Basic model		89.19	22	0.000	0.997	0.044
Adjusted model including direct effects of: parental education, ethnicity, entrance qualification, and grade point average	0.05	20.68	18	0.296	0.999	0.010
Science and engineering or not						
Basic model		361.81	22	0.000	0.990	0.092
Adjusted model including direct effects of: gender, Ethnicity, parental income and grade point average	0.20	26.65	18	0.086	0.999	0.016
University or professional higher education						
Basic model		101.48	20	0.000	0.995	0.061
Adjusted model including direct effects of: parental education, grade point average, extrinsic motivation, ethnicity on expected income and gender on importance of grants	0.10	22.54	15	0.094	0.999	0.021

From this table it is evident that for all dependent variables the basic model has to be extended with direct effects from one or more of the exogenous variables (parental education, ethnicity or gender). That implies that the exogenous and control variables in question also directly impact students' actual choices.

The explained variance (R^2) in the dependent variables does not exceed 22%. This implies that our model does not explain most of students' choice behaviour with regard to the dependent variables. One possible reason for this is that the model here focuses largely on the financial part of the picture. Another reason could be the limited way individual choice was modelled. For example, we did not look at all potential variables that may explain grade point average, extrinsic motivation or the perceptions about future earnings. The rest of the outcomes presented in Table 9.4 will be discussed for each of the dependent variables.

Students' living situation: The basic model, which excludes the direct effects of background characteristics on students' living situation, provides a good fit with the data (the RMSEA-value is below 0.10 and the NFI is well above 0.9). This suggests that the test of the role of the perceptions of financial incentives for students' actual decisions on where they prefer to live is already successful. However, the model can be further improved by including the direct effects of a number of background characteristics (gender, parental education, entrance qualification and extrinsic motivation). The P-, NFI- and RMSEA-values show an outstanding fit with the data. Together this suggests that students' perceptions of financial incentives as intermediary variables make a significant contribution to explaining the variation in student choices with respect to where the live.

Taking up student loans or not: With an RMSEA score of 0.007 (and NFI almost 1.00) the basic model shows an outstanding fit with the data. This suggests that the expected intermediary role of the perception variables is realistic.

Amount of loans taken up: This model could only be tested for 134 valid cases. Though it is a limited number, it exceeds the minimum sample size of 100 cases (or at least 5 times the number of variables included) often indicated in literature for such analyses (Kelloway, 1998). The basic model presents a good fit with the data (RMSEA below 0.1 and NFI above 0.9). But the model can be improved by including the direct effects of ethnicity, gender and extrinsic motivation on the amount of loans taken up. This is a first indication that the theoretic model makes sense for explaining the amount students borrow.

Having a job or not: The basic model, excluding the direct relationships between the background characteristics and the likelihood of having a part-time job, shows a very good fit with the data (RMSEA is below 0.05 and NFI far above 0.9). The model can be improved by including the direct effects of parental education, entrance qualification, grade point average, gender and extrinsic motivation. However, this weakens the intermediary role of the perception variables.

Job earnings: The scores from the structural equation analysis (RMSEA of 0.05 and NFI of 0.996) show that the basic model fits the data very well, which again supports the model drawn up in this study. The model can be improved by

adding the direct effects of parental education, ethnicity and entrance qualification, leading to almost perfect RMSEA and NFI scores.

Number of hours worked: The basic model shows a very good fit with the dataset (RMSEA below 0.05 and NFI well above 0.9). The model is improved by including the direct effects of parental education, ethnicity, entrance qualification and grade point average.

Science and engineering: In testing the hypotheses that lower-SES students and those taking up student loans are less likely to choose science and engineering programs, the basic model was slightly modified by adding whether students take up loans as an explanatory variable. The basic model shows a good fit with the data set (RMSEA is below 0.1 and NFI is 0.993). The model can be improved by including the direct effects of gender, ethnicity, parental income and grade point average. The outstanding fit of the model indicates that the theoretical model very well explains the dependent variable for the given dataset.

University or professional higher education: In testing the hypotheses that lower-SES students and those taking up student loans are less likely to choose a university study program compared to other students we also added "whether students take up loans" as an explanatory variable to the basic model. Because not all students who qualify for higher education are entitled to enter university programs, only the 1,091 students who qualified for university (but may also choose a HBO-program) were included. The main finding is that entrance qualification does not serve as a useful explanatory variable in this model. The basic model also in this case shows a very good fit with the data. The RMSEA-score is 0.06 and the NFI is close to 1.00. The model can be improved by including the direct effects of parental education, grade point average and extrinsic motivation. In addition, including the direct effects of ethnicity on expected future income and gender on the importance of grants also improves the model.

All in all, the basic model without the direct effects of the exogenous and control variables on the dependent choice variables generally shows a good fit with the data but can be improved by including some of the direct effects, except for whether students take up loans. As far as parental education, parental income and ethnicity are concerned, this is a first indication that the analysis supports the hypotheses. But including direct effects of the exogenous and control variables weakens the intermediate role of the student perception variables. Whether the hypotheses are supported or rejected also depends on the magnitude and direction of the effects, which are explored in the next section.

9.4.2   Magnitude and direction of the effects

The second step in the SEM-analysis is to assess the magnitude and direction of the effects of the independent variables amongst each other and on the dependent variables. The standardised direct and indirect effects on the dependent variables are presented in Table 9.5. The effects among the independent variables are presented in Appendix III, Table III.1.

Table 9.5: SEM standardised effects, phase II

Variables	Total effect	Direct effect	Indirect effect
Students' living situation (N=1810)			
Parental education	0.20	0.13	0.06
Gender (female)	0.06	0.09	- 0.03
Entrance qualification (VWO)	0.21	0.16	0.05
Extrinsic motivation	- 0.06	- 0.07	0.01
Importance of grants	- 0.06	- 0.06	0.00
Willingness to borrow	0.19	0.19	0.00
Taking up student loans (N=1810)			
Study a risky investment	0.05	0.03	0.02
Importance of grants	- 0.11	- 0.11	0.00
Willingness to borrow	0.25	0.25	0.00
Amount of loans (N=134)			
Ethnicity (allochtonous)	0.27	0.22	0.06
Gender (female)	0.15	0.20	- 0.05
Extrinsic motivation	0.19	0.21	- 0.02
Importance of grants	- 0.13	- 0.13	0.00
Willingness to borrow	0.27	0.27	0.00
Having a job or not (N=1810)			
Parental education	- 0.13	- 0.11	- 0.02
Gender (female)	0.06	0.05	0.01
Entrance qualification (vwo)	- 0.07	- 0.04	- 0.03
Grade point average	- 0.06	- 0.05	- 0.01
Extrinsic motivation	0.10	0.09	- 0.01
Study a risky investment	- 0.07	- 0.06	- 0.01
Importance of grants	0.06	0.06	0.00
Willingness to borrow	- 0.08	- 0.08	0.00
Job earnings (N=960)			
Ethnicity (allochtonous)	0.06	0.07	- 0.01
Parental education	- 0.13	- 0.12	- 0.01
Entrance qualification (vwo)	- 0.19	- 0.19	0.01
Expected future income	0.05	0.05	0.00
Study a risky investment	- 0.13	- 0.10	- 0.03
Importance of grants	0.17	0.17	0.00
Willingness to borrow	- 0.05	- 0.05	0.00
Number of hours worked (N=1567)			
Ethnicity (allochtonous)	0.08	0.08	0.00
Parental education	- 0.10	- 0.06	- 0.05
Entrance qualification (vwo)	- 0.16	- 0.16	0.00
Grade point average	- 0.07	- 0.07	0.00
Science & engineering or not (N=1810)			
Ethnicity(allochtonous)	- 0.06	- 0.05	- 0.01
Gender (female)	- 0.40	- 0.38	- 0.02
Grade point average	0.15	0.15	0.00
University or hbo (N=1091)			
Parental education	0.16	0.11	0.05
Gender (female)	-0.07	0.00	-0.07
Grade point average	0.15	0.13	0.02
Extrinsic motivation	-0.08	-0.14	0.05
Expected future income	0.20	0.20	0.01
Study a risky investment	0.05	0.05	0.00
Willingness to borrow	0.08	0.08	0.00

Only effects of 0.05 and larger are presented; all effects are presented in Appendix VI.

Students' living situation

Hypothesis 6 states that lower-SES students with price sensitive perceptions are more likely to live with their parents than higher-SES students. The standardized direct, indirect and total effects in Table 9.5 show that parental education, gender and entrance qualification have a strong direct positive effect on students' living situation, meaning that students from higher educated parents, female students and students with pre-university diplomas are more likely to live away from home. Extrinsic motivation, has a negative direct impact on students' living situation, implying that high extrinsically motivated students are more likely to stay with their parents. The effects of ethnicity, parental income and grade point average are small.

   With respect to the perception variables, the willingness to borrow has a (strong) positive relationship with the living situation of students. The more students are willing to borrow, the more likely it is that they are living away from home. On the other hand, students that are more sensitive to grants are more likely to live away from home. That makes sense because those students face higher living costs. The other perception variables have no substantial effects on students' living situation.

   All in all, parental education and two out of the four perception variables have a substantial direct effect on students' living situation and indirectly affect it through the background characteristics, which supports Hypothesis 6.

The role of student loans

Hypothesis 7 states that students from low socio-economic groups with price sensitive perceptions are less likely to take up student loans than high-SES students. This hypothesis is tested in two ways: whether students take up a loan, and if they do, what amount they borrow.

   Taking up student loans or not: Regarding whether students take up a loan, the model fit (see Section 9.4.1) was outstanding for the basic model, implying that no direct effects of the exogenous and control variables were needed to explain why students take up loans. Table 9.5 shows that only perceptions (the willingness to borrow, the importance of grants and the riskyness of studying) have a substantial effect on taking up loans. The SEM analysis, however, also shows several small indirect effects (see Appendix VI, Table VI.1). Female students and students from higher income families are less likely to borrow than other students. In addition, students with higher GPA-scores in secondary education and allochtonous indirectly are more likely to borrow. All of these indirect effects correspond to results from other studies (e.g., Hofman *et al.*, 2003).

   As for the perception variables, the SEM-model shows that financial risk, importance of grants and willingness to borrow have a substantial effect on the take-up of loans. Students who find higher education more risky, more often take up loans. Students who are more likely to study if no grants were available are

less likely to take up student loans. This is probably because they have sufficient means themselves. Finally, students who have higher debt acceptance levels are much more likely to take up loans than others, which is logical. Thus the model shows that students who claim to find debt acceptable also really take up loans in practice. As can be seen from Appendix VI, the other perception variables have no substantial direct or indirect effects.

Amount of student loans: Table 9.5 clearly points out that ethnicity, gender and extrinsic motivation have a strong positive impact on the amount students borrow. That means that allochtonous students, females and students with a higher extrinsic motivation take up higher amounts of student loans than other students. However, the direct effect of gender is lowered a bit by its indirect effect on the borrowing amount through other variables, like entrance qualification, GPA, extrinsic motivation and the perception variables).

The perception variables show that students who would also study without student grants are likely to have lower loan amounts. In addition, students who indicated they were more willing to borrow also indeed are the most likely to borrow higher amounts, which shows consistency between students attitudes and actions.

All in all, the SES-variables do not show a strong relationship with the extent to which students take up loans and the amounts they borrow. This does not support Hypothesis 7. However, three out of four perception variables were found to have a substantial effect on taking up loans, including some indirect effects from gender, ethnicity and GPA. These support the theoretical model.

Involvement in work

Hypothesis 8 states that lower-SES students with price sensitive perceptions are more often involved in part-time work than high-SES students. This hypothesis is tested in three ways. First by evaluating whether students are involved in part-time work or not. Secondly by examining the amount students earn with these jobs, and thirdly for the number of hours students spend on working activities.

Having a job or not: Table 9.5 shows that parental education, gender, entrance qualification, grade point average and extrinsic motivation all have a substantial effect on the likelihood of having a job. As expected, students from higher educated families are less likely to have a job. Female students and higher extrinsically motivated students more often have jobs than others. But more qualified students less often have jobs.

Of the perception variables, financial risk, importance of grants and willingness to borrow are found to have substantial effects. Unexpectedly, students who find higher education more risky less often have jobs. Students who indicate that they are not sensitive to grants work more often. Students who accept higher debt levels are less likely to work. Altogether, the results mainly support the hypothesis.

Job earnings: The results show students from higher educated parents and those with higher entrance qualifications earn less through jobs, the effects being mostly direct. In addition, allochtonous students earn more than autochthon students, whereas the indirect effects take away part of the direct effect.

With regard to the perception variables, students who are more likely to study if there would be no grants earn considerably more than other students. Again, students who regard higher education as a risky investment have lower job earnings. This contradicts expectations. Finally, students who are willing to borrow also have lower job earnings.

Hours worked: Table 9.5 indicates that students with higher educated parents, with higher entrance qualifications and with a higher grade point average work fewer hours. Interestingly, the effect of parental education on the number of hours worked is half direct and half indirect, suggesting that parental education has an impact through many other variables as well. That is consistent with the previous findings and expectations. Also consistent with expectations, allochtonous students spend more time on working.

None of the perception variables have a substantial effect on the number of hours worked.

If all results of the three indicators for students' involvement in jobs are combined then the results broadly support the hypothesis. Parental education and ethnicity show expected effects and for two of the three dependent variables for job involvement there is an intermediary role of students' perceptions of financial incentives.

Type of program

In this section, two hypotheses are tested. Hypothesis 9 states that lower-SES students with price sensitive perceptions are more likely to study in relatively shorter or easier study programs than higher-SES students. Hypothesis 10 states that students who borrow are more likely to study in relatively shorter or easier study programs than students who do not take up student loans. Both hypotheses are tested in two ways. Whether students choose (longer and) more difficult science and engineering study programs (or other programs), and whether students qualified for university choose university or professional higher education programs. The latter are perceived as easier and requiring a shorter actual time to degree.

Science and engineering: Table 9.5 shows that the largest effect comes from gender, with female students far less often choosing science and engineering programs. This is a general existing pattern. Also allochtonous students are less likely to choose science and engineering programs, supporting Hypothesis 9. Grade point average also has a substantial positive impact on choosing science and engineering. None of the other variables, including the perception variables have an effect on the choice for science and engineering programs or not. These findings do not support the hypothesis.

With regard Hypothesis 10, it must be stated that individuals who take up loans are less likely to attend science and engineering programs but the effect is not substantial enough to support the hypothesis.

University or professional higher education: Table 9.5 indicates that students from higher educated families more often go to university than others. Also as expected, students with higher grade point averages most often choose university over professional higher education. Female students and higher extrinsically motivated students less often choose university education.

With regard to the perception variables, students expecting higher future income more often choose university. In addition, students who are more willing to take up loans are more likely to go to university. Unexpectedly, students who regard higher education as a risky investment are more likely to go to university than to professional higher education.

With regard to Hypothesis 10, there is no relationship between whether students take up loans and the type of institution they choose.

Based on both analyses Hypothesis 10 needs to be rejected. As for Hypothesis 9, there are only a few relationships between students' socio-economic status and the type of program or institution they choose. Perception variables play intermediary role for the choice of type of institution. Although there is no strong evidence supporting the hypothesis, there neither is evidence to reject it.

Overall results

A first overall remark is that most indirect effects are limited. Parental education in a number of cases has substantial indirect effects. This confirms prior evidence in student choice research that parental education is one of the prime determinants of student choice. In addition, ethnicity, gender and entrance qualification in some cases have substantial indirect effects, and in many cases minor, but existent, indirect effects. There are a few situations in which the indirect effects work contrary to the direct effect of an independent variable. For example, the effect that females more often live away from home is reduced by their being less willing to take up student loans and therefore may be more limited in their choices with regard to their living situation. Another example is that higher extrinsically motivated students are less likely to go to university. This reluctance may be reduced because they expect higher future earnings and therefore may be more tempted to choose university.

Altogether, the results from the structural equation analysis for the second phase of the empirical study are ambiguous. On the one hand, the theoretical model was shown to have an excellent fit with the data for all dependent variables. As such, it supports the idea that integrating students' perceptions of financial incentives into student choice models is worthwhile. This idea is strengthened by the fact that in most cases two or three of the perception variables play a substantial role in explaining the variance in the dependent variable. On the other hand, however, the total, direct and indirect effects of all

independent variables are not always as strong as expected or hoped for. On top of that, the direction of some of the effects was contradictory to expectations formulated in the hypotheses.

9.5   Overall conclusions phase II

The findings from the bivariate analysis, the multiple regression analysis and the structural equation modelling show very similar results in the sense that for each dependent variable the same patterns were found in the independent variables that have a significant relationship with (or effect on) the dependent variables. The outcomes of the three analyses are also consistent in the direction of the relationships/effects between the independent and dependent variables.

If one focuses on the extent to which the hypotheses are supported by the empirical observations, Hypotheses 10 has to be rejected. Students who take up loans do not differ in the type of program or institution they choose compared to students who doe not take up student loans. Hypothesis 7, which suggests that lower-SES students are less likely to take up student loans, is also not very well supported by the analyses and also has to be rejected. The evidence with respect to the other four hypotheses is ambiguous. Generally one or two socio-economic background variables, mainly parental education and ethnicity, were found to have an effect on the dependent variables (students' living situation, their take up of loans, their involvement in part-time work and the type of program or institution they choose). In addition, three perception variables were found to often play an intermediary role in the model: students' perception of higher education as a financial risk, the importance of grants and the willingness to borrow. Future income expectations play a minor role. So, where it was shown in Chapter 8 that students from different background do have substantial differences in their future income expectations, these expectations appear to hardly influence the actual study choices students make. All in all, although not all outcomes for all variables are consistent with the hypotheses, the analyses also show that students' perceptions of financial incentives play a role in student choice and can also play an intermediary role between students' background characteristics and their actual study-related choices.

10 Summary, conclusions and reflections

Student choice is an important and at the same time contentious topic in higher education policy. It was shown in Chapter one this is partly due to the worldwide tendency towards cost sharing. Students and their parents have to bear an increasing share of the costs of higher education by means of higher tuition fees and a growing reliance on loans and student jobs instead of grants (Johnstone, 2004). The increasing costs for students and their families raises the question of what this means in terms of access to higher education. Is higher education still affordable? Do increasing costs prevent potential students, particularly those from disadvantaged backgrounds, from entering higher education or from choosing their most preferred program or institution? The basic issue addressed in this thesis is students' price-responsiveness. How do students from various socio-economic backgrounds react to price incentives such as tuition fees, grants and loans?

Student choice has been widely explored in the literature. This study aims to contribute to the existing literature by evaluating the potential value of *behavioural economics* for this research area. This theory explores human financial decision-making in situations of uncertainty by integrating psychological phenomena into economic reasoning (Kahneman and Tversky, 2001). Based on these psychological phenomena, individuals form their own subjective perceptions of decision-making situations. This study investigates whether these perceptions play an intermediary role in the relationships between financial incentives, socio-economic status and student choice. It aims to get a better understanding of issues like debt aversion and differences in price-responsiveness between students from different SES-groups.

Below, the main findings of this thesis are summarised and reflections are formulated about what the conclusions imply for theories and policies that relate to student choice issues.

10.1 Major outcomes from previous student choice research

Chapter 2 discussed the major outcomes of prior student choice research. Student choice generally relates to students' enrolment decisions. It studies whether students enter and persist in higher education and what type of programs and institution they choose. In the current study, the concept of student choice is extended by also including other kinds of decisions students have to make when enrolling in higher education, like whether to live at their parental home or to live independently, to take up loans, and to take a part-time job or not.

Many studies across a wide range of countries have come to the conclusion that financial incentives like tuition fees, grants and loans hardly impact students' choices and their enrolment patterns (Leslie and Brinkman, 1987, Heller, 1997, De Jong *et al.*, 2001). Only a small number of studies indicate that developments towards cost sharing through tuition and student support policies may have harmed access for students from lower socio-economic groups (McPherson and Schapiro, 1998; Heller, 2001). The studies that do report an impact of tuition and student support on access particularly show that lower-SES students choose shorter, cheaper, less prestigious, and less risky educational opportunities (Heller, 1997; McPherson and Schapiro, 1997).

Although many students in a number of countries take up substantial student loans, a large number of studies pointing at the fact that students are debt averse (Campaign and Hossler, 1998; Callender, 2003). However, the claim that debt aversion also leads to reduced access is not yet supported with convincing evidence (Johnstone, 2005). Therefore, the issue of debt aversion and its potential impact on access to higher education remains an intriguing topic.

Student choice research usually is based on survey research among students who already entered higher education. This is a methodological weakness; surveying and following up on senior secondary education pupils is more preferred. However, such surveys are rare partly because panel studies are time consuming, difficult and expensive to conduct. They also require much larger samples because one has to account for much larger non-response rates if the study consists of successive survey rounds.

Finally, almost all student choice research comes to the conclusion that student choice appears to be most strongly influenced by the level of parental education, grade point average in secondary education, and factors like the distance between parental home and the higher education institution. Financial incentives like tuition fees and grants, are generally found to play a minor role, regardless of whether one looks at student choice in Australia (Dobson, 2003), Canada (Junor & Usher, 2004), the Netherlands (De Jong *et al.*, 1997; Hofman *et al.*, 2003), the UK (Callender, 2003), the US (Heller, 2001) or elsewhere (ICHEFAP, 2005). Particularly because student financing appears to be one of the most popular policy instruments to influence student choice, it remains interesting to explore the role of financial incentives for student choice and why non-financial factors dominate over monetary factors. Is it true that money does not matter?

10.2   A new theoretical framework for student choice

The major objective of this study is to apply a new theoretical approach to the field of student choice. Chapter 3 described the traditional economic theories that so far underlay most research on the role of financial incentives in student choice, being price theory and human capital theory.

The empirical evidence on student choice is difficult to reconcile with traditional economic theories. Both neo-classical price theory and human capital theory predict only small differences in price-responsiveness between students from various socio-economic groups. Price theory states that students, as rational actors, respond to price changes. Though students from lower socio-economic backgrounds may respond more strongly to changes in tuition fees of student support, also better-off students are expected to react to price changes. In practice, however, there are many examples where this does not happen to be the case. There are too many examples where changes in fees or student support do not lead to enrolment changes (Andrews, 1999; Heller, 1997; Hossler *et al.*, 1999). In other cases students from lower-SES groups do appear to be price sensitive. Confronted with increased cost sharing they tend to choose shorter and cheaper programs and institutions (McPherson and Schapiro, 1998) and are shown to be debt averse (Callender, 2003). These differences cannot be easily understood from a rational neo-classical price theory perspective.

The second and most popular theoretical perspective on student choice is the human capital theory. Although it is based on general price theory, it takes a long-run investment perspective and argues that as long as the individual discounted benefits of higher education outweigh the discounted costs, students will invest in education, regardless of their current income position and socio-economic status or that of their parents. Students are expected to make rational cost-benefit analyses. This expectation, however, is contradicted by the fact that in many countries qualified individuals from lower socio-economic backgrounds are strongly underrepresented in higher education even correcting for academic aptitude (HIS, 2002). In addition, students often try to prevent taking up loans. They prefer to work besides studying, which in many cases leads to an extension of the actual duration of study (Vossensteyn, 2004a,b). This fact is particularly surprising in countries where the private financial returns to higher education are substantial. The College Board (2004) indicates that in America graduates on average earn about $1.000.000 more during their career than individuals with a secondary education qualification. This also holds for students from the poorest backgrounds. From a rational perspective, debt aversion and differences in price-responsiveness for various groups of students are difficult to understand.

The more recent and extended versions of human capital theory are more nuanced and also account for consumption benefits, uncertainty, quality differences and time preferences (Webbink, 1999). This extended human capital theory suggests that students' circumstances and preferences can lead to different cost-benefit analyses and therefore may result in different student choices. Nevertheless, even in a more bounded rational human capital perspective, students' debt aversion and the differences in price-responsiveness between students from various SES-groups can only be explained to a limited extent. This is particularly for three reasons: 1) the private returns to higher education are generally very high; 2) student support mechanisms are mostly generous to poor students; 3) student loans normally have flexible and generous repayment

conditions including low interest rates and debt forgiveness in cases of repayment difficulties. Therefore, actual student behaviour may call for even further adjustments in the traditional human capital theory. In addition, human capital theory does not clearly explain why people have different preferences leading to different discount rates and different cost-benefit analyses.

Overall, the empirical evidence indicates that lower-SES students seem to react according to general price theory, whereas higher-SES students behave according to the human capital perspective. Combined with the fact that students are averse to taking up loans, empirical evidence suggests that the relationships between financial incentives, socio-economic background and student choice are more complex than traditional economic theories would like us to believe.

10.2.1   Theory of behavioural economics

To address the above-mentioned shortcomings in the traditional theories, Chapter 4 explored a relatively new theoretical approach for understanding financial decision-making: *behavioural economics*. Behavioural economics states that the impact of financial factors on individual decision-making is not straightforward but is likely to be 'filtered' through a number of psychological mechanisms that make individuals deviate from rationality.

In trying to understand and explain why individuals systematically deviate from rational behaviour in economic decision-making in situations of uncertainty behavioural economics integrates a number of psychological concepts into economic theory (Kahneman and Tversky, 1979). As such it extends the concept of bounded rationality of Herbert Simon (1957) but does not claim that individuals act irrational; they deviate from rational decision-making in a structured way (Thaler, 1992; Rabin, 1998). The theory provides a long list of psychological phenomena (see Table 4.1) that influence individuals' perceptions of financial factors. The psychological "filters" that are considered here as directly relevant for student choice are: are reference levels, loss aversion, the endowment effect, mental accounting and intertemporal choice.

Reference levels

Reference levels imply that individuals value alternative decision outcomes as gains or losses relative to a reference point, and not as the absolute outcomes of a decision, e.g. the status quo (The Royal Swedish Academy of Sciences, 2002). With relation to student choice, it is likely that (potential) students value tuition fees and student support in relation to their current (parental) income situation. This implies that tuition fees are likely to have a stronger negative impact on the enrolment decisions of poor students than of rich students. For grants it works the other way around. The reference effect also influences students through peer effects of parents, friends, classmates and teachers.

Loss aversion and the endowment effect

Loss aversion suggests that individuals are significantly more averse to losses than they are attracted to gains of the same size (Kahneman *et al.*, 1991). In terms of student choice this suggests that students will be deterred more strongly by the costs of study, like tuition fees and student debt than they will be attracted by gains, like grants, scholarships, future earnings and labour market opportunities. It is thus expected that students are less likely to attend high-cost institutions even if the costs differences with low-cost institutions are compensated by grants. Students are also likely to be hesitant to take up student loans.

Intertemporal choice and self-control

Intertemporal choice refers to the phenomenon that, when the costs and benefits of a decision are spread out over time, individuals attach relative higher weights to short-run benefits and costs than to long-run ones (Thaler, 1992). Regarding student choice, this is likely to reduce the likelihood of investing in higher education. Students also are expected to prefer the direct benefits of part-time work above taking up loans, even if student jobs may delay students' entrance into the labour market and reduce their lifetime earnings. The phenomenon of self-control argues that individuals are uncertain about their future spending of money or time and are likely to limit their future options. As such, students may prefer to take part-time jobs instead of student loans to prevent any potential repayment difficulties. To reduce the risks of failure to get a degree, they may also choose shorter, easier and less expensive study programs.

Mental accounting

Mental accounting indicates that individuals label different components of wealth differently using various rules for spending different categories of resources (Allers, 2001). In the case of student choice, mental accounting may help explain debt aversion because taking up student loans implies that students spend money from their "future income account" which is generally perceived as more 'painful' than from other types of accounts. Higher education is also not likely to be a top priority for individual spending: it is not regarded a primary need.

10.2.2   Theoretical framework and hypotheses

In Chapter 5 a behavioural economics framework was developed that specifies the relationships between financial incentives like tuition fees, grants and loans, students' socio-economic status, other student background variables, students' perceptions of financial incentives and their actual study-related choices. The theoretical framework suggests that financial incentives are interpreted by

students in the context of their individual background characteristics resulting in their perceptions of these financial incentives. These perceptions of costs and benefits then are translated into actual choices. Student perceptions are thus treated as an intermediary stage between the original financial incentives and the actual choices students make. These relationships are visualised in the financial perceptions model for student choice.

Figure 10.1: The financial perceptions model for student choice
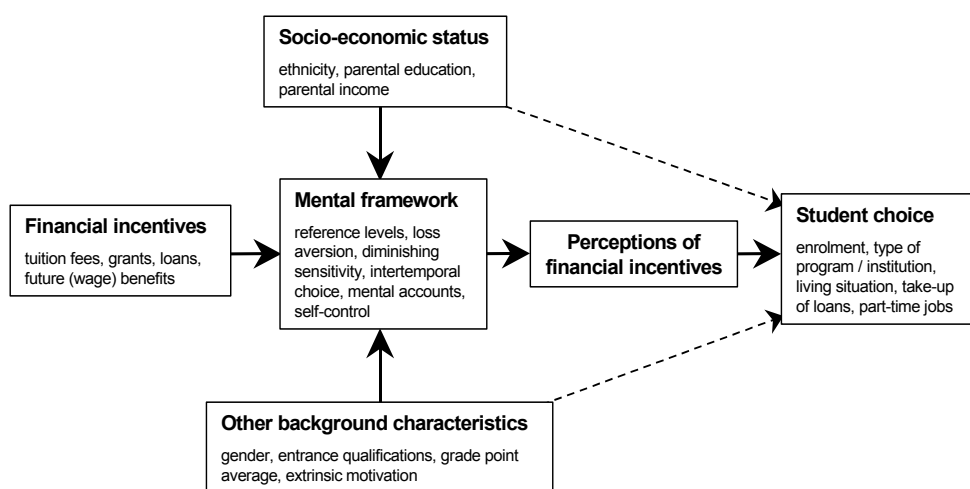
To test whether this model rationalises the data, ten hypotheses on the relationships between students' socio-economic status, their perceptions of financial incentives and their actual study-related choices were formulated. Socio-economic status is regarded as a key variable in explaining student price-responsiveness. Nevertheless, other background variables are included in the explanatory model because they were important in prior student choice research. The hypotheses address two types of relationships, resulting in two phases in the empirical research. First, whether students from different SES-groups have different perceptions of financial incentives. Second, whether differences in perceptions lead to differences in students' actual choices. The hypotheses are:

Phase 1: socio-economic status and perceptions of financial incentives

Hypothesis 1:   Low-SES students are more likely to perceive higher education as a risky investment than high-SES students.

Hypothesis 2:   Low-SES students are more likely to be deterred by tuition increases or attracted to tuition decreases than students from high-SES groups.

Hypothesis 3:   Low-SES students are more attracted to grants or scholarships than high-SES students.

Hypothesis 4:   Low-SES students have lower future income expectations than high-SES-students.

Hypothesis 5:   The maximum amount that students are willing to borrow for investing in higher education is lower for low-SES students than for high-SES students.

Phase 2: Socio-economic status, perceptions and actual student choice

In this second set of hypotheses students' perceptions of financial incentives play an intermediary role in the relationships between SES and actual study choices.

Hypothesis 6:   Low-SES students are more likely to live with their parents than high-SES students.

Hypothesis 7:   Low-SES students are less likely to take up student loans than high-SES students.

Hypothesis 8:   Low-SES students are more involved in part-time jobs while studying than high-SES students.

Hypothesis 9:   Low-SES students are more likely to attend higher education programs with a relatively short duration and programs that are perceived as less difficult than high-SES students.

Hypothesis 10:   Students taking up loans will be more likely to attend higher education programs with a relatively short duration and programs that are perceived as less difficult than students who do not take up student loans.

10.3   Research methodology

Survey data from an existing survey database on Dutch first-year higher education students (i.e freshmen) in 1997 was used to test the theoretical model. To increase the homogeneity of the research population, focus was given to students who for the first time entered higher education. These "real freshmen students" were expected to be under the strongest influence of (socio-economic) background characteristics. This is interesting from the perspective of the hypotheses. The 1997 cohort of students was chosen for two reasons. First, it is the richest databases in terms of information on students' perceptions. Second, because these students entered higher education just after the introduction of the "performance-related grant" in 1996 that attached higher risks to investing in higher education (see Chapter 6, Section 6.2.2). The 1997 new entrants were expected to be particularly cautious about the costs and benefits of studying.

10.3.1   Operationalisation

The operationalisation of the hypotheses was presented in Chapter 6. For each hypothesis one or multiple dependent variables were selected. The dependent variables were divided into variables reflecting students' perceptions of financial incentives (phase 1) and variables indicating actual student choice (phase 2).

The explanatory model of this study consisted of socio-economic status variables (the core focus of this study) and control variables that were found important in prior student choice research. In addition, the dependent perception variables of the first phase of the analysis were used as independent intermediary variables in the second phase. All variables used are listed in Table 10.1.

Table 10.1: Variables used in the analysis

Type of variables	Hypothesis	Variables
Dependent variables phase I	1	Study perceived as a financial risky investment
	2	Sensitivity to tuition fees
	3	Importance of grants and scholarships
	4	Expected starting salary
	4	Expected maximum salary during career
	5	Willingness to borrow (maximum acceptable debt)
Dependent variables phase II	6	Living status of students
	7	Taking up loans
	7	Amount of loans
	8	Having a part-time job
	8	Job earnings
	8	Number of hours worked
	9 & 10	Science and engineering or not
	9 & 10	Type of institution (university or professional HE)
Independent SES-variables	all	Parental education
	all	Parental income
	all	Ethnicity (autochthon or allochtonous)
Independent control variables	all	Gender
	all	Entrance qualification
	all	Grade point average in secondary education
	all	Extrinsic motivation
Intermediary independent variables phase II	6 - 10	Study perceived as a financial risky investment
	6 - 10	Sensitivity to tuition fees
	6 - 10	Importance of grants and scholarships
	6 - 10	Expected starting salary
	6 - 10	Expected maximum salary during career
	6 - 10	Willingness to borrow (maximum acceptable debt)

10.3.2 Statistical methods

The sample used for this study was described on the basis of a number of key statistics (see Section 7.3), including the number of cases, the frequency distribution, the mean scores, and the standard deviation. The results were then compared to statistics about the entire Dutch student population. Though the sample is not fully representative of the population it is not the intention to extrapolate our findings to the total student population. The objective was to make statistically reliable statements. This criterion was met.

The second step in the statistical analysis was computing bivariate relationships between independent and dependent variables. This bivariate analysis does not imply causality but only indicates potential relationships. Composite *F-tests* (ANOVA) were done, which compared both the variance between groups and within groups.

The third step was to test the fully specified model based on the theoretical framework. This was done by linear multivariate regression analysis. Depending on the characteristics of the dependent variables used a standard multiple regression model (for continuous dependent variables) or a multinominal logistical regression method (for dependent variables with only two or three intervals) was employed. Chapter 7 explored whether it was necessary to include any interaction effects in the model. This turned out to be not the case.

The final part of the analysis used the more advanced *structural equation modelling* (SEM) method. SEM-analysis provides three advantages compared to multiple regression analysis (Kelloway, 1998). First, because it runs all specified equations simultaneously, it does not hide effects between any of the variables in the model. As a result, it shows all direct and indirect effects in the (causal) model. Second, SEM tests whether the assumed causal relationships (together) fit the dataset being used. This allows for fine-tuning (improving) of the theoretical model applied to the data. Third, SEM is a convenient tool for building a theoretical (path) model with intermediate layers of independent variables. Therefore, the structural relations within a theory are depicted as a path diagram linking the variables with unidirectional arrows representing causal relationships. It is a simplified way of doing path analysis. Figure 10.2 shows the simplified path diagram of this analysis.

Figure 10.2: A basic model for the structural equation analysis[79]
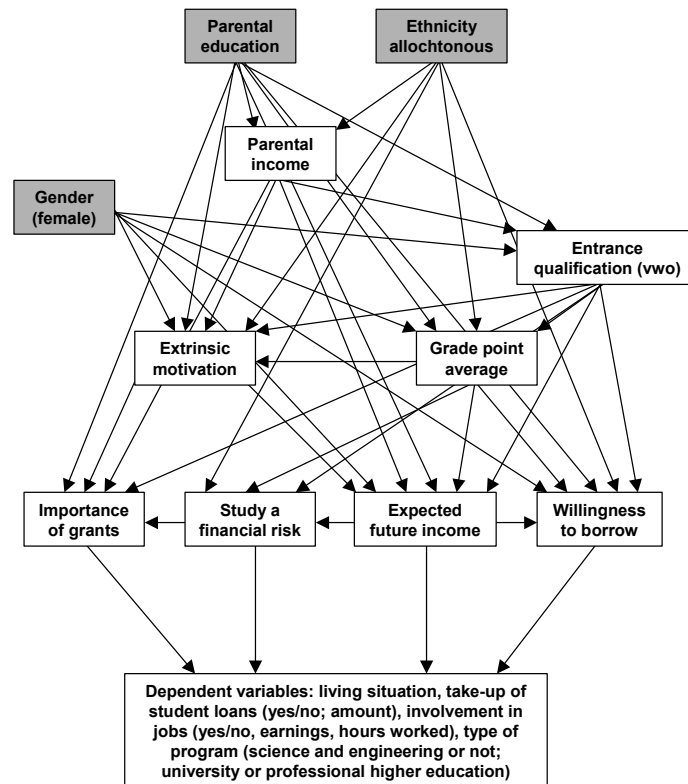
10.4   Empirical results: do students' financial perceptions matter?

The theoretical model was tested in two stages. The first phase related to the question whether students from different socio-economic backgrounds have different perceptions of financial incentives related to studying. The second phase addressed whether other perceptions also shape different study-related choices. The major findings from the analyses, which were described in Chapters 8 and 9, are discussed in the following two subsections.

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[79]   Note: The grey boxes represent the exogenous variables.

10.4.1 Socio-economic status and perceptions of financial incentives

Table 10.2 presents the main empirical outcomes with relation to the question to what extent students from various socio-economic backgrounds differ in their perceptions of financial incentives related to higher education. This table provides for each of the hypotheses and dependent variables an overview of the significant explanatory variables for each of the three statistical tests: bivariate analysis, multiple regression analysis and structural equation modelling. Statistically insignificant relationships/effects are not shown. This overview shows whether the outcomes are consistent across the three analyses. In addition, the table indicates whether the direction of the relationships is in accordance with the hypotheses (+) or not (-).

Table 10.2: Testing the hypotheses, phase 1

Hypotheses / dependent variables		Bivariate analysis significant variable	sup.	Regression analysis significant variable	sup.	Structural Equation Models significant variable	sup.
Hypothesis 1: study a financial risk	R²			0.02		0.02	
		Parental income	+	Parental education	+		
		Ethnicity	+	Ethnicity	+	Ethnicity	+
		Entrance qualification	+	Entrance qualification	—	Entrance qualification	+
		GPA	+	GPA	+	GPA	+
Hypothesis 2: Tuition incentive	R²			-0.01		0.01	
		Parental education	+				
						Parental income	+
				Entrance qualification	—		
Hypothesis 3: importance of grants	R²			0.15		0.12	
		Parental education	+	Parental education	+	Parental education	+
		Parental income	+	Parental income	+	Parental income	+
		Ethnicity	+				
		Gender	+	Gender	+		
		Entrance qualification	+	Extrinsic motivation	+	Extrinsic motivation	+
Hypothesis 4a: Expected start wage	R²			0.12		0.12	
		Parental education	+	Parental education	+	Parental education	+
		Parental income	+	Parental income	+	Parental income	+
		Gender	+	Gender	+	Gender	+
		Entrance qualification	+	Entrance qualification	+	Entrance qualification	+
		GPA	+				
		Extrinsic motivation	+	Extrinsic motivation	+	Extrinsic motivation	+
Hypothesis 4b: Expected top wage	R²			0.27		0.28	
		Parental education	+	Parental education	+	Parental education	+
		Parental income	+	Parental income	+	Parental income	+
				Ethnicity	—		
		Gender	+	Gender	+	Gender	+
		Entrance qualification	+	Entrance qualification	+	Entrance qualification	+
		GPA	+	GPA	+	GPA	+
		Extrinsic motivation	+	Extrinsic motivation	+	Extrinsic motivation	+
Hypothesis 5: Willingness to borrow	R²			0.07		0.06	
		Parental education	+	Parental education	+	Parental education	+
		Parental income	+	Parental income	+		
		Ethnicity	—	Ethnicity	—	Ethnicity	—
		Gender	+	Gender	+	Gender	+
		Entrance qualification	+	Entrance qualification	+	Entrance qualification	+
		GPA	+	GPA	+	GPA	+
		Extrinsic motivation	—				

Note: The dotted lines distinguish the SES variables from the control variables.

From Table 10.2 it can be deduced that the patterns of significant variables are very much similar across the three statistical methods. This emphasises the reliability of the findings. Table 10.2 does not show that all models proved to be significant as a model, except for the one concerning students' sensitivity to tuition fees. Therefore, Hypothesis 2, which states that low-SES students are more sensitive to tuition fees than high-SES students, has to be rejected. One must acknowledge that tuition sensitivity was measured in a specific way, asking students who qualified to enrol in a science and engineering study program, but had not done so yet, if they could be persuaded by a tuition change.

Concerning the other four hypotheses, at least two out of three socio-economic background variables were statistically significant and supported the hypotheses. This means that Hypotheses 1, 3, 4, and 5 cannot be rejected based on the data and methods employed in this study. Students from different socio-economic backgrounds do have different perceptions of financial incentives. Lower-SES students find higher education investments more risky, find grants more important, expect lower future earnings (starting and maximum wages), and the maximum level of debt they find acceptable is lower compared to higher-SES students. The support for Hypothesis 1, whether higher education is perceived as a financial risk, is relatively weak.

Parental education proves to be the strongest explanatory SES-variable. It not only shows to be significant most frequently, it also has the greatest impact (see Appendices). Ethnicity has a more ambiguous role. In the case of Hypothesis 5 it has a sign that is opposite to expectations, suggesting that allochtonous students accept higher debt levels than autochthon students. This may be explained by cultural factors, which was also found in previous research (Hofman *et al.*, 2003).

With regard to the control variables, gender and entrance qualification were the most frequent significant explanatory variables. Female students found grants more important, expected lower future earnings and were less willing to borrow than male students. Students with higher entrance qualifications, and to a lesser extent those with higher grade point averages, found studying less risky, attach lower importance to grants, expect higher future income and accepted higher levels of study debt compared to less well-qualified students. All of this supports the expectations, although the findings do not directly relate to the hypotheses, which only address the relationships between socio-economic background and student perceptions. Extrinsic motivation was found to play a less important and more ambiguous role in the analyses.

Finally, the variance explained by the multivariate and SEM models (R^2) is not very high, ranging between 1% and 28%. This implies that the model does not explain very much of students' perceptions of financial incentives. This is partly due to the fact that the model not included all variables that may explain students' perceptions, which would likely lead to a much more complex model.

10.4.2   SES, perceptions of financial incentives, and student choice

Now a table (Table 10.3) is presented containing the main empirical outcomes with relation to the question to what extent students from various SES groups holding different perceptions of financial incentives also differ in their actual study-related choices. It presents the significant variables for each of the hypotheses and dependent variables showing whether the outcomes are consistent across the three analyses. In addition, it indicates whether the relationships support the hypotheses (+) or not (-).

Table 10.3: Testing the hypotheses, phase 2

Hypotheses / dependent variables		Bivariate analysis significant variable	sup.	Regression analysis significant variable	sup.	Structural Equation Models significant variable	sup.
Hypothesis 6:	**R²**			0.20		0.13	
Living situation		Parental education	+	Parental education	+	Parental education	+
		Parental income	+				
		Gender	—	Gender	—	Gender	—
		Entrance qualification	+	Entrance qualification	+	Entrance qualification	+
		GPA	+				
		Extrinsic motivation	—	Extrinsic motivation	—	Extrinsic motivation	—
				Importance of grants	+	Importance of grants	+
		Expected top wage	+				
		Willingness to borrow	+	Willingness to borrow	+	Willingness to borrow	+
Hypothesis 7a:	**R²**			0.16		0.07	
Take up loans						Study a financial risk	—
		Importance of grants	+	Importance of grants	—	Importance of grants	+
		Willingness to borrow	+	Willingness to borrow	+	Willingness to borrow	+
Hypothesis 7b:	**R²**			0.20		0.22	
Loan amount		Ethnicity	—	Ethnicity	—	Ethnicity	—
		Gender	—	Gender	—	Gender	—
				Entrance qualification	—		
		GPA	—				
				Extrinsic motivation	+	Extrinsic motivation	+
				Tuition incentive	+		
						Importance of grants	—
		Expected top wage	+				
		Willingness to borrow	+	Willingness to borrow	+	Willingness to borrow	+
Hyp: 8a:	**R²**			0.09		0.05	
Having a job		Parental education	+	Parental education	+	Parental education	+
		Gender	+			Gender	+
		Entrance qualification	+	Entrance qualification	+	Entrance qualification	—
		GPA	+	GPA	+	GPA	—
		Extrinsic motivation	—	Extrinsic motivation	—	Extrinsic motivation	+
				Study a financial risk	—	Study a financial risk	—
				Tuition incentive	—		
				Importance of grants	—	Importance of grants	—
		Expected top wage	+				
		Willingness to borrow	+	Willingness to borrow	+	Willingness to borrow	+

Note: The dotted lines distinguish between the SES, control and perception variables.

Table 10.3: Testing the hypotheses, phase 2 (continued)

Hypotheses / dependent variables		Bivariate analysis significant variable	sup.	Regression analysis significant variable	sup.	Structural Equation Models significant variable	sup.
Hypothesis 8b:	R^2			0.22		0.10	
Job earnings		Parental education	+	Parental education	+	Parental education	+
		Ethnicity	+			Ethnicity	+
		Entrance qualification	+	Entrance qualification	+	Entrance qualification	+
		GPA	+				
		Extrinsic motivation	—				
				Study a financial risk	—	Study a financial risk	—
				Importance of grants	—	Importance of grants	+
				Expected start wage	—	Expected income	+
		Willingness to borrow	+			Willingness to borrow	+
Hypothesis 8c:	R^2			0.08		0.05	
Hours worked		Parental education	+	Parental education	+	Parental education	+
		Parental income	+				
		Ethnicity	+	Ethnicity	+	Ethnicity	+
		Entrance qualification	+	Entrance qualification	+	Entrance qualification	+
		GPA	+	GPA	+	GPA	+
		Extrinsic motivation	—	S			
		Importance of grants	+	Importance of grants	+		
		Expected start wage	+				
		Expected top wage	+				
		Willingness to borrow	+				
Hypothesis 9a / 10a:	R^2			0.28		0.20	
Science & eng.		Parental education	+	Parental education	+		
				Parental income	—		
		Ethnicity	+	Ethnicity	+	Ethnicity	+
		Gender	+	Gender	+	Gender	+
		Entrance qualification	+				
		GPA	+	GPA	+	GPA	+
		Expected start wage	+	Expected start wage	+		
		Expected top wage	+				
		Willingness to borrow	+				
Hypothesis 9b / 10b:	R^2			0.22		0.10	
University / HBO		Parental education	+	Parental education	+	Parental education	+
		Parental income	+				
		Gender	+			Gender	+
		GPA	+	GPA	+	GPA	+
		Extrinsic motivation	—	Extrinsic motivation	—	Extrinsic motivation	—
						Study a financial risk	—
		Expected start wage	+				
		Expected top wage	+	Expected top wage	+	Expected income	+
		Willingness to borrow	+	Willingness to borrow	+	Willingness to borrow	+

Note: The dotted lines distinguish between the SES, control and perception variables.

The patterns of significant independent explanatory variables in Table 10.3 are less consistent across the three statistical methods when compared to the findings in Table 10.2. However, this is mainly due to differences between the bivariate analysis and the regression and SEM analyses. The outcomes of the regression and SEM analyses, the most important methods that test our theoretical model, are remarkably similar.

It can be seen from Table 10.3 that Hypothesis 7, referring to the relationship between socio-economic background and students' borrowing behaviour, is not supported by the data. There is neither a significant relationship between socio-economic status and whether students take up loans nor with respect to the amount students borrow. Only ethnicity showed a significant relationship, but the direction was contrary to expectations: allochtonous students take up higher amounts than autochthon students. These findings correspond to the evidence found by De Jong *et al.* (2001). The reason that lower-SES students borrow as much as higher-SES students is often explained by the fact lower-SES students simply need the money. They borrow for liquidity reasons.

Hypothesis 10, which states that students who take up loans are more likely to choose shorter and/or easier types of study programs, also has to be rejected. Taking up loans neither had an impact on choosing science and engineering study programs nor on going to university or professional higher education. Maybe students first chose a program and institution and than decided to take up loans or not.

For the other hypotheses (6, 8, 9), the effects of parental education support the hypotheses, with the exception of the SEM-analysis in the case of choosing science and engineering or not. In only a few cases parental income was significant in the bivariate analyses, which do not test our full model. The effects of students' ethnic status support Hypotheses 8 and 9, but were not significant for the other hypotheses. Altogether, this provides (weak) support for the hypotheses that students from various socio-economic backgrounds also differ in their actual study-related choices. For example, lower-SES students more often live at home with their parents, they are more involved in part-time jobs and more often choose study programs that are (perceived) as being shorter or easier to complete.

One also has to look whether the above-mentioned findings can, to some extent, related to students' perceptions of financial incentives. Here, as Table 10.3 shows, our empirical evidence becomes rather thin. In the multiple regression and SEM models, some or all of the (four[80]) perception variables turn out to be significant. The willingness to borrow and the expected future income were most often found to be significant. Followed by the importance of grants and the perception of studying as a financial risk. As far as evidence for the intermediate role of students' perceptions of financial incentives in the relationships between socio-economic background and actual student choice, the evidence is weak and diverse. In addition, the effects of the perception of study as a financial risk are contrary to what was expected: students who perceive studying as a financial risk are less involved in jobs and more often go to university. Finally, it is striking that there is little support for the theoretical model's ability to explain participation in science and engineering study programs, particularly in the SEM-analysis.

With regard to the control variables, entrance qualification and, to a lesser extent, grade point average are the most consistent significant explanatory

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[80] Note that "tuition sensitivity" has not been included in the structural equation models in phase 2, as explained in Chapters 7 and 9.

variables in the model. Gender is a rather strong predictor in the sense that female students are much less likely to choose a science and engineering study program than male students. This confirms the general picture in the Netherlands. However, contrary to expectations, female students are less likely to stay with their parents than male students (females probably more often choose institutions further away from home or they have a stronger need to be independent). And when female students borrow, they take up higher amounts than male students, which was not expected (the same goes for allochtonous students). Finally, the role of extrinsic motivation is ambiguous. Though it is statistically significant in a number of cases, the results are opposite of expectations. More extrinsically motivated students, who aim at getting a well paying job that also gives them power and status, more often live with their parents, they are more heavily involved in part-time work, and they more often prefer professional higher education over university.

Altogether, the empirical research leads to the following main conclusions. First, students from different socio-economic backgrounds have different perceptions of financial incentives. In addition, students' perceptions about financial incentives play a distinct role in student choice. However, not all perceptions are important. Willingness to borrow and importance of grants are more important than future income expectations, suggesting that students take a relatively short-run perspective. The perception of higher education as a financial risk has an opposite effect on student choice than was expected. The analyses showed that socio-economic status also has a substantial direct (and indirect) effect on student choice. This implies that financial perceptions are not dominant in affecting individual student choice and do not necessarily lead to differences in student choice.

10.5   Reflections

The main findings of this study can be reflected upon in various ways. At the beginning of this book a number of objectives and research questions were formulated. These here form the structure for the main reflections: 1) the relation to outcomes of other student choice research, 2) the extent to which behavioural economics has an added value compared to traditional economic theories, 3) relevance for student choice policies, 4) an international perspective, 5) the statistical methods applied, 6) the limitations of the current study, and 7) opportunities for future research.

10.5.1   *Correspondence to earlier research*

Most of the findings here correspond well to the general picture from the literature that students are not very responsive to financial incentives (see

Chapter 2). Nevertheless, trends toward (further) cost sharing often encounter opposition and are argued to have negative effects on access to higher education, particularly for those from disadvantaged backgrounds. In view of this study's major findings, this opposition can be explained by students' strong perceptions of financial incentives and differences for students from various SES-backgrounds. However, the results also show that differences in perceptions do not automatically lead to different choices. Maybe therefore, no single Dutch study to date has been able to show that increased cost sharing has harmed access for disadvantaged students. Student numbers have steadily increased irrespective of demographic developments and the socio-economic composition of the student body has not changed over time (De Jong *et al.*, 1991; Hofman *et al.*, 2003).

The major finding that different price perceptions do not necessarily lead to different choices is also consistent with international student choice literature. Recent studies in the UK showed that students from disadvantaged backgrounds are really debt averse (Callender, 2003) but there is no convincing evidence that these students refrain from borrowing and are prevented from entering higher education. The same goes for student choice research in America (Fossey & Bateman, 1998), Canada (Junor & Usher, 2004) and Australia (Andrews, 1999). However, variations in price-responsiveness do show up in cases where substantial price and quality differences exist (McPherson &Schapiro, 1998). Therefore the relative homogeneous structure of tuition and student support mechanisms in the Netherlands may explain the low price-responsiveness found. In addition, the process of cost sharing has a gradual, incremental character in the Netherlands. Students may have become used to the pattern of only small annual steps in rising tuition fees, living expenses and loans. Also price and quality are hardly different and may not yet force students to make difficult choices.

A final remark can be made about the concept of student choice. Prior studies often refer to student choice only in terms of enrolment decisions like whether to enrol in higher education, in what type of institution or study program, and whether to complete a program. The current study takes a broader perspective and applies the theoretical model to a broader range of study-related decisions, such as whether or not to take up loans, having part-time jobs and students' living situation.

10.5.2   *Behavioural economics and student choice: added value?*

Up to now, the human capital theory has been the most advanced economic theory relevant for understanding student choice. The original human capital model was based on the idea of rational decision-making. In recent years the model was extended to allow for imperfect information, uncertainty, biased preferences, and consumption benefits (see Chapter 3). However, the augmented human capital model still does not explain why different individuals evaluate costs and (future) benefits differently, have imperfect information, have different levels of uncertainty, and therefore differ in their subjective rationality.

Therefore, the main critique of human capital theory is that even the extended theory is limited in explaining debt aversion, students' borrowing behaviour and differences in student choices for individuals from various SES groups, regardless of its simplicity and value for explaining student choice and labour market issues. This prompted the exploration of the potential added value of behavioural economics for student choice research. It aims at understanding why individuals differ from rational choice in economic decision-making by looking at psychological phenomena that influence the (subjective) valuation of costs and benefits. It for instance is interesting that this study showed that the perception "willingness to borrow" appears to play an important role in student choice.

Reflecting on the theories, both take almost opposite positions on the dimension of integrating concepts from other social science areas into their reasoning. At the one extreme, human capital theory starts out as a simple economic model based on an almost pure concept of rationality. Gradually, it has relaxed some of its assumptions, allowing for time preferences, consumption benefits and uncertainty. At the other extreme, behavioural economics incorporates a diverse collection of psychological concepts into economic reasoning to explain human behaviour in financial decision-making situations. Using many examples and experiments, it builds up a general theory inductively. However, behavioural economics is challenged to construct a coherent theoretical model out of these many different social and psychological phenomena. It lacks the simplicity, transparency and coherence of theories like human capital theory.

Both theoretical approaches have not yet provided the ideal theoretical model to fully explain student choice. As such, researchers working with the human capital theory could consider integrating more behavioural economic concepts into their models like including reference levels and loss aversion. Behavioural economics could try to reduce its complexity by clustering some of the psychological phenomena into broader concepts. This may reduce overlap and internal contradiction. For example, overlap can be found in the concepts of loss aversion, endowment effect and reference levels. Contradictions may occur when people demand disproportionally high future returns to an investment but are not willing to take up loans because they do not want to spend any money of their future income account. Altogether, scientists adhering to one of the theoretical approaches can learn from each other.

An advantage of behavioural economics is that it provides a framework that recognises that an individual's perceptions play a crucial role in economic decision-making. This directs our attention to the fact that individual perceptions often differ from rational expectations due to limited and biased information. The empirical study showed that students from various SES backgrounds hold diverging perceptions of financial incentives but that these do not necessarily lead to different actions and choices. This is an important finding because student financing and student choice are shown to be complex issues (see Figure 2.2) with perceptions formed in various choice stages. Understanding student perceptions can strengthen student choice research beyond its current horizons.

10.5.3 Relevance for student choice policies

An important finding of this study is that students from different backgrounds have different perceptions of financial incentives. Students relate costs and benefits of higher education to their current income situation. Some categories of students require disproportionately high future benefits to justify current educational investments. Students often prefer the immediate gratification of part-time work than taking up loans and fully concentrate on studying to complete one's degree sooner to earlier enter the graduate labour market.

These findings are relevant to the topic of debt aversion that receives a lot of attention in press, policy and research. This study indicated that students from disadvantaged backgrounds perceive borrowing as something bad, which does not prevent them from taking up loans. They may just need the money. In terms of access, it does not prevent them from entering higher education. Nevertheless, much public information on student debt and tuition fees in newspapers, magazines and research publications in many countries conveys the message that tuition fees and loans harm access to higher education. It must also be recognised that potential students and their parents often do not have or use the information available about the level of tuition fees, the availability of student support, and the future benefits of higher education. Therefore, the attention of and publicity on the potential harmful effect of cost sharing on access may be more harmful to access than cost sharing itself. As indicated in Chapter 2, research shows little evidence of access problems due to cost sharing, but this study has also indicated that lower-SES students are more sensitive to price incentives.

In Chapter 1 it was indicated that lower-SES students are strongly underrepresented in higher education and that many governments would like to increase or widen access for those groups. Therefore the information and communication about costs and benefits of higher education remain important. Particularly lower-SES students should be well informed about the potential benefits of higher education and about the way student support an generous debt repayment conditions can limit the risks involved in higher education investment.

The reference effect may also be one of the reasons why the gradual changes towards cost sharing in the Netherlands did not lead to access problems. The almost uniform tuition fees and student support regimes and the small steps in increasing individual costs made Dutch not very sensitive to these "built in" price increases. But students oppose when substantial changes to the student financing system are proposed. Government strategies to introduce cost sharing could thus be to take a long-run incremental perspective to reduce the risk of harming access. This situation refers to the analogy of the frog. When one throws a frog in a kettle with boiling water, it will directly jump out. However, if one puts a frog in a kettle with cold water which is then heated until it boils, the frog will stay in and slowly get cooked. The question then remains whether there is a threshold in the net costs beyond which students will become price-sensitive. Looking at international evidence, parts of American higher education seem to have reached this threshold.

An overall conclusion from this study is that parental education, gender and academic preparation are stronger predictors of student choice than price incentives. This is consistent with most student choice research. In addition, the majority of students would also study if no student support or grants were available. Mainly students from disadvantaged backgrounds, indicate that student support is important for their decision to enrol in higher education. This provides food for thought about the current student support mechanism in the Netherlands. Like for most other student support systems, the Dutch system's prime objective is to stimulate access. But providing general subsidies to all students irrespective of SES may be questioned because many students, especially more affluent ones, regard such subsidies of minor importance for their enrolment decisions. Thus it would be more efficient to target public subsidies to students who do really need it: those from low-SES backgrounds. This conclusion can also be drawn for other countries as well. Finnie *et al.* (2004) came to the same conclusion for Canada, where more than half of all student support dollars through general tax credits, scholarships and support for independent students are provided to above median income families. The same pattern can be found in many European countries where the majority of students benefit from uniform grants, family allowances or tax benefits (Vossensteyn, 2004b). Of course student support can also serve other goals, like providing a basic income to students or having a uniform and transparent system of student support.

10.5.4   *Research findings in an international perspective*

It is clear that the empirical results from this study can be put in an international context. The application of behavioural economics appeared to be relevant in the relatively homogenous situation of Dutch higher education. Therefore, it may be even more compelling to apply behavioural economics to situations with a large variety of postsecondary education options in terms of quality and net price. Interesting examples then are the US, Canada and New Zealand where students face a range of opportunities that differ in price and quality. For example, the notion of loss aversion can be tested in situations characterised by a high-tuition high-aid strategy, as found in the US. Behavioural economics suggests that the deterrent impact of tuition fees is about twice as strong as the attractive power of grants. This implies that a high-tuition high-aid strategy harms access, particularly for low-SES students. It may also be interesting to explore whether students' different perceptions of changes in net price relate to changing enrolment patterns of low-SES students in the US as indicated by Kane (1995) and McPherson and Schapiro (1998).

Another issue stems from the conclusion that students' perceptions matter. This is particularly important for the debates on debt aversion taking place in many countries. Debt aversion often is directly related to a decrease in higher education accessibility. Indeed, it has been found that students dislike to take up loans for studying and that they fear to accumulate study debt (Callender, 2003; Gladieux, 2003; Junor & Usher, 2004). Nevertheless, there is no compelling evidence proving that debt aversion also results in access problems. As found in this study, students'

perceptions of financial issues are not directly translated into serious action. Students who dislike debt may still take up loans. This does not mean that debt aversion should not be taken seriously. It is a first indication of potential access problems and information asymmetries.

Finally, on a very ambitious level, the behavioural economic approach may also help explain differences between students from different countries with respect to student choices. Reference levels can be a useful tool for analysing differences in student choice between various countries, such as the international comparative projects like *Euro Student* (HIS Hochschul-Informations-System, 2002).

10.5.5 Statistical approach

For testing the hypotheses, three statistical methods were used. This strategy proved to be quite demanding, though it produced satisfactory results. The behavioural economics model was put to a serious statistical test using multivariate regression analysis and structural equation modelling (SEM). Although both methods have many similarities, SEM provides some advantages over multiple regression analysis. The main advantage is that it explicitly models all relationships in a causal path model. In addition, it estimates all direct and indirect effects within the model, which makes visible all relationships. Finally, it estimates the fit between the theoretical model and the data (for more details, see Chapter 7).

SEM provided results that otherwise would not have been found. The model fit measures revealed that the theoretical model in most cases fit the data very well. This strengthens the overall conclusions and allows one to focus on the direct and indirect effects. Next to all direct effects within the model, particularly parental education appeared to have important indirect effects on the variables specified in our model. Also ethnicity, gender and entrance qualification had some indirect effects within the model. Another benefit of SEM was that it reduced the complexity of the model by streamlining the output of the first phase of the analysis before the perception variables were used as intermediary variables in the second phase.

All in all, using both multivariate regression and SEM provided a thorough statistical test of the theory and hypotheses. The outcomes proved to be mainly consistent across the different statistical methods.

10.5.6 Limitations of the current study

Naturally, the current study also has its limitations. The first relates to the fact that behavioural economics was applied and tested in the homogeneous context of Dutch higher education. It was not possible to analyse the role of students' perceptions of financial incentives in more differentiated situations of the quality and net price of programs and institutions.

Another limitation concerns the fact that the study uses sample data only for first year students. Although this provided a relatively homogeneous research

population it was impossible to make a distinction between young and mature students. From a behavioural economics point of view this could make a substantial difference (see Chapter 5). In addition, it was not possible to differentiate between students who enrol in higher education and those who do not. Finally, it was not possible to analyse any evolution in students' perceptions and actual choices when they reach successive stages in their studies.

A further limitation was the secondary analysis of data from an existing database. The data used were not of the most recent date (1997), so current students may in some respects have slightly different opinions. But most findings are consistent with the outcomes of other (more recent) research. Nevertheless, using secondary analysis on an existing survey database meant using predefined variables based on questionnaires that partly served other purposes. Setting up an own survey could in some cases have led to more specifically targeted questions and variables, particularly on students' perceptions.

The current study mainly focuses on the differences between students from various socio-economic backgrounds. However, one can also think of other interesting distinctions between student groups, for example between male and female students. Although gender was incorporated gender in the theoretical model as a control variable, no specific hypotheses about gender were formulated and tested because gender differences in terms of labour market returns are so strong that variation in perceptions between male and female students can also be explained by the human capital model.

A final limitation of the model is that it did not include type of higher education (university or higher professional education (HBO)) and discipline as explanatory variables. These were only used as dependent variables indicating students' choices.

Regardless of these limitations, the evidence suggests that students from various SES-groups do hold different perceptions of financial incentives and that these perceptions to some extent also play a role in the actual choices students make. This underlines that behavioural economics is helpful in understanding student choice.

10.5.7   Opportunities for further research

If we acknowledge that behavioural economics provides a viable theoretical framework for studying student choice, it can be used to further expand the human capital model. As this study is one of the first applications of behavioural economics to student choice, these ideas should be further explored. The argumentations can be refined and the ideas may be expanded to parts of student choice research that lay outside the scope of this study.

Taking into account previous sections, it is interesting to apply behavioural economics to data from more than one country, particularly including situations of differential tuition fees and high-tuition high-aid (see some potential hypotheses in Chapter 5). One could also think of situations over time, for example looking at the short-term and long-term effects of substantial policy changes.

Another issue to be further explored is debt aversion. The behavioural economic concept of loss aversion can play an important role here. Based on the findings here it is important to distinguish between a dislike of borrowing as opposed to a deterrent effect of student loans on higher education access. Closely linked to this are the opportunities to study more deeply the potential impact of various loan repayment mechanisms on student borrowing behaviour and access.

Finally, a more general issue concerns information and communication. If it is found that students' perceptions matter, indirectly information and communication are important. These issues gain importance, but are still underrepresented in student choice literature (Jongbloed *et al.*, 2004). Behavioural economics offers an opportunity to expand research in this area, because it is all about bounded rationality, limited and biased information. Meijers (1995) for example showed that students have and use only limited information on the financial implications studying. If public policies require students to bear a greater part of higher education costs, then it becomes increasingly important that students and their parents receive and use adequate information about these cost and benefits, as well as about the arguments for cost sharing.

10.5.8   In conclusion

Overseeing the results of this study, it can be concluded that money matters. Students do have explicit perceptions about financial incentives related to study. However, these perceptions are perhaps less important as expected at the beginning of the study because differences in perceptions do not always lead to differences in student choice. What is more, these perceptions differ for students from different socio-economic backgrounds. But socio-economic status remains an important determinant of student choice, though sometimes in different ways as expected (e.g., in the case of ethnicity). Nevertheless, students' perceptions of financial incentives have proven to play an interesting intermediary role in student price-responsiveness studies, which makes behavioural economics a useful perspective to explore the nuances of student choice.

Nederlandstalige samenvatting

Studiekeuze en de financiële positie van studenten in het hoger onderwijs zijn tegelijk belangrijke en omstreden onderwerpen. Dit vooral in een tijd waarin sprake is van een wereldwijde ontwikkeling om studenten langzaam maar zeker een groter deel van de kosten van hoger onderwijs te laten dragen. Deze laatste trend wordt ook wel *cost sharing* genoemd (Johnstone 2004). *Cost sharing* houdt in dat collegegelden worden ingevoerd of verhoogd en dat studieleningen ten opzichte van studiebeurzen en andere subsidies aan belang winnen. Deze ontwikkeling roept de vraag op naar consequenties voor de toegankelijkheid van het hoger onderwijs. Is hoger onderwijs nog wel betaalbaar? Weerhouden stijgende kosten potentiële studenten ervan om te gaan studeren? Hoe reageren studenten uit sociale achterstandsgroepen? Met deze vragen in het achterhoofd is het centrale onderwerp van dit proefschrift de prijsgevoeligheid van studenten. Hoe reageren studenten van verschillende sociaal-economische status (SES) op prijsprikkels zoals collegegelden, beurzen en studieleningen?

Er is reeds veel onderzoek gedaan naar het keuzegedrag van studenten en de potentiële rol van financiële instrumenten daarbij. De onderhavige studie heeft tot doel te verkennen wat de waarde is van de Economische Gedragstheorie (*Behavioural Economics*) voor het begrijpen van studiekeuzegedrag. Deze theorie zoekt vooral een verklaring voor op het eerste gezicht irrationele beslissingen die door individuen worden genomen in situaties van onzekerheid. Hierbij wordt gebruik gemaakt van een aantal psychologische verschijnselen die beslissingen mede beïnvloeden (Kahneman & Tversky, 2001). Op grond van deze psychologische concepten vormen individuen hun eigen subjectieve *percepties* van beslissituaties. In de onderhavige studie wordt onderzocht of deze percepties een rol spelen in de relaties tussen financiële prikkels, SES en studiekeuzen. Het ligt in de bedoeling om zo meer inzicht te krijgen in thema's zoals leenaversie en een verschil in prijsgevoeligheid tussen studenten van verschillende sociaal-economische herkomst.

In deze samenvatting presenteren we eerst de belangrijkste bevindingen van eerder onderzoek naar de invloed van financiële prikkels op studiekeuzen. Daarna komen de traditionele theoretische benaderingen (prijstheorie en human capital theorie), de economische gedragstheorie, de opzet en uitkomsten van het empirisch onderzoek aan bod. Tenslotte wordt kort gereflecteerd op de uitkomsten van dit onderzoek. Wat heeft het onderzoek opgeleverd voor theorievorming en beleid?

Belangrijkste bevindingen van eerder studiekeuzeonderzoek

In Hoofdstuk 2 zijn de belangrijkste bevindingen van eerder onderzoek naar de rol van financiële prikkels in studiekeuzegedrag samengevat. Met studiekeuzen wordt meestal gedoeld op de vraag of men gaat studeren, aan welk type opleiding of instelling en of men wel of niet doorgaat met studeren. In de huidige studie worden studiekeuzen breder opgevat door ook te kijken naar andere typen beslissingen, zoals het opnemen van studieleningen, het nemen van een baantje naast de studie en waar een student gaat wonen (thuis bij de ouders of elders).

Een veelheid van studies over studiekeuzegedrag in vele landen komt tot de conclusie dan financiële prikkels zoals collegegelden, beurzen en leningen nauwelijks invloed hebben op deelnamepatronen en op de keuzes die studenten maken (Leslie & Brinkman, 1987; Heller, 1997; De Jong *et al.*, 2001). Slechts een beperkt aantal studies geeft aan dat toenemende kosten voor studenten de toegankelijkheid van het hoger onderwijs voor studenten uit lagere SES groepen[81] negatief beïnvloeden. Met name in Amerika lijken hogere collegegelden en studieleningen deze studenten in de richting van kortere, goedkopere en minder prestigieuze opleidingen en instellingen te duwen (McPherson & Schapiro, 1997, 1998; Heller, 1997, 2001).

Alhoewel wereldwijd vele studenten studieleningen opnemen is er een groot aantal studies dat duidt op een zekere leenaversie bij studenten (Campaigne and Hossler, 1998; Callender, 2003). Echter, dat leenaversie ook leidt tot een verminderde toegankelijkheid is nog niet onomstotelijk bewezen (Johnstone, 2005). Daarom blijven leenaversie en de mogelijke impact daarvan op de toegankelijkheid van het hoger onderwijs een intrigerend vraagstuk.

Tenslotte komen de meeste onderzoeken over studiekeuzegedrag tot de conclusie dat studiekeuzen het sterkst beïnvloed worden door niet-financiële factoren, zoals de opleiding van ouders, eindexamenscores in het secundair onderwijs en de afstand tussen het ouderlijk huis en de hoger onderwijsinstelling. Financiële prikkels spelen een ondergeschikte rol. Dit is wat de empirie ons leert in Nederland, Australië, Canada, het Verenigd Koninkrijk, de Verenigde Staten en elders. Desalniettemin vormen studiefinanciering en collegegeldbeleid populaire instrumenten voor beleidsmakers die wensen om studiekeuzes te beïnvloeden. Daarom blijft het de moeite waard om de rol van financiële prikkels in studiekeuzegedrag te bestuderen en te begrijpen waarom niet-financiële factoren dominant lijken te zijn. Is het echt waar dat geld er niet toe doet?

Een nieuw theoretisch perspectief

Een belangrijk doel van deze studie is het toepassen van een nieuwe theoretische benadering op studiekeuzegedrag. Maar allereerst hebben we in Hoofdstuk 3 de

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[81] SES wordt hier bepaald aan de hand van het relatieve opleidingniveau van ouders, het relatieve inkomen van ouders en etniciteit.

traditionele economische theorieën besproken die doorgaans worden gebruikt om de rol van financiële prikkels op studiekeuzen te bestuderen. Dat zijn de neoklassieke prijstheorie en de *human capital theory* (theorie van het menselijk kapitaal).

Het is gebleken dat de empirische bevindingen van studiekeuzeonderzoek niet altijd in overeenstemming zijn met deze traditionele economische theorieën. Beide bovengenoemde theoretische benaderingen zijn gebaseerd op het idee van rationeel handelende individuen en voorspellen dat studenten uit verschillende SES groepen slechts kleine verschillen zullen vertonen wat betreft hun prijsgevoeligheid. In het licht van de prijstheorie zullen studenten in het algemeen als rationele actoren reageren op prijsprikkels. Van studenten uit lagere-SES groepen wordt weliswaar verwacht dat ze sterk reageren op veranderingen in het collegegeld of studiebeurzen, maar ook studenten uit hogere SES groepen worden verwacht hun gedrag te veranderen als de prijzen van hoger onderwijs worden gewijzigd. In de praktijk blijkt dit echter niet zo te zijn. Er zijn vele gevallen aan te wijzen van landen waar substantiële prijsveranderingen niet hebben geleid tot veranderingen in deelnamepatronen (Andrews, 1999; Heller, 1997; Hossler *et al.*, 1999). Echter, in andere gevallen blijken studenten uit lagere-SES groepen juist wel op prijsveranderingen te reageren, bijvoorbeeld door het kiezen van goedkopere en kortere opleidingen (McPherson & Schapiro, 1998). Ook blijken deze studenten vaker leenaversie te vertonen (Callender, 2003). Theorie en praktijk blijken hier dus moeilijk te verenigen.

Het tweede en meest populaire theoretische perspectief op studiekeuzes is de *human capital theory*. Het basisidee van deze theorie is dat individuen zullen investeren in onderwijs zolang de verdisconteerde individuele baten hoger zijn dan de kosten, ongeacht de huidige inkomenspositie of de sociaal-economische status van studenten of hun ouders. Studenten worden daarbij verondersteld een rationele kosten-baten afweging te maken. Studies van het (individuele) rendement van hoger onderwijsinvesteringen leveren in de meeste gevallen een zeer hoog rendement op van rond de 8% tot 10% per jaar in Nederland (Blöndahl *et al.*, 2001). Dat is aanzienlijk hoger dan het rendement van de gemiddelde spaarrekening. Meer concreet wijst de College Board (2004) erop dat Amerikaanse afgestudeerden over hun leven gemiddeld $1.000.000 meer verdienen dan mensen die na hun *high school diploma* direct de arbeidsmarkt op zijn gegaan. Deze rendementen gelden voor studenten van zowel hoge- als lage-SES groepen. Het is daarom in een *human capital* perspectief moeilijk te begrijpen dat studenten uit de lagere-SES groepen sterk ondervertegenwoordigd zijn in het hoger onderwijs. Bovendien is het in dit perspectief vreemd dat studenten zeer terughoudend zijn met het opnemen van studieleningen. Zij nemen liever een bijbaantje, hetgeen vaak betekent dat zij studievertraging oplopen en daarmee hun inkomensperspectief nadelig beïnvloeden.

In de meer moderne versie van de *human capital* theorie is het traditionele beeld van de rationele beslisser meer genuanceerd door ook rekening te houden

met de consumptieve baten van hoger onderwijs, onzekerheid, verschillen in kwaliteit van opleidingen en tijdsvoorkeuren (Webbink, 1999). Deze meer uitgebreide versie van de *human capital* theorie biedt de mogelijkheid om rekening houdend met specifieke omstandigheden en preferenties *subjectieve* afwegingen van individuen the modelleren die afwijken van *objectieve* afwegingen die uitgaan van perfecte informatie en rationele individuen. Maar zelfs in dit meer genuanceerde perspectief kunnen leenaversie en verschillen in prijsgevoeligheid tussen studenten uit verschillende SES groepen moeilijk worden verklaard. Om drie redenen zouden er nauwelijks verschillen in prijsgevoeligheid tussen rijke en arme studenten moeten zijn: 1) de private rendementen van hoger onderwijs zijn in het algemeen hoog; 2) studiefinanciering is doorgaans genereus voor studenten uit de lagere-SES klassen; 3) studieleningen hebben doorgaans zeer flexibele en genereuze terugbetalingsvoorwaarden, zoals een laag rente percentage en schuld kwijtschelding in het geval van structurele problemen met de terugbetaling.

De geconstateerde verschillen tussen de theoretische verwachtingen en de dagelijkse praktijk van studiekeuzegedrag duiden erop dat de traditionele *human capital* theorie wellicht nog verder aangepast moet worden. Daarnaast geeft deze theorie nog geen verklaring voor de verschillen in prijsgevoeligheid tussen individuen uit andere SES groepen.

Alles overziende wijzen de empirische feiten erop dat studenten uit lage-SES groepen zich vooral gedragen volgens de prijstheorie terwijl studenten uit de midden- en hoge-SES groepen handelen volgens het *human capital* model. Beide zouden echter volgens dezelfde theorie moeten worden verklaard. Studiekeuzes zijn dus complexer dan de traditionele economische theorieën ons willen laten geloven.

Economische gedragstheorie

Om aan de bovengenoemde tekortkomingen van de traditionele economische theorieën tegemoet te komen is in Hoofdstuk 4 een nieuwe theoretische benadering uiteengezet. Dit is de economische gedragstheorie (*Behavioural Economics*) die vooral ingaat op individuele financiële beslissingen in situaties van onzekerheid, hetgeen studiekeuzes ook zijn. De economische gedragstheorie stelt dat het effect van financiële factoren op individuele beslissingen (en handelingen) niet direct is maar wordt gekleurd of gefilterd door een aantal psychologische mechanismen. In essentie zorgen deze mechanismen ervoor dat individuen vaak geen (objectief) rationele keuzen maken. Rationaliteit is één van de basisassumpties van de traditionele economische theorieën.

De economische gedragstheorie probeert te begrijpen waarom individuen systematisch lijken af te wijken van rationeel keuzegedrag bij het maken van financiële beslissingen (Kahneman & Tversky, 2001). Daartoe wordt een aantal psychologische concepten geïntegreerd in het economisch redeneren en Simon's (1957) het begrip van *begrensde rationaliteit* verder gestalte gegeven. Dit betekent

niet dat individuen irrationeel handelen, maar dat ze in hun financiële beslissingen structureel afwijken van rationeel handelen (Thaler, 1992; Rabin, 1998). Economische gedragstheoretici onderscheiden een groot aantal psychologische concepten (zie Tabel 4.1) die de individuele percepties van financiële factoren kleuren. In de onderhavige studie beperken we ons tot de psychologische concepten die van direct belang worden geacht voor studiekeuzegedrag. In Hoofdstuk 5 is de economische gedragstheorie vertaald in termen van studiekeuzegedrag. Hieronder wordt kort aangegeven hoe relevante psychologische concepten doorwerken op studiekeuzegedrag.

Vergelijkingskaders

De kern van het psychologische concept *vergelijkingskader* (*reference level*) is dat mensen referentiepunten gebruiken voor het beoordelen van beslissingssituaties. Zij waarderen de verschillende alternatieven in termen van winst of verlies ten opzichte van een referentiepunt en niet zozeer op basis van de absolute uitkomsten van een beslissing (The Royal Swedish Academy of Sciences, 2002; Antonides, 2004). Belangrijke referentiepunten zijn de status quo of gewoonten. Met betrekking tot studiekeuzegedrag kan men zich voorstellen dat (potentiële) studenten collegegelden en studiefinanciering beoordelen in het licht van hun huidige inkomenssituatie of die van hun ouders. Dat betekent dat collegegelden een sterker negatief effect hebben op de beslissing om deel te nemen aan hoger onderwijs voor arme studenten dan voor rijke studenten. Voor beurzen is het effect precies tegengesteld. Een ander vergelijkingskader wordt gevormd door de invloed van "peers", zoals ouders, familie, vrienden, klasgenoten en leraren.

Afkeer van verlies en bezitsneiging

Afkeer van verlies of *verlies aversie* duidt erop dat individuen een significant grotere afkeer hebben van een verlies van een bepaalde omvang dan dat zij genoegen ondervinden van winsten van eenzelfde omvang (Kahneman *et al.*, 1991). Dit staat bekend als *bezitsneiging* en houdt in dat mensen een veel grotere waarde hechten aan een voorwerp als zij dit op moeten geven (verkopen) dan als zij het nog moeten verwerven (aankopen). In termen van financiële prikkels met betrekking tot studiekeuzegedrag suggereert dit dat studenten meer worden afgeschrikt door de lasten van studeren, zoals collegegelden en studieschulden, dan dat zij worden aangetrokken door de baten, zoals studiebeurzen, toekomstig inkomen en arbeidsmarktperspectieven.

Intertemporele keuzes en zelf-controle

Van intertemporele keuzes is sprake als de kosten en baten van een beslissing zich uitspreiden door de tijd en individuen een grotere waarde hechten aan korte

termijn baten en kosten dan aan toekomstige (Thaler, 1992). Op grond hiervan kan worden verwacht dat studenten minder geneigd zijn om in onderwijs te investeren dan goed voor ze is. Zij prefereren bijvoorbeeld de directe baten van een bijbaantje boven het opnemen van een lening, zelfs als zij daardoor later de arbeidsmarkt betreden en hun levensinkomsten doen dalen. In aanvulling hierop wordt vanuit het concept *zelf-controle* beargumenteerd dat individuen hun toekomstig bestedingsgedrag niet volledig vertrouwen en proberen om hun toekomstige opties te beperken (Thaler & Shefrin, 1991). Zo nemen studenten liever een bijbaantje dan een studielening om eventuele terugbetalingsproblemen te vermijden. Zij kunnen ook de risico's van het niet halen van een diploma beperken door kortere, makkelijkere of minder dure opleidingen te kiezen.

Mentaal boekhouden

Het economische principe van uitwisselbaarheid betekent dat geld van de ene rekening net zo makkelijk kan worden uitgegeven als geld van een andere rekening. "Aan euro's zitten geen strikjes". Het verschijnsel van mentaal boekhouden wijst echter op het gegeven dat individuen anders omgaan met verschillende onderdelen van hun vermogen (Allers, 2001). Ze vinden het bijvoorbeeld makkelijker om een rekening courant aan te spreken dan een spaarrekening. Het aangaan van een studielening betekent in deze redenering dat men de kosten van het hoger onderwijs uitstelt en eigenlijk geld besteedt van de *toekomstige inkomens rekening*. Het aanspreken van toekomstig inkomen wordt veelal als meer pijnlijk ervaren dan het uitgeven van geld uit andere bronnen waardoor studenten minder geneigd zijn om te lenen. Daarnaast hebben investeringen in hoger onderwijs geen topprioriteit omdat het niet als een eerste levensbehoefte wordt beschouwd. Kortom, ook het doel van de aanwending van geld is van belang.

Theoretisch kader

Op grond van de hierboven beschreven inzichten is in Hoofdstuk 5 een model ontwikkeld dat specificeert hoe de relaties tussen de financiële prikkels (collegegelden, beurzen, leningen en toekomstig inkomen), de sociaal-economische status en andere achtergrondkenmerken van studenten doorwerken op hun percepties van financiële prikkels en op studiekeuzes.

   Dit theoretisch model beschrijft dat studenten financiële prikkels interpreteren met behulp van de hierboven beschreven psychologische verschijnselen binnen de context van hun individuele achtergrondkenmerken. Dit alles resulteert in individuele percepties van de kosten en baten van hoger onderwijs die vervolgens worden omgezet in feitelijk studiekeuzegedrag. De percepties van studenten vormen derhalve een intermediaire fase tussen de oorspronkelijke financiële prikkels en feitelijke studiekeuzes.

Daarbij moet worden opgemerkt dat de psychologische verschijnselen elkaar kunnen versterken, overlappen en samenhangen kunnen vertonen. Daardoor zijn ze in het model gecombineerd en simultaan verwerkt in hypothesen. Dit model is gevisualiseerd in Figuur A.

Figuur A: Het financiële percepties model van studiekeuzegedrag
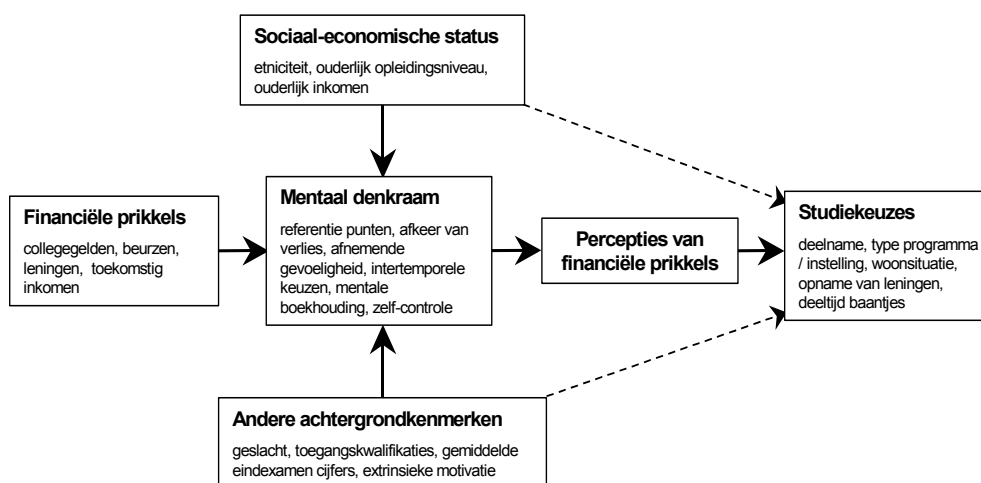
Om dit model te testen zijn er tien hypothesen geformuleerd met betrekking tot de relaties tussen de sociaal-economische achtergrond van studenten, hun percepties van financiële prikkels en hun feitelijke studiekeuzes. De sociaal-economische status wordt beschouwd als de centrale verklarende factor voor de prijsgevoeligheid van studenten. Daarnaast zijn er andere achtergrondvariabelen van studenten in het verklaringsmodel opgenomen, zoals geslacht, vooropleiding, examencijfers en motivatie, omdat deze in eerder onderzoek belangrijk bleken te zijn voor studiekeuzegedrag. De opgestelde hypothesen zijn ingedeeld in twee typen relaties. De eerste betreft de vraag of studenten uit verschillende SES groepen andere percepties hebben van hoger onderwijs-gerelateerde financiële prikkels (fase 1). De tweede groep hypothesen gaat in op de vraag of de mogelijke verschillen in percepties leiden tot verschillen in de feitelijke keuzes van studenten (fase 2). De hypothesen luiden als volgt:

Fase 1:

Vergeleken met hoge-SES studenten zullen lage-SES studenten:
- studeren vaker als een financiëel risico ervaren (Hypothese 1);
- gevoeliger zijn voor collegegeldveranderingen (Hypothese 2);
- vaker aangetrokken worden door beurzen (Hypothese 3);

- relatief lage inkomensverwachtingen hebben (Hypothese 4);
- minder genegen zijn om studieleningen op te nemen (Hypothese 5).

Fase 2:

Vergeleken met hoge-SES studenten zullen lage-SES studenten:
- vaker bij hun ouders blijven wonen (Hypothese 6);
- minder vaak en minder veel lenen (Hypothese 7);
- meer genegen zijn bijbaantjes te hebben (Hypothese 8);
- relatief vaker kortere en makkelijker gepercipieerde opleidingen kiezen (Hypothese 9).

Studenten met een studielening zullen relatief vaker kortere en makkelijker opleidingen kiezen dan studenten die niet lenen (Hypothese 10).

Onderzoeksopzet

Om het theoretische model te toetsen is gebruik gemaakt van bestaand datamateriaal afkomstig uit enquêtes onder eerstejaarsstudenten in het hoger onderwijs in Nederland. Om een homogene onderzoekspopulatie te creëren hebben we alleen gegevens van studenten geselecteerd die zich voor de eerste maal in het hoger onderwijs hadden ingeschreven. Deze "echte eerstejaarsstudenten" ondervinden de sterkste invloed van hun sociaal-economische herkomst, hetgeen belangrijk is in het licht van de opgestelde hypothesen. Het databestand met gegevens van studenten in 1997 bevatte de "rijkste" gegevens met betrekking tot de percepties van studenten en is het meest geschikt voor de toetsing van ons model van studiekeuzegedrag. Een ander belangrijk voordeel van het gebruik van gegevens over het cohort 1997 is dat deze studenten ingestroomd zijn net nadat in 1996 de prestatiebeurs was ingevoerd. De prestatiebeurs impliceerde grotere financiële risico's voor studeren. Deze studenten worden verwacht bewuste kosten-baten afwegingen te maken met betrekking tot hun studiekeuzes.

Operationalisering

De operationalisering van de hypothesen is uitgebreid gepresenteerd in Hoofdstuk 6. Voor elk van de 10 hypothesen zijn één of meer afhankelijke variabelen geïdentificeerd. Net als de hypothesen zijn de afhankelijke variabelen onderverdeeld in twee groepen. De eerste groep afhankelijke variabelen heeft betrekking op de percepties die studenten hebben van financiële prikkels ten aanzien van studiekeuzegedrag. De tweede groep betreft de werkelijke studiegerelateerde keuzes die studenten maken.

    Het verklaringsmodel dat wordt gebruikt voor de toetsing van de hypothesen bestaat vervolgens uit twee groepen onafhankelijke variabelen. De eerste gaat in

op de sociaal-economische status van studenten en de tweede groep betreft controlevariabelen zoals geslacht, toegangskwalificatie, eindexamencijfers en motivatie. De afhankelijke en onafhankelijke variabelen zijn gepresenteerd in Tabel A.

Tabel A: Variabelen gebruikt in de empirische analyse

Type variabelen	Hypothese	Variabelen
Afhankelijke variabelen fase I	1	Studeren beschouwd als een risicovolle investering
	2	Gevoeligheid voor collegegelden
	3	Belang van studiebeurzen
	4	Verwacht toekomstig startsalaris
	4	Verwacht maximum salaris in de carrière
	5	Maximaal acceptabele studieschuld
Afhankelijke variabelen fase II	6	Woonsituatie van studenten
	7	Al dan niet opnemen van een studielening
	7	Hoogte van het leenbedrag
	8	Het hebben van een bijbaantje
	8	De verdiensten uit een bijbaantje
	8	Het aantal gewerkte uren
	9 & 10	Het kiezen van een exacte studie
	9 & 10	Het type instelling (universiteit of HBO)
Onafhankelijke SES-variabelen	Alle	Ouderlijk opleidingsniveau
	Alle	Ouderlijk inkomen
	Alle	Etniciteit (autochtoon of allochtoon)
Onafhankelijke controle variabelen	Alle	Geslacht
	Alle	Toegangskwalificatie
	Alle	Gemiddeld eindexamencijfer (middelbare school)
	Alle	Extrinsieke motivatie
Intermediaire onafhankelijke variabelen fase II	6 - 10	Studeren gezien als een risicovolle investering
	6 - 10	Gevoeligheid voor collegegelden
	6 - 10	Belang van studiebeurzen
	6 - 10	Verwacht toekomstig startsalaris
	6 - 10	Verwacht maximum salaris in de carrière
	6 - 10	Maximaal acceptabele studieschuld

Statistische methoden

Als eerste stap in de empirische analyse is de steekproef beschreven met het aantal cases, de frequentie verdeling, de gemiddelden en de standaard deviatie. Deze maatstaven zijn vergeleken met die voor de volledige populatie van

eerstejaarsstudenten in Nederland in 1997. Het belangrijkste is dat er voldoende cases in de diverse subgroepen (intervallen per variabele) zitten.

Om de hypothesen te toetsen zijn drie statistische methoden gebruikt: bivariate analyse, multipele regressie en *structural equation modelling*. In de bivariate analyse zijn de relaties tussen de onafhankelijke en afhankelijke variabelen geanalyseerd met behulp van varantieanalyse via de samengestelde *F-toets* (ANOVA), waarbij is gekeken naar de variantie tussen en binnen de groepen (of intervallen). Bivariate analyse geeft alleen aan of er samenhang tussen variabelen bestaat, maar wijst nog niet op causaliteit.

Met de multipele regressie is het complete theoretische model voor iedere afhankelijke variabele getoetst, waarbij alle onafhankelijke variabelen zijn meegenomen in de statistische analyses. Hiervoor is een standaard lineaire multipele regressie uitgevoerd. Alleen voor de afhankelijke variabelen met slechts enkele mogelijke uitkomsten is een multinominale logistische regressie methode gehanteerd. In Hoofdstuk 8 bleek dat het opnemen van interactievariabelen (om uit te drukken dat onafhankelijke variabelen elkaar beïnvloeden) niet nodig was.

Als laatste statistische toets is *structural equation modelling* (SEM) toegepast, ook wel bekend als LISREL. SEM-analyse kent drie voordelen ten opzichte van multipele regressie (Kelloway, 1998). Ten eerste berekent het programma voor iedere afhankelijke variabele alle gespecificeerde vergelijkingen (relaties tussen de variabelen binnen het model) simultaan. Daardoor worden alle directe en indirecte effecten die zich binnen een model afspelen zichtbaar. Een indirect effect is bijvoorbeeld het effect van ouderlijk opleidingsniveau op de afhankelijke variabele dat via de variabele ouderlijk inkomen loopt. Ten tweede toetst de SEM analyse of alle veronderstelde causale verbanden tezamen een goede "fit" vertonen met de gebruikte dataset. De "fit-maatstaven" geven aan of het theoretische model plausibel is. Het rekenprogramma geeft ook aan of de uitkomsten van het model nog verbeterd kunnen worden door relaties binnen het model toe te voegen of te verwijderen, zodat het model kan worden geoptimaliseerd. Ten derde kan SEM-analyse een pad-model met intermediaire lagen van variabelen te specificeren en toetsen. Zo wordt causaliteit gemeten en worden alle relaties, directe en indirecte effecten binnen het model zichtbaar. Het te toetsen model bestaat doorgaans uit een pijlendiagram van causale relaties. Een voorbeeld hiervan is gepresenteerd in *Figuur 10.2*.

Empirische bevindingen: doen de percepties van studenten ertoe?

Zoals eerder aangegeven is het theoretische model in twee stappen getoetst. In de eerste fase is gekeken of studenten van verschillende SES-groepen verschillende percepties van financiële prikkels hebben, dus of zij de kosten en baten van studeren anders inschatten. In de tweede fase is gekeken of eventuele verschillen in percepties leiden tot daadwerkelijke verschillen in studiekeuzen. De

belangrijkste bevindingen, die in de Hoofdstukken 8 en 9 uitgebreid aan de orde zijn geweest, worden hieronder voor beide fasen afzonderlijk besproken.

Sociaal-economische status en percepties van financiële prikkels

Met betrekking tot de vraag of studenten uit verschillende SES groepen verschillende percepties hebben van financiële prikkels met betrekking tot studeren zijn de belangrijkste bevindingen van de statistische toetsen van de hypothesen samengevat in Tabel 10.2. Hierin staan de significante effecten van de onafhankelijke variabelen op de percepties van studenten en of deze effecten de hypotheses ondersteunen of niet.

Ten eerste kunnen we concluderen dat de significantie van de onafhankelijke variabelen in het algemeen eenzelfde beeld oplevert in de drie verschillende analyse-methoden: de bivariate analyse, regressie analyse en *structural equation modelling*. Dat duidt erop dat de uitkomsten van de analyses betrouwbaar zijn. Daarnaast bleek het theoretische model in de regressie analyses en structural equation modelling significant te zijn voor alle afhankelijke variabelen behalve voor de gevoeligheid van studenten voor veranderingen in collegegelden. Dat betekent dat Hypothese 2 moet worden verworpen. Wel moet worden opgemerkt dat de collegegeldgevoeligheid op een specifieke situatie (groep studenten) en langs een omweg getoetst is.

Wat betreft de andere vier hypothesen zijn telkens minimaal twee van de drie SES-variabelen significant. Dat betekent dat studenten van verschillende sociaal-economische herkomst wel degelijk andere percepties van financiële prikkels hebben. Studenten uit lagere sociaal-economische klassen vinden studeren meer risicovol, zij vinden beurzen belangrijker, zij verwachten een lager toekomstig inkomen en zij vinden studieschulden minder acceptabel dan andere studenten.

Ouderlijk opleidingsniveau blijkt de sterkste verklarende SES-variabele te zijn. Deze variabele is niet alleen het vaakst significant, maar heeft ook de sterkste invloed. Etniciteit is niet in alle gevallen significant en in één geval is het significante effect ervan tegengesteld aan de verwachting (Hypothese 5): allochtone studenten blijken hogere studieschulden meer acceptabel te vinden dan autochtone studenten. Culturele factoren kunnen hiervan de oorzaak zijn (zie ook Hofman *et al.*, 2003).

Van de controlevariabelen zijn geslacht en toegangskwalificaties het vaakst significant. Vrouwelijke studenten vinden beurzen belangrijker, zij hebben lagere toekomstige inkomstenverwachtingen en zij zijn minder bereid te lenen voor hun studie dan mannelijke studenten. Studenten met hogere vooropleidingen en met hogere eindexamenscores vinden studeren minder riskant, zij vinden beurzen minder belangrijk, zij verwachten hogere toekomstige salarisniveaus en zij zijn bereid meer te lenen dan studenten met mindere toegangskwalificaties. Hoewel deze bevindingen geen directe ondersteuning voor de hypothesen vormen (het zijn controle variabelen), zijn zij wel conform de verwachtingen. Extrinsieke motivatie speelt een minder belangrijke rol.

Een interessante bevinding van de eerste fase is dat de verklaarde variantie in de multivariate regressie analyses en in de SEM analyses niet erg hoog is: maximaal 28%. Dit betekent dat het opgestelde theoretische model helaas maar een deel van de percepties van studenten over financiële factoren verklaart en dus nog veel zaken over het hoofd lijkt te zien. Dit is echter gebruikelijk voor dit soort analyses (Beekhoven, 2002).

SES, percepties van financiële prikkels en feitelijke studiekeuzen

De belangrijkste bevindingen met betrekking tot de vraag in hoeverre verschillen in sociaal-economische achtergrond en percepties van financiële prikkels leiden tot andere studiekeuzen staan samengevat in Tabel 10.3. Hierin staat voor de drie gehanteerde statistische toetsen welke onafhankelijke variabelen een significant effect hebben op feitelijke studiekeuzes en of deze effecten de hypotheses ondersteunen of niet.

De patronen in significante verklarende variabelen zijn minder consistent tussen de verschillende statistische methoden dan in de eerste fase van het onderzoek. Deze verschillen zitten met name tussen de bivariate analyses aan de ene kant en de andere twee analyses aan de andere kant. De uitkomsten van de multipele regressie en SEM-analyses, waarmee feitelijk het theoretische model is getoetst, komen sterk overeen.

Op grond van de toetsresultaten moeten twee van de vijf hypotheses van de tweede fase worden verworpen: Hypothese 7 aangaande de vraag of studenten al dan niet lenen, en Hypothese 10 die stelt dat studenten die lenen vaker makkelijker en kortere opleidingen kiezen. Er is geen verband gevonden tussen de sociaal-economische status van studenten en de mate waarin zij studieleningen opnemen. Alleen etniciteit vertoont een significant verband met leengedrag, maar de richting daarvan is tegengesteld aan onze verwachtingen: allochtone studenten nemen hogere studieleningen op dan autochtone studenten. Deze bevindingen komen overeen met bestaand onderzoek. Zo beargumenteren De Jong *et al.* (2001) dat lagere-SES studenten net zo vaak lenen als hoge-SES studenten omdat de eerste groep het geld gewoon nodig heeft (*liquidity constraint*). Wat betreft Hypothese 10 kunnen we opmerken dat het leengedrag van studenten geen enkele invloed lijkt te hebben op zowel de vraag of een exacte opleiding wordt gekozen of dat men kiest voor hogeschool of universiteit. Wellicht kiezen studenten eerst voor een opleiding en instelling en besluiten zij pas later of zij lenen.

Voor de overige hypothesen (6, 8, 9) zijn de effecten van ouderlijk opleidingsniveau significant en ondersteunen de hypothesen (behalve in het geval van de SEM-analyse voor de keuze van exact). Dus studenten van lager opgeleide ouders blijven vaker bij hun ouders wonen, hebben vaker bijbaantjes en kiezen vaker voor HBO-opleidingen en niet-exacte studies. Ouderlijk inkomen is alleen significant in de bivariate analyses, maar niet in de volledige modeltoetsing. De effecten van etniciteit ondersteunen Hypothesen 8 en 9 maar

niet Hypothese 6. Al met al vinden we enige ondersteuning voor de hypothesen dat studenten van verschillende SES groepen ook andere studiekeuzes maken. Lagere-SES studenten wonen bijvoorbeeld vaker bij hun ouders, zij hebben vaker een deeltijd baantje, en zij kiezen vaker opleidingen die als makkelijker of korter te boek staan.

Voor een volledige ondersteuning van de hypothesen moeten percepties een significante rol spelen bij het verklaren van studiekeuzegedrag. De empirische feiten zijn echter niet helemaal eenduidig en volledig in overeenstemming met onze verwachtingen. In de modeltoetsing (multipele regressie en SES-analyse) zijn slechts enkele van de vijf perceptievariabelen significant. Met name zijn de bereidheid tot lenen en het verwachte toekomstige inkomen van belang, maar ook het belang van beurzen en het financiële risico van studeren speelt af en toe een rol. De gevonden significante effecten van het financiële risico van studeren zijn echter tegengesteld aan de verwachtingen: studenten die studeren financieel risicovol vinden hebben minder gauw een bijbaantje en gaan meestal wel naar een universiteit in plaats van naar een hogeschool. Tenslotte is het opvallend dat er weinig ondersteuning is gevonden binnen ons model voor de deelname aan exacte studies.

Met betrekking tot de controlevariabelen zijn de toegangskwalificatie en in mindere mate het eindexamengemiddelde de meest consistente significante verklarende variabelen. Geslacht is ook een vrij sterke verklarende factor, vooral in de zin dat vrouwelijke studenten veel minder vaak voor exacte studies kiezen. Dat bevestigt het algemeen bestaande beeld. Daarentegen vonden we tot onze verrassing dat vrouwelijke studenten vaker uitwonend zijn dan mannen (wellicht omdat zij vaker een studie ver van huis kiezen of omdat zij liever onafhankelijk zijn). Daarnaast nemen vrouwelijke studenten (als zij lenen) onverwacht ook hogere leningen op dan mannen. Hetzelfde patroon tekent zich af voor allochtone studenten. Tenslotte neemt extrinsieke motivatie een ambivalente positie in. Hoewel significant in een aantal gevallen, is de richting vaak tegengesteld aan onze verwachtingen. Meer extrinsiek gemotiveerde studenten, die dus studeren om later een goed betaalde baan te vinden met veel status en macht, wonen bij hun ouders, zijn minder betrokken bij bijbaantjes en verkiezen veelal een HBO-opleiding boven de universiteit.

Reflecties / Slotbeschouwing

De bevindingen van deze studie kunnen op verschillende manieren in perspectief worden geplaatst. Wat heeft de studie bijgedragen aan onze kennis van studiekeuzes en wat betekent dit voor het beleid op dit terrein? Om hier antwoord op te geven reflecteren we hier op een wat lossere manier op de onderzoeksvragen.

Relatie met eerder onderzoek

De meeste bevindingen van het onderhavige onderzoek komen sterk overeen met de algemene bevinding in de studiekeuzeliteratuur dat studenten in het algemeen niet erg prijsgevoelig zijn. Niettemin stuiten de beleidsinitiatieven die de onderwijskosten verleggen van de overheid naar de student (*cost sharing*) op grote weerstand en hoort men dikwijls dat dit de toegankelijkheid van het hoger onderwijs in gevaar brengt, vooral voor studenten uit lage-SES groepen. In het licht van onze belangrijkste onderzoeksresultaten kunnen deze reacties verklaard worden door het feit dat studenten zich sterke percepties vormen van financiële prikkels, waarbij studenten uit verschillende SES-groepen substantieel verschillen. Maar onze resultaten tonen ook dat verschillen in percepties niet automatisch leiden tot verschillen in feitelijke studiekeuzen. Wellicht is dat de reden dat tot op heden geen enkele Nederlandse studie heeft uitgewezen dat een kostenverzwaring de toegankelijkheid voor achterstandsgroepen negatief heeft beïnvloed. De sociaal-economische samenstelling van de studentenpopulatie is door de tijd heen niet substantieel gewijzigd (De Jong *et al.*, 1991; Hofman *et al.*, 2003). Verder is er geen samenhang te ontdekken tussen de kostenverzwaringen over de afgelopen decennia en de afgenomen interesse voor exacte studies.

Onze belangrijkste bevinding die luit dat verschillen in percepties van financiële prikkels niet direct leiden tot verschillend keuzegedrag is ook consistent met de resultaten van soortgelijk onderzoek in andere landen. Recente studies in het Verenigd Koninkrijk duiden er bijvoorbeeld op dat studenten uit achterstandsgroepen een sterke leenaversie hebben (Callender, 2003). Er is echter nog geen overtuigend bewijs dat deze leenaversie studenten ervan weerhoudt om studieleningen op te nemen of aan hoger onderwijs deel te nemen. Dit blijkt eveneens uit studies voor andere landen, zoals in de Verenigde Staten (Fossey and Bateman, 1998), Canada (Junor and Usher, 2004) en Australië (Andrews, 1999). Desalniettemin kan er variatie optreden in de prijsgevoeligheid van studenten als er sprake is van aanzienlijke prijs- en kwaliteitsverschillen in het hoger onderwijs aanbod (McPherson and Schapiro, 1998).

Gerelateerd aan deze laatste opmerking kan de lage prijsgevoeligheid van studenten in Nederland misschien worden toegeschreven aan de relatief uniforme structuur van collegegelden, studiefinanciering en de kwaliteit van studieprogramma's. Daarbij komt dat de lastenverzwaring voor studenten in Nederland zeer geleidelijk heeft plaatsgevonden. De netto kosten stijgen jaarlijks met kleine stapjes via collegegeldverhogingen, toenemende kosten van levensonderhoud en het toenemend beroep op studieleningen. Studenten raken waarschijnlijk gewend aan dit patroon, dat als een *referentie-effect* kan worden bestempeld.

Een laatste algemene opmerking betreft het concept studiekeuze. Veel onderzoek op dit gebied refereert doorgaans enkel aan de deelnamebeslissingen van studenten (wel of niet studeren, welke opleiding aan welke instelling en wel

of niet doorstuderen). In de huidige studie worden studiekeuzen uitgebreid tot beslissingen over de woonsituatie, of men studieleningen opneemt en of men een bijbaantje neemt naast de studie. Dit betekent dat het ontwikkelde theoretische kader toegepast wordt op een breder spectrum van studiegerelateerde keuzes.

De waarde van "behavioural economics" voor studiekeuzeonderzoek

De toegevoegde waarde van de economische gedragstheorie (*behavioural economics*) voor studiekeuzegedrag is mede af te leiden door een vergelijking met traditionele theorieën als de *human capital* theorie. De originele human capital theorie is gestoeld op de assumptie van rationaliteit. Inmiddels is het model echter uitgebreid met de mogelijkheid van imperfecte informatie, onzekerheid, vooringenomen percepties, consumptiemotieven en verschillen in kwaliteit tussen opleidingen (zie Hoofdstuk 3). Ook dit meer uitgebreide human capital model verklaart echter niet waarom individuen verschillen wat betreft hun kijk op kosten en baten, waarom zij verschillende soorten (imperfecte) informatie gebruiken, onzekerheid anders inschatten en derhalve verschillen in hun subjectieve rationaliteit. Ondanks de eenvoud van het human capital model en zijn verdiensten in het verklaren van studiekeuze- en arbeidsmarktvraagstukken blijft de kritiek overeind dat ook het uitgebreide model nog tekortschiet in het verklaren van leenaversie, het leengedrag van studenten en verschillen in studiekeuzegedrag tussen studenten van verschillende SES groepen. Op grond van deze overwegingen is gekeken in hoeverre de economische gedragstheorie kan helpen om studiekeuzegedrag beter te begrijpen. Deze benadering poogt te doorgronden waarom individuen afwijken van rationele keuzen in economische beslissituaties. Daarbij onderscheidt de theorie een aantal psychologische concepten die ertoe leiden dat individuen kosten en baten anders inschatten dan volgens de traditionele economische theorie mag worden verwacht. Het is bijvoorbeeld interessant dat de huidige studie aantoont dat vooral de bereidheid tot het opnemen van studieleningen (een perceptie) een belangrijke factor is in het studiekeuzeproces.

Reflecterend op deze theorieën kunnen we concluderen dat beide nagenoeg tegengestelde posities innemen wat betreft de mate waarin zij concepten uit andere sociale vakgebieden integreren in hun argumentatie. Aan de ene kant is het originele human capital model een eenvoudig economisch model dat uitgaat van het bijna pure begrip van rationaliteit. Door de tijd heeft de theorie overigens een aantal van de strenge assumpties afgezwakt, bijvoorbeeld door rekening te houden met tijdsvoorkeuren, imperfecte informatie en onzekerheid. Aan de andere kant staat de economische gedragstheorie die een gevarieerde verzameling van vooral psychologische fenomenen in het economisch redeneren integreert om zo het feitelijk gedrag van mensen in economische beslissituaties te begrijpen. Met behulp van vele voorbeelden en experimenten wordt op een inductieve wijze een algemene theorie opgebouwd. De belangrijkste uitdaging is er echter om uit deze veelheid van fenomenen een eenduidig en coherent

theoretisch model op te bouwen. Momenteel ontbreekt het nog aan eenvoud, transparantie en coherentie zoals die wel binnen de *human capital* theorie bestaat.

Beide theoretische benaderingen hebben dus nog geen model opgeleverd waarmee studiekeuzegedrag ten volle kan worden verklaard. Onderzoekers die met de human capital theorie werken zouden derhalve kunnen overwegen of de economische gedragstheorie een waardevolle aanvulling op bestaande conceptuele modellen kunnen leveren. Voor de *behavioural economists* ligt er de taak om de complexiteit van hun huidige modellen te reduceren door bijvoorbeeld te proberen enkele psychologische fenomenen te clusteren tot meer algemene concepten. Dit om de overlap en interne tegenstellingen te verminderen. Momenteel zit er bijvoorbeeld overlap tussen concepten zoals de aversie van verlies, bezitsneiging en referentie-effecten. Contradicties kunnen optreden als individuen aan de ene kant buitenproportioneel hoge rendementen op investeringen verwachten maar aan de andere kant niet willen lenen omdat zij nu liever niet interen op hun toekomstig (hoge) inkomen. Al met al kunnen beide benaderingen van elkaar profiteren om tot modellen te komen die menselijk keuzegedrag beter verklaren.

Een voordeel van de economische gedragstheorie is de aandacht voor percepties van individuen die besluiten nemen in onzekere omstandigheden. Deze percepties vormen een mentaal denkkader waarbinnen individuen informatie interpreteren om tot een beslissing te komen. Dit onderstreept het idee dat individuele percepties kunnen afwijken van rationele verwachtingen omdat er gebruik wordt gemaakt van beperkte en gekleurde informatie. Op grond hiervan kan men beredeneren dat studenten van verschillende achtergronden andere percepties van financiële prikkels hebben. Ook is gebleken dat verschillen in percepties niet noodzakelijk hoeven te leiden tot verschillende keuzes. Dat is interessant omdat studiekeuzen onder invloed staan van een veelheid aan factoren (zie Figuur 2.2) waarbij studenten zich in de verschillende stadia van het studiekeuzeproces vele percepties vormen. Als we een beter begrip krijgen van de rol van percepties van studenten kunnen we ook studiekeuzes beter leren begrijpen dan tot nu toe mogelijk was met de traditionele economische theorieën.

Relevantie voor studiekeuzebeleid

Een belangrijke uitkomst van het onderhavige onderzoek is dat de economische gedragtheorie een aantal argumenten aandraagt voor het verschijnsel dat studenten van verschillende achtergronden andere percepties van financiële prikkels hebben. Zo relateren studenten de kosten en baten van hoger onderwijs aan hun huidige inkomenssituatie. Ook wensen bepaalde groepen studenten erg hoge toekomstige baten om hun investeringen te rechtvaardigen. Verder prefereren studenten vaak de directe gratificatie van deeltijdwerk boven het opnemen van studielening waardoor zij zich volledig op de studie zouden kunnen concentreren, sneller af te studeren en dan sneller de arbeidsmarkt te betreden met een goed renderend diploma.

Momenteel is er veel aandacht voor het fenomeen leenaversie, zowel in de media, politiek en onderzoek. De huidige studie toont aan dat studenten uit achterstandsgroepen lenen als onaantrekkelijk percipiëren. Dat weerhoudt hen er overigens niet studieleningen op te nemen, waarschijnlijk omdat zij liquiditeitsproblemen hebben. Het weerhoudt studenten ook niet om te gaan studeren. Niettemin staan de media bol van artikelen waarin beweerd wordt dat studieschuld en collegegelden de toegang tot het hoger onderwijs beperken. Daarbij moet worden aangetekend dat potentiële studenten en hun ouders relatief weinig informatie hebben of gebruiken over collegegelden, de mogelijkheden van studiefinanciering en de toekomstige baten van hoger onderwijs. Derhalve kan de publiciteit over de mogelijke schadelijke gevolgen van *cost sharing* voor de toegankelijkheid van het hoger onderwijs meer schadelijk zijn dan *cost sharing* zelf. Zoals in Hoofdstuk 2 is aangetoond is er weinig empirische onderbouwing voor toegankelijkheidsproblemen als gevolg van *cost sharing*. Maar onze studie geeft aan dat lage-SES studenten meer prijsgevoelige percepties hebben dan andere studenten. In Hoofdstuk 1 bleek dat lage-SES studenten ondervertegenwoordigd zijn in het hoger onderwijs en dat vele overheden de toegankelijkheid voor deze groepen willen verbreden. Gezien deze feiten zijn informatie en de communicatie over de kosten en baten van het hoger onderwijs belangrijke issues. Vooral lage-SES studenten die het meest prijsgevoelig en onzeker zijn over de kosten en baten van hoger onderwijs en hoe studiefinanciering de risico's van hoger onderwijsinvesteringen kunnen verminderen hebben baat bij gerichte maatregelen.

Een belangrijk onderwerp in *behavioural economics* is het referentie-effect op grond waarvan een individu de mogelijke uitkomsten van een beslissing vergelijkt met zijn huidige inkomenssituatie. Dit effect kan één van de redenen zijn waarom de geleidelijkheid van de kostenstijgingen voor studenten in Nederland niet tot toegankelijkheidsproblemen hebben geleid. Nederlandse studenten zijn gewend aan het betalen van collegegelden en accepteren de kleine verhogingen die in het systeem ingebakken lijken te zijn. De stapsgewijze kleine veranderingen in de collegegelden en studiefinanciering impliceren een relatief stabiel referentiekader. Alleen als er substantiële veranderingen in het stelsel worden voorgesteld komen studenten serieus in opstand. Dit betekent dat, om een negatieve invloed op toegankelijkheid te voorkomen, men bij *cost sharing* wellicht een lange termijn perspectief moet hanteren waarbij veranderingen geleidelijk worden doorgevoerd. De vraag is echter waar de grens ligt waarna studenten wel prijsgevoelig worden. Internationale ervaringen laten zien dat delen van het Amerikaanse hoger onderwijs wat dit betreft in de gevarenzone zitten (zie Hoofdstuk 2).

Een algemene conclusie van het onderhavige onderzoek is dat studenten niet erg prijsgevoelig zijn en dat ouderlijk opleidingsniveau, geslacht, vooropleiding and eindexamenresultaten de belangrijkste verklaring voor studiekeuzes leveren. Dit komt overeen met de resultaten van het meeste studiekeuzeonderzoek. Daarnaast toont de huidige studie aan dat de meerderheid van studenten ook zou

studeren als er geen studiefinanciering of studiebeurzen zouden zijn. Slechts een minderheid van de studenten, vooral studenten uit achterstandsgroepen, geeft aan dat studiefinanciering wel een belangrijke factor is om te gaan studeren. Dit geeft te denken als men naar het Nederlandse stelsel van studiefinanciering kijkt. Zoals in vele andere landen is studiefinanciering erop gericht om de toegankelijkheid te stimuleren. De Nederlandse overheid verstrekt echter generieke subsidies aan alle studenten (basisbeurzen), onafhankelijk van sociaal-economische situatie van studenten. Hier kan men vraagtekens bij zetten als we bedenken dat studenten van midden- en hogere SES klassen dergelijke subsidies niet echt belangrijk vinden in relatie tot hun deelnamebeslissingen. In een dergelijke situatie lijkt het meer efficiënt om publieke subsidies alleen te richten op studenten die het echt nodig hebben, dus op lage-SES studenten. Finnie *et al.* (2004) kwamen tot eenzelfde conclusie voor Canada, waar algemene belastingfaciliteiten, studiebeurzen en studiefinanciering voor onafhankelijke studenten leiden tot een situatie waarin meer dan de helft van de studiefinancieringsmiddelen terecht komt bij studenten uit gezinnen met een bovengemiddeld inkomen. Eenzelfde patroon treedt op in vele Europese landen waar doorgaans de meerderheid van studenten een beroep kan doen op generieke beurzen, kinderbijslagregelingen of belastingfaciliteiten (Vossensteyn, 2004b). Uiteraard kan studiefinanciering meer doelen dienen dan zo efficiënt mogelijk de toegankelijkheid dienen, zoals het voorzien in een basisinkomen voor studenten of het aanbieden van een simpel en transparant geheel van voorzieningen.

Onderzoeksresultaten in een internationale context

Aansluitend op de voorgaande opmerkingen kan worden opgemerkt dat de empirische resultaten op basis van een Nederlandse onderzoekspopulatie ook geldig zijn in een internationale context. De toepassing van *behavioural economics* is al relevant gebleken in de relatief homogene situatie van het Nederlandse hoger onderwijs. Het is nog meer uitdagend om deze nieuwe theorie toe te passen en testen in situaties waar studenten met een veel grotere variëteit aan postsecundaire onderwijsopties te maken hebben in termen van kwaliteit en prijs. Als interessante voorbeelden kan gedacht worden aan landen zoals de Verenigde Staten, Canada, Nieuw Zeeland en Australië. In landen met een gevarieerd hoger onderwijs systeem kan bijvoorbeeld het concept van verliesaversie getest worden voor situaties van gedifferentieerde collegegelden, al dan niet vergezeld van studiebeurzen die collegegeldverschillen compenseren. Omdat *behavioural economics* suggereert dat collegegelden (kosten) een zwaardere impact hebben dan studiebeurzen (baten), kan men verwachten dat gedifferentieerde collegegelden een negatieve invloed hebben op de toegankelijkheid voor lage-SES studenten, vooral in het duurdere onderwijssegment. Het is ook interessant om te bekijken of verschillende percepties van veranderingen in de netto onderwijsprijs gerelateerd kunnen worden aan veranderingen in deelnamepatronen van lage-

SES studenten. In de VS is dit onderzocht door Kane (1995) en McPherson and Schapiro (1998).

Aan ander issue is dat de percepties van studenten over financiële factoren er wel degelijk toe doen. Dit is vooral van belang voor de discussie over leenaversie zoals die in vele landen gevoerd wordt. Leenaversie wordt doorgaans direct verbonden met een afname van de toegankelijkheid van het hoger onderwijs. Er is inderdaad sterke aanwijzingen dat studenten het vervelend vinden om studieleningen op te nemen en dat zij vrezen een hoge studieschuld op te bouwen (Callender, 2003; Gladieux, 2003; Junor and Usher, 2004). Desalniettemin is er geen overtuigend bewijs dat leenaversie ook leidt tot deelnameproblemen. Ook in deze studie vonden we dat de percepties van studenten niet direct worden omgezet in duidelijk afwijkende studiekeuzen. Studenten met leenaversie nemen vaak wel degelijk studieleningen op. Dit betekent echter niet dat leenaversie niet serieus genomen moet worden, want het is in ieder geval een eerste indicatie van potentiële toegankelijkheids- en informatieproblemen.

Een optie is om de economische gedragstheorie te gebruiken om verschillen in studiekeuzegedrag te verklaren tussen studenten uit verschillende landen. Het concept van referentieniveaus kan hierbij zeer bruikbaar zijn, bijvoorbeeld als men data gebruikt van internationaal vergelijkende studies zoals de *Euro Student* monitor van het HIS (2002).

Reflectie op de gehanteerde statistische methoden

Voor het testen van de hypothesen zijn drie statistische methoden gehanteerd. Naast de standaard bivariate analyses voor het testen van (potentiële) relaties tussen de afzonderlijke afhankelijke en onafhankelijke variabelen is het volledig gespecificeerde *behavioural economic*s model van studiekeuzegedrag getest met multipele regressie en *structural equation modelling* (SEM). Hoewel multipele regressie en SEM voor een groot deel overeenkomen, heeft de laatste methode enkele voordelen. Het belangrijkste pluspunt is dat SEM alle verbanden modelleert als een causaal padmodel. Daarbij worden alle directe en indirecte effecten binnen het model geschat, hetgeen tot "rijkere" resultaten leidt omdat in een SEM analyse indirecte effecten[82] zichtbaar worden en dat gebeurt niet bij regressie analyse. Tenslotte schat de SEM-analyse de "fit" tussen het theoretische model en de gebruikte dataset (zie Hoofdstuk 7).

De SEM-analyse heeft resultaten opgeleverd die we anders niet gevonden zouden hebben. De model-fit maatstaven toonden aan dat het theoretische model in de meeste gevallen goed overeenkomt met de data. Dit versterkt onze algemene conclusies en maakt het mogelijk ons te concentreren op de directe en indirecte effecten. Naast alle directe effecten bleek ouderlijk opleidingsniveau ook belangrijke indirecte effecten te hebben op de variabelen binnen het theoretische

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[82] Een indirect effect is bijvoorbeeld het effect van ouderlijk opleidingsniveau op de keuze voor universiteit of hogeschool dat (indirect) via de eindexamenresultaten loopt.

model. Ook etniciteit, geslacht en toegangskwalificatie hebben in een aantal gevallen indirecte effecten binnen ons model. Een ander resultaat van het SEM model is dat het alle directe effecten tussen de onafhankelijke variabelen toont, waardoor de complexiteit van het model kon worden gereduceerd door de insignificante verbanden te verwijderen. Dat was vooral nuttig voor de overgang tussen de eerste fase en tweede fase van het empirische onderzoek, dus de overgang van de percepties van studenten naar de rol van die percepties voor feitelijke studiekeuzen.

Al met al vormen beide statistische methoden, multivariate analyse en SEM, een strenge toets op de relevantie van het theoretische model en de hypothesen. De uitkomsten laten een grote mate van consistentie zien tussen de verschillende statistische methoden.

Beperkingen van de studie

De huidige studie kent ook een aantal beperkingen. De eerste daarvan is dat het *behavioural economics* model is toegepast op de relatief homogene situatie van het Nederlandse hoger onderwijs. Daardoor hebben we niet kunnen onderzoeken wat de rol van de percepties van studenten van financiële prikkels is in meer gedifferentieerde situaties wat betreft de prijs en kwaliteit van programma's en/of instellingen.

Een andere beperking van de studie is dat er een steekproef is gebruikt van eerstejaarsstudenten die al staan ingeschreven. Ondanks dat dit een vrij homogene groep studenten is die nog sterk onder de invloed van hun sociale achtergrondkenmerken staan is het niet mogelijk onderscheid te maken tussen studenten in het begin van hun studieperiode en studenten die in latere studiejaren zitten. Volgens een gedragseconomisch perspectief zou dat tot aanzienlijke verschillen in percepties en gedrag kunnen leiden (zie Hoofdstuk 5). Een andere beperking is dat er geen onderscheid gemaakt is naar individuen die wel en die niet zijn gaan studeren. Tenslotte is het niet mogelijk om de ontwikkeling in de percepties van studenten en hun feitelijke keuzes door de tijd vast te leggen.

Een verdere beperking is het doen van secundaire analyse op een bestaande gegevensset. De gebruikte gegevens waren niet van de meest recente datum (1997) waardoor huidige generatie studenten afwijkende opinies zouden kunnen hebben vergeleken met de onderzochte populatie. Onze resultaten bleken echter consistent te zijn met ander studiekeuzeonderzoek, ook dat van recenter datum. Desalniettemin is het nadeel van secundaire data-analyse dat er met vooraf gedefinieerde vragen en variabelen moet worden gewerkt. Als we onze eigen vragenlijst hadden kunnen samenstellen hadden we, achteraf gezien, enkele variabelen anders gedefinieerd, bevraagd en geoperationaliseerd, bijvoorbeeld met betrekking tot het belang van collegegelden en studiebeurzen.

De huidige studie is bijna geheel gericht op de verschillen tussen studenten van verschillende sociaal-economische klassen. Ook het onderscheiden van

andere groepen studenten zou interessant kunnen zijn, zoals het verschil tussen mannen en vrouwen, tussen studenten in de verschillende typen hoger onderwijs, in verschillende disciplines, of tussen jonge en oude studenten. Geslacht is wel in ons model opgenomen, maar dan als controle variabele. Dit is gedaan omdat geslacht een belangrijke determinant is voor de variatie in de arbeidsmarktpositie van individuen en derhalve al voldoende wordt afgedekt met de *human capital* theorie. Wat betreft het type hoger onderwijs (universiteit of hogeschool) en de discipline is ervoor gekozen deze niet als verklarende variabelen in ons model op te nemen maar als afhankelijke variabelen voor de feitelijke studiekeuzes van studenten.

Ondanks al deze beperkingen kan er een met grote mate van zekerheid worden vastgesteld dat studenten uit verschillende SES-groepen verschillende percepties van financiële prikkels bezitten en dat deze ook een rol (kunnen) spelen in de uiteindelijke studiekeuzes die zij maken. Dat bevestigt ons aanvankelijke vermoeden dat *behavioural economics* van dienst kan zijn bij het begrijpen van de financiële beslissingen van studenten.

Mogelijkheden voor toekomstig onderzoek

Op grond van het gegeven dat *behavioural economics* een bruikbaar perspectief is om studiekeuzegedrag te analyseren formuleren we enkele mogelijkheden voor toekomstig onderzoek. Ten eerste kan gedacht worden aan het uitbreiden van het *human capital* model met enkele concepten uit *behavioural economics*. Ook kunnen deze laatste concepten verder worden uitgewerkt in de context van studiekeuzegedrag. Men kan denken aan een aanscherping van de argumentatie, maar ook aan toepassing op delen van studiekeuzeonderzoek die niet in het huidige onderzoek zijn betrokken. Zo kan men denken aan het vergelijken van meer landen, het bestuderen van situaties van gedifferentieerde collegegelden, of van situaties van hoge collegegelden gecombineerd met hoge studiefinanciering (*high-tuition-high-aid*). In Hoofdstuk 5 zijn al enkele mogelijke hypothesen voor dergelijke situaties geformuleerd. Daarnaast kan men denken aan veranderingen door de tijd, om te kijken naar korte- en lange termijn effecten van substantiële beleidsveranderingen.

Een onderwerp dat zeker meer onderzoek behoeft is het fenomeen van leenaversie. Het *behavioural economics* concept van de afkeer van verlies kan hierbij een belangrijke rol spelen. Gebaseerd op onze onderzoeksbevindingen lijkt het belangrijk te zijn een duidelijk onderscheid te maken tussen het idee dat men het niet prettig vindt om te lenen tegenover het idee dat studieleningen studenten ervan zouden weerhouden om überhaupt te gaan studeren. Hieraan gerelateerd kan men ook kijken naar de mogelijk invloed van verschillende terugbetalings-mechanismen op het leengedrag van studenten en de toegankelijkheid van het hoger onderwijs.

Tenslotte, als er is vastgesteld dat de percepties van studenten ertoe doen, dan zegt dit impliciet dat informatie en communicatie belangrijk zijn. Dit zijn punten

die aan belang winnen maar nog steeds ondervertegenwoordigd zijn in de studiekeuzeliteratuur (Jongbloed *et al.*, 2004). *Behavioural economics* biedt de mogelijkheden om dergelijk onderzoek verder uit te breiden omdat het uitgaat van beperkte rationaliteit en van beperkte en subjectieve informatie. Eerdere studies hebben al aangetoond dat studenten slechts beperkte informatie hebben en gebruiken aangaande de financiële arrangementen en gevolgen van het hoger onderwijs. Als het overheidsbeleid erop gericht is dat studenten een groter deel van de kosten van hoger onderwijs moeten dragen, wordt het steeds belangrijker dat (potentiële) studenten en hun ouders adequate informatie ontvangen en gebruiken over de kosten en baten van hoger onderwijs, alsmede over de argumenten waarom zij gevraagd worden een groter deel van de kosten voor hun rekening te nemen.

Tot slot

Alle resultaten van de huidige studie overziende kan worden geconcludeerd dat geld wel degelijk belangrijk is bij studiekeuzes. Studenten vormen expliciete percepties van financiële prikkels aangaande studeren. Deze percepties zijn echter minder belangrijk dan bij aanvang van de huidige studie werd verwacht, omdat verschillen in percepties niet altijd doorwerken in studiekeuzes. Het is echter belangrijk te weten dat de percepties van financiële prikkels verschillen tussen studenten uit verschillende SES-groepen. Sociaal-economische status blijft een belangrijke factor bij studiekeuzegedrag, hoewel het soms op een andere manier doorwerkt dan verwacht. Er is gebleken dat de percepties van studenten over financiële prikkels een interveniërende rol spelen in het studiekeuzeproces en de prijsgevoeligheid van studenten. Dat betekent dat *behavioural economics* een waardevolle theorie is voor het analyseren van studiekeuzegedrag.

Appendix I: Bivariate analyses, phase I

Table I.1:   Higher education as a financial risk, mean scores and F-test

	Intervals	Mean	N	Std. dev.
Parental income	<1500	5.87	38	3.322
F-value: NS	1500-3000	6.72	258	2.979
	3000-4500	6.38	503	2.789
	4500-6000	6.36	366	2.816
	6000-7500	6.41	277	2.701
	>7500	6.10	289	2.866
	total	6.37	1731	2.838
Parental education	LO/LBO/MAVO	6.46	538	2.853
F-value: **	MBO/HAVO/VWO	6.58	489	2.751
	HBO/HO unfinished	6.40	561	2.884
	university	5.91	377	2.852
	total	6.37	1965	2.844
Ethnicity	autochthon	6.31	1823	2.849
F-value: **	allochtonous	7.09	142	2.684
	total	6.37	1965	2.844
Gender	male	6.34	1036	2.798
F-value: NS	female	6.40	929	2.895
	total	6.37	1965	2.844
Entrance qualification	unknown/LBO/MAVO	4.94	33	3.162
F-value: ***	MBO	6.58	220	2.944
	HAVO	6.63	555	2.879
	VWO	6.24	1157	2.781
	total	6.37	1965	2.844
GPA	< 6,0	6.74	151	2.521
F-value: ***	6,1 - 6,5	6.69	489	2.790
	6,6 - 7,0	6.39	651	2.843
	7,1 - 8,0	6.13	573	2.890
	> 8,0	5.50	101	3.038
	total	6.37	1965	2.844
Extrinsic motivation	0 - 3.75	6.04	223	3.090
F-value: NS	4 - 5.75	6.14	320	2.912
	6 - 6.75	6.38	312	2.646
	7 - 7.75	6.60	442	2.615
	8 - 8.75	6.35	367	2.965
	9 - 10	6.51	301	2.933
	total	6.37	1965	2.844

Significance levels: ***=0,001; **=0,01; *=0,05; +=0,1; NS=not significant

Table I.2:   Attitudes to tuition changes, mean scores and F-test

	Intervals	Mean	N	Std. Dev
Parental income	<1500	1.0	6	1.26
F-value: **	1500-3000	4.2	32	3.07
	3000-4500	3.7	59	2.49
	4500-6000	3.3	56	2.90
	6000-7500	2.9	56	2.79
	>7500	2.8	68	2.70
	total	3.2	277	2.78
Parental education	LO/LBO/MAVO	3.4	75	2.90
F-value: NS	MBO/HAVO/VWO	3.2	81	2.55
	HBO/HO unfinished	3.1	86	2.86
	university	3.1	86	2.75
	total	3.2	328	2.76
Ethnicity	autochthon	3.2	309	2.74
F-value: NS	allochtonous	3.6	19	3.09
	total	3.2	328	2.76
Gender	male	3.2	169	2.87
F-value: NS	female	3.2	159	2.65
	total	3.2	328	2.76
Entrance qualification	unknown/LBO/MAVO	1.1	8	1.73
F-value: NS	MBO	3.0	30	3.39
	HAVO	3.4	66	2.91
	VWO	3.2	224	2.63
	total	3.2	328	2.76
GPA	< 6,0	3.3	21	3.30
F-value: NS	6,1 - 6,5	3.2	92	2.94
	6,6 - 7,0	3.2	119	2.56
	7,1 - 8,0	3.1	85	2.73
	> 8,0	3.1	11	2.95
	total	3.2	328	2.76
Extrinsic motivation	0 - 3.75	3.8	36	3.09
F-value: NS	4 - 5.75	3.1	54	3.01
	6 - 6.75	3.2	48	2.15
	7 - 7.75	3.3	71	2.61
	8 - 8.75	3.2	65	2.91
	9 - 10	2.7	54	2.82
	total	3.2	328	2.76

Significance levels: ***=0,001; **=0,01; *=0,05; +=0,1; NS=not significant

Table I.3: *Likelihood of studying without student support, mean scores and F-test*

	Intervals	Mean	N	Std. dev.
Parental income	<1500	1,96	26	0,66
F-value: ***	1500-3000	2,16	177	0,86
	3000-4500	2,41	371	0,80
	4500-6000	2,57	268	0,73
	6000-7500	2,76	201	0,72
	>7500	3,00	219	0,77
	total	2,56	1262	0,82
Parental education	LO/LBO/MAVO	2,38	379	0,83
F-value: ***	MBO/HAVO/VWO	2,38	342	0,77
	HBO/HO unfinished	2,62	410	0,80
	university	2,87	282	0,79
	total	2,55	1413	0,82
Ethnicity	autochthon	2,56	1318	0,82
F-value: *	allochtonous	2,39	95	0,90
	total	2,55	1413	0,82
Gender	male	2,58	749	0,85
F-value: +	female	2,50	664	0,79
	total	2,55	1413	0,82
Entrance qualification	unknown/LBO/MAVO	2,23	13	1,09
F-value: ***	MBO	2,27	143	0,87
	HAVO	2,45	365	0,87
	VWO	2,63	892	0,77
	total	2,55	1413	0,82
GPA	< 6,0	2,54	103	0,79
F-value: NS	6,1 - 6,5	2,53	334	0,83
	6,6 - 7,0	2,53	477	0,84
	7,1 - 8,0	2,54	424	0,81
	> 8,0	2,75	75	0,79
	total	2,55	1413	0,82
Extrinsic motivation	0 - 3.75	2,52	160	0,82
F-value: NS	4 - 5.75	2,52	244	0,79
	6 - 6.75	2,48	229	0,81
	7 - 7.75	2,62	322	0,82
	8 - 8.75	2,57	247	0,84
	9 - 10	2,53	211	0,86
	total	2,55	1413	0,82

Significance levels: ***=0,001; **=0,01; *=0,05; +=0,1; ns=not significant

Table I.4:   Expected starting wage, mean scores and F-test

	Intervals	Mean	N	Std. dev.
Parental income	<1500	2526.3	38	769.5
F-value: ***	1500-3000	2679.1	261	958.7
	3000-4500	2720.2	504	932.9
	4500-6000	2752.7	367	1016.8
	6000-7500	2996.9	278	1201.8
	>7500	3286.9	291	1376.9
	total	2855.7	1739	1102.4
Parental education	LO/LBO/MAVO	2735.1	544	1014.1
F-value: ***	MBO/HAVO/VWO	2740.8	490	957.3
	HBO/HO unfinished	2925.3	562	1164.2
	university	3100.5	378	1255.7
	total	2860.6	1974	1103.1
Ethnicity	autochthon	2858.4	1831	1108.6
F-value: NS	allochtonous	2889.0	143	1034.1
	total	2860.6	1974	1103.1
Gender	male	3104.7	1040	1159.7
F-value: ***	female	2588.9	934	967.1
	total	2860.6	1974	1103.1
Entrance qualification	unknown/LBO/MAVO	2836.8	36	1058.1
F-value: ***	MBO	2674.8	221	842.3
	HAVO	2552.9	555	921.6
	VWO	3043.7	1162	1187.1
	total	2860.6	1974	1103.1
GPA	< 6,0	2717.3	153	974.0
F-value: **	6,1 - 6,5	2740.3	491	1137.6
	6,6 - 7,0	2908.8	655	1105.1
	7,1 - 8,0	2917.2	574	1105.9
	> 8,0	3028.5	101	1033.3
	total	2860.6	1974	1103.1
Extrinsic motivation	0 - 3.75	2589.3	224	908.1
F-value: ***	4 - 5.75	2772.7	320	998.7
	6 - 6.75	2795.6	315	1027.9
	7 - 7.75	2922.7	443	1143.2
	8 - 8.75	2990.8	367	1198.2
	9 - 10	2972.5	305	1192.1
	total	2860.6	1974	1103.1

Significance levels: ***=0,001; **=0,01; *=0,05; +=0,1; ns=not significant

Table I.5:   *Expected maximum wage, mean scores and F-test*

	Intervals	Mean	N	Std. dev.
Parental income	<1500	4625.0	38	1510.660
F-value: ***	1500-3000	4521.6	261	1745.517
	3000-4500	4711.6	504	1604.864
	4500-6000	5001.7	367	1700.622
	6000-7500	5463.6	278	1739.678
	>7500	6105.7	291	1827.709
	total	5095.9	1739	1786.064
Parental education	LO/LBO/MAVO	4738.3	544	1690.673
F-value: ***	MBO/HAVO/VWO	4935.7	490	1732.128
	HBO/HO unfinished	5164.6	562	1777.647
	university	5670.3	378	1870.024
	total	5087.1	1974	1789.723
Ethnicity	autochthon	5079.9	1831	1782.501
F-value: NS	allochtonous	5180.1	143	1883.819
	total	5087.1	1974	1789.723
Gender	male	5654.6	1040	1766.813
F-value: ***	female	4455.3	934	1593.339
	total	5087.1	1974	1789.723
Entrance qualification	unknown/LBO/MAVO	4548.6	36	1493.222
F-value: ***	MBO	4469.5	221	1501.675
	HAVO	4305.9	555	1525.072
	VWO	5594.4	1162	1791.087
	total	5087.1	1974	1789.723
GPA	< 6,0	4817.0	153	1751.528
F-value: ***	6,1 - 6,5	4717.2	491	1709.509
	6,6 - 7,0	5091.8	655	1783.414
	7,1 - 8,0	5322.1	574	1819.039
	> 8,0	5929.5	101	1623.597
	total	5087.1	1974	1789.723
Extrinsic motivation	0 - 3.75	4516.2	224	1631.374
F-value: ***	4 - 5.75	5011.3	320	1757.853
	6 - 6.75	4897.6	315	1647.062
	7 - 7.75	5281.9	443	1811.209
	8 - 8.75	5290.5	367	1807.629
	9 - 10	5254.1	305	1916.129
	total	5087.1	1974	1789.723

Significance levels: ***=0,001; **=0,01; *=0,05; +=0,1; ns=not significant

Table I.6:   *Willingness to borrow, mean scores and F-test*

	Intervals	Mean	N	Std. dev.
Parental income	<1500	5.1	35	4.344
F-value: **	1500-3000	4.3	241	4.094
	3000-4500	4.0	468	3.776
	4500-6000	4.0	345	3.428
	6000-7500	4.2	265	3.735
	>7500	5.0	275	4.389
	total	4.3	1629	3.884
Parental education	LO/LBO/MAVO	3.8	502	3.575
F-value: ***	MBO/HAVO/VWO	4.0	453	3.753
	HBO/HO unfinished	4.1	525	3.876
	university	5.1	360	4.001
	total	4.2	1840	3.816
Ethnicity	autochthon	4.1	1709	3.718
F-value: ***	allochtonous	5.3	131	4.810
	total	4.2	1840	3.816
Gender	male	4.5	986	4.000
F-value: ***	female	3.8	854	3.557
Chi-sq: *	total	4.2	1840	3.816
Entrance qualification	unknown/LBO/MAVO	2.2	29	2.731
F-value: ***	MBO	2.7	200	3.076
	HAVO	3.6	504	3.720
	VWO	4.8	1107	3.867
	total	4.2	1840	3.816
GPA	< 6,0	3.9	144	4.142
F-value: ***	6,1 - 6,5	3.8	458	3.623
	6,6 - 7,0	4.0	606	3.617
	7,1 - 8,0	4.5	533	3.984
	> 8,0	5.5	99	4.124
	total	4.2	1840	3.816
Extrinsic motivation	0 - 3.75	4.6	214	3.706
F-value: +	4 - 5.75	4.5	303	3.766
	6 - 6.75	4.4	295	3.775
	7 - 7.75	3.9	414	3.664
	8 - 8.75	4.2	344	3.987
	9 - 10	3.7	270	3.965
	total	4.2	1840	3.816

Significance levels: ***=0,001; **=0,01; *=0,05; +=0,1; ns=not significant

Appendix II: Multiple regression analyses, phase I

Table II.1:   Higher education as a financial risk, multiple regression analysis

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	5.843	0.529		11.049	0.000
Parental income (x 1000 NLG)	0.000	0.000	0.004	0.178	0.859
Parental education: max MAVO versus WO	0.361	0.208	0.057	1.738	0.082
Parental education: max VWO versus WO	0.556	0.204	0.085	2.721	0.007
Parental education: HBO or HE unfinished vs WO	0.416	0.192	0.066	2.165	0.030
Ethnicity: allochthonous	0.704	0.248	0.064	2.838	0.005
Gender: female	-0.003	0.129	-0.001	-0.025	0.980
Entrance qualification: MAVO	-1.514	0.499	-0.068	-3.032	0.002
Entrance qualification: MBO	0.148	0.216	0.016	0.684	0.494
Entrance qualification: HAVO	0.204	0.152	0.032	1.339	0.181
Grade point average	-0.335	0.089	-0.085	-3.748	0.000
Extrinsic motivation	0.049	0.030	0.038	1.649	0.099

R2 = 0.027; Adjusted R2 = 0.022; F-value = ***

Table II.2:   Attitudes to tuition changes, multiple regression analysis

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	3.039	1.326		2.292	0.023
Parental income (x 1000 NLG)	0.000	0.000	-0.056	-0.850	0.396
Parental education: max MAVO versus WO	0.246	0.518	0.037	0.475	0.635
Parental education: max VWO versus WO	0.143	0.499	0.022	0.286	0.775
Parental education: HBO or HE unfinished vs WO	0.086	0.439	0.014	0.195	0.846
Ethnicity: allochthonous	0.531	0.682	0.045	0.779	0.437
Gender: female	0.030	0.314	0.005	0.095	0.924
Entrance qualification: MAVO	-1.998	1.023	-0.112	-1.954	0.052
Entrance qualification: MBO	-0.426	0.572	-0.045	-0.746	0.456
Entrance qualification: HAVO	0.159	0.418	0.023	0.380	0.704
Grade point average	0.108	0.224	0.028	0.484	0.629
Extrinsic motivation	-0.084	0.072	-0.067	-1.167	0.244

R2 = 0.027; Adjusted R2 = -.006; F-value = ns

Table II.3:   *Importance of grants (likelihood of studying without student support, all opposed to the answer: certainly yes), multiple regression analysis*

	certainly not			probably not			probably yes		
	B	Exp. (B)	Sig.	B	Exp. (B)	Sig.	B	Exp. (B)	Sig.
Parental income	0,000	1,000	0,000	0,000	1,000	0,000	0,000	1,000	0,000
Parental ed. max MAVO	1,234	3,436	0,002	1,272	3,568	0,000	0,681	1,977	0,025
Parental ed. max VWO	1,694	5,442	0,000	1,904	6,712	0,000	1,169	3,218	0,001
Parental ed. max HBO	0,651	1,918	0,081	0,759	2,136	0,005	0,384	1,469	0,112
Ethnicity (allochtonous)	-0,091	0,913	0,841	-0,268	0,765	0,505	-0,544	0,580	0,163
Gender (female)	0,376	1,456	0,135	0,645	1,906	0,002	0,467	1,595	0,020
Entrance qual. max MAVO	0,394	1,483	0,681	-0,851	0,427	0,363	-1,475	0,229	0,125
Entrance qual. MBO	0,627	1,871	0,135	-0,020	0,980	0,957	-0,499	0,607	0,185
Entrance qual. HAVO	0,302	1,353	0,305	-0,471	0,624	0,067	-0,369	0,691	0,129
Grade point average	-0,291	0,747	0,093	-0,228	0,796	0,111	-0,235	0,791	0,081
Extrinsic motivation	-0,137	0,872	0,022	-0,100	0,905	0,052	-0,083	0,921	0,087

Pseudo R2: Nagelkerke = 0.148; χ2 = ***

Table II.4:   *Expected starting wage, multiple regression analysis*

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	2978.3	194.5		15.3	0.000
Parental income (x 1000 NLG)	0.0	0.0	0.046	2.0	0.045
Parental education: max MAVO versus WO	-215.1	76.5	-0.087	-2.8	0.005
Parental education: max VWO versus WO	-220.2	75.2	-0.086	-2.9	0.003
Parental education: HBO or HE unfinished vs WO	-78.6	70.7	-0.032	-1.1	0.267
Ethnicity: allochthonous	79.1	91.2	0.019	0.9	0.385
Gender: female	-459.3	47.3	-0.208	-9.7	0.000
Entrance qualification: MAVO	-207.2	176.6	-0.025	-1.2	0.241
Entrance qualification: MBO	-358.3	79.6	-0.102	-4.5	0.000
Entrance qualification: HAVO	-427.3	56.1	-0.174	-7.6	0.000
Grade point average	58.7	32.9	0.038	1.8	0.075
Extrinsic motivation	76.7	11.0	0.152	7.0	0.000

R2 = 0.121; Adjusted R2 = 0.116; F-value = ***

Table II.5:   *Expected maximum wage, multiple regression analysis*

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	4974.4	286.0		17.4	0.000
Parental income (x 1000 NLG)	0.1	0.0	0.115	5.5	0.000
Parental education: max MAVO versus WO	-401.3	112.4	-0.100	-3.6	0.000
Parental education: max VWO versus WO	-264.8	110.6	-0.064	-2.4	0.017
Parental education: HBO or HE unfinished vs WO	-188.0	104.0	-0.047	-1.8	0.071
Ethnicity: allochthonous	259.9	134.0	0.038	1.9	0.053
Gender: female	-1042.7	69.5	-0.291	-15.0	0.000
Entrance qualification: MAVO	-1011.9	259.7	-0.076	-3.9	0.000
Entrance qualification: MBO	-1073.1	117.1	-0.189	-9.2	0.000
Entrance qualification: HAVO	-1112.3	82.6	-0.279	-13.5	0.000
Grade point average	210.9	48.4	0.085	4.4	0.000
Extrinsic motivation	162.8	16.2	0.199	10.0	0.000

R2 = 0.278; Adjusted R2 = 0.274; F-value = ***

Table II.6:   *Willingness to borrow, multiple regression analysis*

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	3.730	0.574		6.502	0.000
Parental income (x 1000 NLG)	0.000	0.000	0.006	0.242	0.809
Parental education: max MAVO versus WO	-0.602	0.226	-0.087	-2.662	0.008
Parental education: max VWO versus WO	-0.420	0.223	-0.059	-1.887	0.059
Parental education: HBO or HE unfinished vs WO	-0.479	0.208	-0.070	-2.300	0.022
Ethnicity: allochthonous	0.965	0.272	0.081	3.552	0.000
Gender: female	-0.472	0.140	-0.077	-3.373	0.001
Entrance qualification: MAVO	-2.062	0.560	-0.084	-3.684	0.000
Entrance qualification: MBO	-1.633	0.238	-0.165	-6.856	0.000
Entrance qualification: HAVO	-0.872	0.167	-0.127	-5.218	0.000
Grade point average	0.323	0.097	0.077	3.341	0.001
Extrinsic motivation	-0.048	0.033	-0.034	-1.455	0.146

R2 = 0.077; Adjusted R2 = 0.071; F-value = ***

Appendix III: Structural equation modelling, phase I

Table III.1: *SEM standardised effects for independent variables*

Variables	Total effect	Direct effect	Indirect effect
Parental income			
Ethnicity (allochtonous)	-0.06	-0.06	0.00
Parental education	0.37	0.37	0.00
Entrance qualification			
Ethnicity (allochtonous)	-0.01	0.00	-0.01
Parental education	0.26	0.21	0.05
Parental income	0.13	0.13	0.00
Gender (female)	-0.07	-0.07	0.00
Grade point average			
Ethnicity (allochtonous)	-0.05	-0.05	0.00
Parental education	0.09	-0.06	0.03
Parental income	0.01	0.00	0.01
Gender (female)	-0.08	-0.08	-0.01
Entrance qualification (vwo)	0.10	0.10	0.00
Extrinsic motivation			
Ethnicity (allochtonous)	0.07	0.06	0.01
Parental education	-0.10	-0.07	-0.03
Parental income	0.03	0.06	-0.03
Gender (female)	-0.03	-0.05	0.02
Entrance qualification (vwo)	-0.20	-0.19	-0.01
Grade point average	-0.06	-0.06	0.00

Table III.2:   SEM standardised effects, phase 1, Students' perceptions of financial incentives

Variables	Total effect	Direct effect	Indirect effect
HE as a financial risk (N=1974)			
Ethnicity (allochtonous)	0.07	0.06	0.01
Parental education	-0.02	0.00	-0.02
Parental income	-0.01	-0.01	-0.00
Gender (female)	0.01	0.00	0.01
Entrance qualification (vwo)	-0.05	-0.03	-0.02
Grade point average	-0.09	-0.09	-0.00
Extrinsic motivation	0.04	0.04	0.00
Tuition sensitivity (N=322)			
Ethnicity (allochtonous)	0.00	0.00	0.00
Parental education	-0.03	0.00	-0.03
Parental income	-0.08	-0.08	0.00
Gender (female)	-0.00	0.00	0.00
Entrance qualification (vwo)	0.02	0.02	0.00
Grade point average	0.02	0.03	0.00
Extrinsic motivation	0.03	0.03	0.00
Importance of grants (N=1262)			
Ethnicity (allochtonous)	-0.02	0.00	-0.02
Parental education	0.25	0.12	0.13
Parental income	0.27	0.26	0.01
Gender (female)	-0.01	0.00	-0.01
Entrance qualification (vwo)	0.03	0.04	-0.01
Grade point average	0.03	0.03	0.00
Extrinsic motivation	0.06	0.06	0.00
Expected starting wage (N=1974)			
Ethnicity (allochtonous)	0.00	0.00	0.00
Parental education	0.12	0.07	0.05
Parental income	0.08	0.05	0.03
Gender (female)	-0.23	-0.21	-0.02
Entrance qualification (vwo)	0.15	0.18	-0.03
Grade point average	0.03	0.04	-0.01
Extrinsic motivation	0.16	0.16	0.00
Expected maximum wage (N=1974)			
Ethnicity (allochtonous)	0.00	0.00	0.00
Parental education	0.18	0.07	0.11
Parental income	0.16	0.11	0.05
Gender (female)	-0.33	-0.29	-0.04
Entrance qualification (vwo)	0.27	0.30	-0.03
Grade point average	0.07	0.08	-0.01
Extrinsic motivation	0.20	0.20	0.00
Willingness to borrow (N=1974)			
Ethnicity (allochtonous)	0.09	0.06	-0.01
Parental education	0.12	0.06	0.06
Parental income	0.04	0.02	0.02
Gender (female)	-0.09	-0.07	-0.02
Entrance qualification (vwo)	0.16	0.15	0.01
Grade point average	0.08	0.08	0.00
Extrinsic motivation	-0.02	-0.02	0.00

Appendix IV: Bivariate analyses, phase II

Table IV.1:   Students' living situation, mean scores and F-test

variables	intervals	mean	N	st. dev
parental income	low (<3000)	0.47	298	0.50
F-value: ***	medium (3000-6000)	0.43	868	0.49
	high (>6000)	0.60	567	0.49
parental education	LO/LBO/MAVO	0.40	544	0.49
F-value: ***	MBO/HAVO/VWO	0.45	486	0.50
	HBO/HE unfinished	0.48	560	0.50
	university	0.69	378	0.46
ethnicity	autochthon	0.49	1826	0.50
F-value: NS	allochtonous	0.46	142	0.50
gender	male	0.47	1037	0.50
F-value: *	female	0.52	931	0.50
entrance qualification	onknown/LBO/MAVO	0.77	35	0.43
F-value: ***	MBO	0.40	220	0.49
	HAVO	0.31	553	0.46
	VWO	0.58	1160	0.49
GPA	low (<6.5)	0.43	640	0.50
F-value: ***s	medium (6.5-7.5)	0.50	1015	0.50
	high (>7.5)	0.57	313	0.50
extrinsic motivation	low (<6.00)	0.58	544	0.49
F-value: ***	medium (6-7.5)	0.48	659	0.50
	high (>7.5)	0.44	765	0.50

Significance levels: ***=0,001; **=0,01; *=0,05; +=0,1; ns=not significant

Table IV.1:   *Students' living situation, mean scores and F-test (continued)*

variables	intervals	mean	N	st. dev
perception: risky investment	low (0-4)	0.52	401	0.50
F-value: NS	medium (5-7)	0.47	738	0.50
	high (8-10)	0.49	820	0.50
perception: tuition incentive	low (0-2)	0.59	143	0.49
F-value: NS	medium (3-6)	0.53	144	0.50
	high (7-10)	0.53	40	0.51
perception: importance grants	would not study	0.50	164	0.50
F-value: NS	probably not	0.50	448	0.50
	probably yes	0.47	659	0.50
	certainly yes	0.49	137	0.50
perception: expected start salary	low (1000-2125)	0.48	598	0.50
F-value: NS	medium (2375-3250)	0.48	983	0.50
	high (>3750)	0.54	387	0.50
perception: expected top salary	low (1125-3750)	0.45	620	0.50
F-value: ***	medium (4250-5500)	0.46	761	0.50
	high (>6500)	0.57	587	0.50
perception: willingness to borrow	low (<5000)	0.39	749	0.49
F-value: ***s	medium (5000-17500)	0.52	756	0.50
	high (>17500)	0.69	329	0.46

Significance levels: ***=0,001; **=0,01; *=0,05; +=0,1; ns=not significant

Table IV.2:   Taking up loans, mean scores and F-test

Variables	intervals	mean	N	st.dev
parental income	low (<3000)	0.08	299	0.28
F-value: NS	medium (3000-6000)	0.08	871	0.27
	high (>6000)	0.06	569	0.23
parental education	LO/LBO/MAVO	0.07	544	0.26
F-value: NS	MBO/HAVO/VWO	0.07	490	0.25
	HBO/HE unfinished	0.08	562	0.27
	university	0.07	378	0.25
ethnicity	autochthon	0.07	1831	0.26
F-value: NS	allochtonous	0.09	143	0.29
gender	Male	0.07	1040	0.26
F-value: NS	female	0.07	934	0.26
entrance qualification	onknown/LBO/MAVO	0.00	36	0.00
F-value: NS	MBO	0.06	221	0.24
	HAVO	0.07	555	0.26
	VWO	0.08	1162	0.27
GPA	low (<6.5)	0.07	644	0.26
F-value: NS	medium (6.5-7.5)	0.07	1017	0.26
	high (>7.5)	0.08	313	0.27
extrinsic motivation	low (<6.00)	0.08	544	0.28
F-value: NS	medium (6-7.5)	0.07	661	0.25
	high (>7.5)	0.07	769	0.25
perception: risky investment	low (0-4)	0.07	404	0.25
F-value: NS	medium (5-7)	0.07	738	0.26
	high (8-10)	0.08	823	0.27
perception: tuition incentive	low (0-2)	0.06	143	0.24
F-value: NS	medium (3-6)	0.07	145	0.25
	high (7-10)	0.13	40	0.33
perception: importance grants	would not study	0.16	164	0.37
*F-value: ***	probably not	0.11	450	0.31
	probably yes	0.06	661	0.24
	certainly yes	0.05	138	0.22
perception: expected start salary	low (1000-2125)	0.07	601	0.26
F-value: NS	medium (2375-3250)	0.07	986	0.26
	high (>3750)	0.07	387	0.26
perception: expected top salary	low (1125-3750)	0.06	622	0.25
F-value: NS	medium (4250-5500)	0.07	764	0.26
	high (>6500)	0.08	588	0.27
perception: willingness to borrow	low (<5000)	0.03	751	0.16
*F-value: ***	medium (5000-17500)	0.07	759	0.25
	high (>17500)	0.20	330	0.40

Significance levels: ***=0,001; **=0,01; *=0,05; +=0,1; ns=not significant

Table IV.3: Amount of loans, mean scores and F-test

Variables	Intervals	mean	N	st.dev
parental income	low (<3000)	0.76	25	0.44
F-value: NS	medium (3000-6000)	0.57	70	0.50
	high (>6000)	0.58	33	0.50
parental education	LO/LBO/MAVO	0.60	40	0.50
F-value: NS	MBO/HAVO/VWO	0.65	34	0.49
	HBO/HE unfinished	0.60	43	0.49
	University	0.54	26	0.51
Ethnicity	Autochthon	0.57	130	0.50
*F-value: ***	Allochtonous	0.92	13	0.28
Gender	Male	0.51	77	0.50
*F-value: ***	Female	0.71	66	0.46
entrance qualification	onknown/LBO/MAVO	0.00	0.00	0.00
F-value: NS	MBO	0.77	13	0.44
	HAVO	0.61	41	0.49
	VWO	0.57	89	0.50
GPA	low (<6.5)	0.78	45	0.42
*F-value: ***	medium (6.5-7.5)	0.51	74	0.50
	high (>7.5)	0.54	24	0.51
extrinsic motivation	low (<6.00)	0.57	46	0.50
F-value: NS	medium (6-7.5)	0.63	46	0.49
	high (>7.5)	0.61	51	0.49
perception: risky investment	low (0-4)	0.63	27	0.49
F-value: NS	medium (5-7)	0.60	52	0.50
	high (8-10)	0.59	63	0.50
perception: tuition incentive	low (0-2)	0.78	9	0.44
F-value: NS	medium (3-6)	0.44	9	0.53
	high (7-10)	0.50	8	0.53
perception: importance grants	would not study	0.70	27	0.47
F-value: NS	probably not	0.69	48	0.47
	probably yes	0.60	42	0.50
	certainly yes	0.57	7	0.53
perception: expected start salary	low (1000-2125)	0.51	43	0.51
F-value: NS	medium (2375-3250)	0.66	71	0.48
	high (>3750)	0.59	29	0.50
perception: expected top salary	low (1125-3750)	0.48	40	0.51
*F-value: ***	medium (4250-5500)	0.75	56	0.44
	high (>6500)	0.53	47	0.50
perception: willingness to borrow	low (<5000)	0.42	19	0.51
*F-value: ***	medium (5000-17500)	0.48	52	0.50
	high (>17500)	0.73	66	0.45

Significance levels: ***=0,001; **=0,01; *=0,05; +=0,1; ns=not significant

Table IV.4:   Having a part-time job, mean scores and F-test

Variables	Intervals	mean	N	st.dev
parental income	low (<3000)	0.64	299	0.48
F-value: NS	medium (3000-6000)	0.63	871	0.48
	high (>6000)	0.62	569	0.49
parental education	LO/LBO/MAVO	0.69	544	0.46
F-value: ***	MBO/HAVO/VWO	0.65	490	0.48
	HBO/HE unfinished	0.63	562	0.48
	university	0.50	378	0.50
Ethnicity	autochthon	0.63	1831	0.48
F-value: NS	allochtonous	0.61	143	0.49
Gender	male	0.60	1040	0.49
F-value: *	female	0.65	934	0.48
Entrance qualification	onknown/LBO/MAVO	0.78	36	0.42
F-value: ***	MBO	0.76	221	0.43
	HAVO	0.66	555	0.47
	VWO	0.58	1162	0.49
GPA	low (<6.5)	0.66	644	0.47
F-value: ***	medium (6.5-7.5)	0.64	1017	0.48
	high (>7.5)	0.52	313	0.50
extrinsic motivation	low (<6.00)	0.57	544	0.50
F-value: ***	medium (6-7.5)	0.59	661	0.49
	high (>7.5)	0.70	769	0.46
perception: risky investment	low (0-4)	0.63	404	0.48
F-value: NS	medium (5-7)	0.63	738	0.48
	high (8-10)	0.62	823	0.49
perception: tuition incentive	low (0-2)	0.68	133	0.47
F-value: NS	medium (3-6)	0.62	139	0.49
	high (7-10)	0.66	50	0.48
perception: importance grants	would not study	0.65	164	0.48
F-value: NS	probably not	0.62	450	0.49
	probably yes	0.64	661	0.48
	certainly yes	0.64	138	0.48
perception: expected start salary	low (1000-2125)	0.64	601	0.48
F-value: NS	medium (2375-3250)	0.62	986	0.48
	high (>3750)	0.61	387	0.49
perception: expected top salary	low (1125-3750)	0.66	622	0.47
F-value: NS	medium (4250-5500)	0.61	764	0.49
	high (>6500)	0.61	588	0.49
perception: willingness to borrow	low (<5000)	0.68	751	0.47
F-value: ***	medium (5000-17500)	0.61	759	0.49
	high (>17500)	0.55	330	0.50

Significance levels: ***=0,001; **=0,01; *=0,05; +=0,1; ns=not significant

Table IV.5:   Income from work, mean scores and F-test

Variables	Intervals	mean	N	st.dev
parental income	low (<3000)	1.88	146	0.82
F-value: NS	medium (3000-6000)	1.74	476	0.76
	high (>6000)	1.77	321	0.76
parental education	LO/LBO/MAVO	1.84	305	0.79
F-value: ***	MBO/HAVO/VWO	1.87	254	0.76
	HBO/HE unfinished	1.72	310	0.73
	university	1.57	184	0.71
ethnicity	autochthon	1.74	988	0.76
F-value: **	allochtonous	2.02	65	0.76
gender	male	1.76	556	0.76
F-value: NS	female	1.76	497	0.76
entrance qualification	onknown/LBO/MAVO	2.43	23	0.79
F-value: ***	MBO	2.15	133	0.84
	HAVO	1.74	291	0.76
	VWO	1.66	606	0.70
GPA	low (<6.5)	1.84	354	0.76
F-value: ***	medium (6.5-7.5)	1.77	545	0.76
	high (>7.5)	1.55	154	0.70
extrinsic motivation	low (<6.00)	1.68	269	0.73
F-value: *	medium (6-7.5)	1.74	345	0.76
	high (>7.5)	1.83	439	0.77
perception: risky investment	low (0-4)	1.85	213	0.82
F-value: NS	medium (5-7)	1.73	398	0.74
	high (8-10)	1.74	435	0.74
perception: tuition incentive	low (0-2)	1.80	81	0.80
F-value: NS	medium (3-6)	1.65	75	0.74
	high (7-10)	1.90	31	0.70
perception: importance grants	would not study	1.68	91	0.70
F-value: NS	probably not	1.67	241	0.69
	probably yes	1.71	377	0.72
	certainly yes	1.86	78	0.78
perception: expected start salary	low (1000-2125)	1.72	301	0.75
F-value: NS	medium (2375-3250)	1.80	536	0.76
	high (>3750)	1.73	216	0.77
perception: expected top salary	low (1125-3750)	1.81	336	0.75
F-value: NS	medium (4250-5500)	1.75	402	0.76
	high (>6500)	1.73	315	0.76
perception: willingness to borrow	low (<5000)	1.87	424	0.79
F-value: ***	medium (5000-17500)	1.62	408	0.68
	high (>17500)	1.75	156	0.78

Significance levels: ***=0,001; **=0,01; *=0,05; +=0,1; ns=not significant

Table IV.6:   Number of hours worked, mean scores and F-test

variables	Intervals	mean	N	st.dev
parental income	low (<3000)	1.88	257	0.81
F-value: ***	medium (3000-6000)	1.72	745	0.77
	high (>6000)	1.66	501	0.77
parental education	LO/LBO/MAVO	1.83	466	0.80
F-value: ***	MBO/HAVO/VWO	1.80	436	0.79
	HBO/HE unfinished	1.65	484	0.76
	university	1.58	320	0.74
ethnicity	autochthon	1.70	1582	0.78
F-value: ***	allochtonous	1.98	124	0.77
gender	male	1.71	887	0.80
F-value: NS	female	1.74	819	0.77
entrance qualification	onknown/LBO/MAVO	2.15	33	0.94
F-value: ***	MBO	2.00	193	0.84
	HAVO	1.83	488	0.78
	VWO	1.60	992	0.74
GPA	low (<6.5)	1.80	576	0.78
F-value: ***	medium (6.5-7.5)	1.72	881	0.79
	high (>7.5)	1.57	249	0.75
extrinsic motivation	low (<6.00)	1.68	460	0.78
F-value: **	medium (6-7.5)	1.67	562	0.76
	high (>7.5)	1.80	684	0.80
perception: risky investment	low (0-4)	1.72	349	0.79
F-value: NS	medium (5-7)	1.71	628	0.79
	high (8-10)	1.72	720	0.77
perception: tuition incentive	low (0-2)	1.75	120	0.83
F-value: NS	medium (3-6)	1.71	124	0.78
	high (7-10)	1.94	47	0.79
perception: importance grants	would not study	1.79	135	0.79
F-value: *S	probably not	1.73	393	0.78
	probably yes	1.62	582	0.76
	certainly yes	1.70	108	0.78
perception: expected start salary	low (1000-2125)	1.72	518	0.77
F-value: NS	medium (2375-3250)	1.76	847	0.80
	high (>3750)	1.65	341	0.77
perception: expected top salary	low (1125-3750)	1.78	538	0.79
F-value: *	medium (4250-5500)	1.73	659	0.78
	high (>6500)	1.66	509	0.78
perception: willingness to borrow	low (<5000)	1.78	652	0.81
F-value: *	medium (5000-17500)	1.66	662	0.75
	high (>17500)	1.66	280	0.78

Significance levels: ***=0,001; **=0,01; *=0,05; +=0,1; ns=not significant

Table IV.7:   Choice for science & engineering, mean scores and F-test

variables	intervals	mean	N	st.dev
parental income	low (<3000)	0.34	299	0.47
F-value: NS	medium (3000-6000)	0.38	871	0.49
	high (>6000)	0.36	569	0.48
parental education	LO/LBO/MAVO	0.33	544	0.47
*F-value: ***	MBO/HAVO/VWO	0.38	490	0.48
	HBO/HE unfinished	0.35	562	0.48
	university	0.42	378	0.49
ethnicity	autochthon	0.37	1831	0.48
*F-value: ****	allochtonous	0.26	143	0.44
gender	male	0.55	1040	0.50
*F-value: *****	female	0.16	934	0.36
entrance qualification	onknown/LBO/MAVO	0.19	36	0.40
*F-value: *****	MBO	0.38	221	0.49
	HAVO	0.29	555	0.46
	VWO	0.40	1162	0.49
GPA	low (<6.5)	0.26	644	0.44
*F-value: *****	medium (6.5-7.5)	0.38	1017	0.48
	high (>7.5)	0.55	313	0.50
extrinsic motivation	low (<6.00)	0.38	544	0.49
F-value: NS	medium (6-7.5)	0.38	661	0.49
	high (>7.5)	0.34	769	0.47
perception: risky investment	low (0-4)	0.41	404	0.49
F-value: NS	medium (5-7)	0.36	738	0.48
	high (8-10)	0.35	823	0.48
perception: importance grants	would not study	0.32	164	0.47
F-value: NS	probably not	0.39	450	0.49
	probably yes	0.39	661	0.49
	certainly yes	0.37	138	0.48
perception: expected start salary	low (1000-2125)	0.27	601	0.45
*F-value: *****	medium (2375-3250)	0.37	986	0.48
	high (>3750)	0.49	387	0.50
perception: expected top salary	low (1125-3750)	0.24	622	0.43
*F-value: *****	medium (4250-5500)	0.41	764	0.49
	high (>6500)	0.45	588	0.50
perception: willingness to borrow	low (<5000)	0.32	751	0.47
*F-value: *****	medium (5000-17500)	0.41	759	0.49
	high (>17500)	0.41	330	0.49
taking-up loans	no loans	0.37	1831	0.48
F-value: NS	loans	0.36	143	0.48

Significance levels: ***=0,001; **=0,01; *=0,05; +=0,1; ns=not significant

Table IV.8:   Choice for university or professional HE, mean scores and F-test

variables	intervals	mean	N	st.dev
parental income	low (<3000)	0.80	124	0.40
F-value: ***	medium (3000-6000)	0.83	487	0.38
	high (>6000)	0.91	431	0.29
parental education	LO/LBO/MAVO	0.79	248	0.41
F-value: ***	MBO/HAVO/VWO	0.81	253	0.39
	HBO/HE unfinished	0.84	349	0.36
	university	0.95	312	0.22
ethnicity	autochthon	0.85	1083	0.36
F-value: NS	allochtonous	0.89	79	0.32
gender	male	0.88	651	0.32
F-value: ***	female	0.81	511	0.39
GPA	low (<6.5)	0.77	322	0.42
F-value: ***	medium (6.5-7.5)	0.86	594	0.35
	high (>7.5)	0.94	246	0.23
extrinsic motivation	low (<6.00)	0.91	398	0.29
F-value: ***	medium (6-7.5)	0.82	388	0.38
	high (>7.5)	0.82	376	0.38
perception: risky investment	low (0-4)	0.85	254	0.36
F-value: NS	medium (5-7)	0.84	441	0.37
	high (8-10)	0.87	462	0.33
perception: tuition incentive	low (0-2)	0.90	93	0.30
F-value: NS	medium (3-6)	0.85	107	0.36
	high (7-10)	0.79	24	0.41
perception: importance grants	would not study	0.83	70	0.38
F-value: NS	probably not	0.85	279	0.35
	probably yes	0.85	450	0.35
	certainly yes	0.90	93	0.30
perception: expected start salary	low (1000-2125)	0.82	302	0.39
F-value: ***	medium (2375-3250)	0.84	565	0.37
	high (>3750)	0.92	295	0.27
perception: expected top salary	low (1125-3750)	0.73	247	0.45
F-value: ***	medium (4250-5500)	0.84	444	0.36
	high (>6500)	0.93	471	0.26
perception: willingness to borrow	low (<5000)	0.78	355	0.41
F-value: ***	medium (5000-17500)	0.87	513	0.34
	high (>17500)	0.92	239	0.26
taking-up loans	no loans	0.85	1073	0.36
F-value: NS	loans	0.88	89	0.33

Significance levels: ***=0,001; **=0,01; *=0,05; +=0,1; ns=not significant

Appendix V: Multiple regression analyses, phase II

Table V.1:   *Students' living situation multiple regression analysis*

	Living at home against living away from home		
	B	(Exp.) B	Sig.
Parental income (x 1000 NLG)	-0.031	0.970	0.125
Parental education: max MAVO versus WO	0.930	2.534	0.000
Parental education: max VWO versus WO	0.741	2.098	0.000
Parental education: HBO or HE unfinished vs WO	0.707	2.027	0.000
Ethnicity: allochthonous	0.212	1.236	0.311
Gender: female	-0.437	0.646	0.000
Entrance qualification: MAVO	-1.738	0.176	0.001
Entrance qualification: MBO	0.263	1.300	0.140
Entrance qualification: HAVO	0.930	2.535	0.000
Grade point average	-0.075	0.927	0.366
Extrinsic motivation	0.071	1.074	0.005
Perception: financial risk	-0.015	0.985	0.429
Perception: tuition incentive	0.023	1.023	0.189
Perception: importance of grants	0.191	1.211	0.004
Perception: expected start salary (x 1000 NLG)	0.005	1.005	0.933
Perception: expected top salary (x 1000 NLG)	-0.032	0.968	0.398
Perception: willingness to borrow	-0.125	0.882	0.000

Pseudo R2: Nagelkerke = 0.204; $\chi 2$ = ***; N = 1810

Table V.2:   *Results from regression analysis, Take-up of loans*

	No loans against taking up loans		
	B	(Exp.) B	Sig.
Parental income (x 1000 NLG)	0.039	1.040	0.320
Parental education: max MAVO versus WO	-0.164	0.849	0.603
Parental education: max VWO versus WO	0.008	1.008	0.980
Parental education: HBO or HE unfinished vs WO	-0.185	0.831	0.527
Ethnicity: allochthonous	0.265	1.303	0.458
Gender: female	-0.091	0.913	0.661
Entrance qualification: MAVO			.
Entrance qualification: MBO	-0.205	0.815	0.557
Entrance qualification: HAVO	-0.185	0.831	0.430
Grade point average	-0.032	0.968	0.829
Extrinsic motivation	0.061	1.062	0.179
Perception: financial risk	-0.046	0.955	0.206
Perception: tuition incentive	-0.020	0.980	0.520
Perception: importance of grants	0.481	1.618	0.000
Perception: expected start salary (x 1000 NLG)	-0.074	0.929	0.466
Perception: expected top salary (x 1000 NLG)	0.045	1.046	0.524
Perception: willingness to borrow	-0.209	0.812	0.000

Pseudo R2: Nagelkerke = 0.163; χ2 = ***; N = 1816

Table V.3:   Results from regression analysis, The amount of loans taken up

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Parental income (x 1000 NLG)	-2.386	6.409	-0.033	-0.372	0.710
Parental education: max MAVO versus WO	-36.520	50.188	-0.089	-0.728	0.468
Parental education: max VWO versus WO	21.695	49.757	0.049	0.436	0.664
Parental education: HBO or HE unfinished vs WO	-22.438	45.739	-0.055	-0.491	0.625
Ethnicity: allochthonous	169.868	55.200	0.259	3.077	0.003
Gender: female	85.067	31.538	0.227	2.697	0.008
Entrance qualification: MAVO					
Entrance qualification: MBO	151.652	55.905	0.240	2.713	0.008
Entrance qualification: HAVO	21.718	37.149	0.053	0.585	0.560
Grade point average	29.497	24.904	0.105	1.184	0.239
Extrinsic motivation	13.730	6.661	0.181	2.061	0.041
Perception: financial risk	-4.837	5.897	-0.070	-0.820	0.414
Perception: tuition incentive	-10.001	4.636	-0.179	-2.157	0.033
Perception: importance of grants	-27.665	18.608	-0.123	-1.487	0.140
Perception: expected start salary (x 1000 NLG)	1.301	16.469	0.008	0.079	0.937
Perception: expected top salary (x 1000 NLG)	-2.075	10.473	-0.020	-0.198	0.843
Perception: willingness to borrow	12.745	3.581	0.298	3.559	0.001

$R^2 = 0.299$; Adjusted $R^2 = 0.204$; F-value = ***; N = 134

Table V.4:   *Results from regression analysis, Having a part-time job*

	No job against having a job		
	B	(Exp.) B	Sig.
Parental income (x 1000 NLG)	-0.027	0.973	0.169
Parental education: max MAVO versus WO	-0.794	0.452	0.000
Parental education: max VWO versus WO	-0.640	0.527	0.000
Parental education: HBO or HE unfinished vs WO	-0.550	0.577	0.000
Ethnicity: allochthonous	-0.046	0.955	0.820
Gender: female	-0.177	0.838	0.112
Entrance qualification: MAVO	-0.554	0.575	0.256
Entrance qualification: MBO	-0.442	0.643	0.020
Entrance qualification: HAVO	-0.110	0.896	0.387
Grade point average	0.206	1.228	0.011
Extrinsic motivation	-0.085	0.919	0.000
Perception: financial risk	0.044	1.045	0.020
Perception: tuition incentive	0.051	1.052	0.002
Perception: importance of grants	-0.147	0.863	0.023
Perception: expected start salary (x 1000 NLG)	0.028	1.029	0.606
Perception: expected top salary (x 1000 NLG)	-0.029	0.972	0.446
Perception: willingness to borrow	0.044	1.045	0.001

Pseudo R2: Nagelkerke = 0.088; χ2 = ***; N = 1816

Table V.5:   *Results from regression analysis, Income from part-time work*

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Parental income (x 1000 NLG)	4.248	5.086	0.027	0.835	0.404
Parental education: max MAVO versus WO	112.586	41.537	0.116	2.711	0.007
Parental education: max VWO versus WO	119.193	41.883	0.116	2.846	0.005
Parental education: HBO or HE unfinished vs WO	25.021	38.353	0.026	0.652	0.514
Ethnicity: allochthonous	87.172	53.272	0.048	1.636	0.102
Gender: female	-4.827	27.541	-0.005	-0.175	0.861
Entrance qualification: MAVO	1164.026	92.449	0.368	12.591	0.000
Entrance qualification: MBO	291.213	42.513	0.214	6.850	0.000
Entrance qualification: HAVO	52.788	30.935	0.054	1.706	0.088
Grade point average	-39.106	20.799	-0.056	-1.880	0.060
Extrinsic motivation	-1.562	6.363	-0.007	-0.245	0.806
Perception: financial risk	-10.900	4.576	-0.070	-2.382	0.017
Perception: tuition incentive	-8.124	4.234	-0.058	-1.919	0.055
Perception: importance of grants	80.575	16.374	0.150	4.921	0.000
Perception: expected start salary (x 1000 NLG)	26.409	13.414	0.068	1.969	0.049
Perception: expected top salary (x 1000 NLG)	0.163	9.166	0.001	0.018	0.986
Perception: willingness to borrow	-2.025	3.510	-0.017	-0.577	0.564

$R^2 = 0.236$; Adjusted $R^2 = 0.222$; F-value = ***; N = 972

Table V.6:   *Results from regression analysis, Hours worked*

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Parental income (x 1000 NLG)	0.102	0.060	0.047	1.712	0.087
Parental education: max MAVO versus WO	2.081	0.510	0.147	4.083	0.000
Parental education: max VWO versus WO	1.787	0.497	0.124	3.597	0.000
Parental education: HBO or HE unfinished vs WO	0.743	0.465	0.054	1.596	0.111
Ethnicity: allochthonous	1.819	0.607	0.074	2.998	0.003
Gender: female	0.078	0.338	0.006	0.230	0.818
Entrance qualification: MAVO	7.393	1.239	0.147	5.966	0.000
Entrance qualification: MBO	3.574	0.540	0.177	6.614	0.000
Entrance qualification: HAVO	1.216	0.384	0.087	3.168	0.002
Grade point average	-0.607	0.253	-0.061	-2.404	0.016
Extrinsic motivation	-0.057	0.076	-0.020	-0.758	0.449
Perception: financial risk	-0.034	0.056	-0.015	-0.618	0.537
Perception: tuition incentive	-0.060	0.052	-0.030	-1.152	0.249
Perception: importance of grants	0.594	0.196	0.078	3.024	0.003
Perception: expected start salary (x 1000 NLG)	0.143	0.166	0.025	0.859	0.391
Perception: expected top salary (x 1000 NLG)	0.043	0.114	0.012	0.377	0.706
Perception: willingness to borrow	-0.054	0.042	-0.033	-1.300	0.194

R^2 = 0.089; Adjusted R^2 = 0.079; F-value = ***; N = 1573

Table V.7:   Results from regression analysis, Discipline

	No science & engineering against science & engineering		
	B	(Exp.) B	Sig.
Parental income (x 1000 NLG)	0.051	1.052	0.020
Parental education: max MAVO versus WO	0.376	1.456	0.038
Parental education: max VWO versus WO	0.092	1.097	0.600
Parental education: HBO or HE unfinished vs WO	0.167	1.182	0.309
Ethnicity: allochthonous	0.514	1.672	0.030
Gender: female	1.880	6.555	0.000
Entrance qualification: MAVO	0.928	2.528	0.073
Entrance qualification: MBO	-0.154	0.858	0.423
Entrance qualification: HAVO	0.193	1.213	0.168
Grade point average	-0.624	0.536	0.000
Extrinsic motivation	0.032	1.033	0.230
Perception: financial risk	0.008	1.008	0.689
Perception: tuition incentive			
Perception: importance of grants	0.093	1.098	0.183
Perception: expected start salary (x 1000 NLG)	-0.164	0.849	0.005
Perception: expected top salary (x 1000 NLG)	0.067	1.069	0.099
Perception: willingness to borrow	-0.015	0.985	0.329
Taking up loans	0.278	1.320	0.203

Pseudo R2: Nagelkerke = 0.275; $\chi2$ = ***; N = 1820

Table V.8:   *Results from regression analysis, Type of institution*

	HBO versus university		
	B	(Exp.) B	Sig.
Parental income (x 1000 NLG)	-0.034	0.966	0.355
Parental education: max MAVO versus WO	1.092	2.979	0.001
Parental education: max VWO versus WO	1.221	3.391	0.000
Parental education: HBO or HE unfinished vs WO	0.911	2.487	0.004
Ethnicity: allochthonous	-0.810	0.445	0.079
Gender: female	0.047	1.048	0.818
Grade point average	-0.741	0.477	0.000
Extrinsic motivation	0.214	1.238	0.000
Perception: financial risk	-0.047	0.954	0.182
Perception: tuition incentive	-0.026	0.974	0.428
Perception: importance of grants	0.015	1.015	0.905
Perception: expected start salary (x 1000 NLG)	-0.098	0.907	0.365
Perception: expected top salary (x 1000 NLG)	-0.339	0.712	0.000
Perception: willingness to borrow	-0.079	0.924	0.009
Taking up loans	0.076	1.078	0.847

Pseudo R2: Nagelkerke = 0.221; $\chi2$ = ***; N = 1093

Appendix VI: SEM, phase II

In principle, all total, direct and indirect effects between the independent variables are similar to the model presented in phase I, see Appendix III.

Table VI.1:   SEM standardised effects for independent variables

Variables	Total effect	Direct effect	Indirect effect
Students' living situation (N=1810)			
Ethnicity (allochtonous)	0.013	0.000	0.014
Parental education	0.196	0.132	0.064
Parental income	0.018	0.000	0.018
Gender (female)	0.058	0.092	- 0.034
Entrance qualification (VWO)	0.208	0.158	0.050
Grade point average	0.019	0.000	0.019
Extrinsic motivation	- 0.063	- 0.068	0.004
Expected future income	0.038	0.025	0.014
Study a risky investment	0.012	0.001	0.010
Attractiveness of grants	- 0.058	- 0.058	0.000
Willingness to borrow	0.194	0.194	0.000
Taking up student loans (N=1810)			
Ethnicity (allochtonous)	0.028	0.000	0.028
Parental education	0.004	0.000	0.004
Parental income	- 0.015	0.000	- 0.015
Gender (female)	- 0.016	0.000	- 0.016
Entrance qualification (vwo)	0.033	0.000	0.033
Grade point average	0.014	0.000	0.014
Extrinsic motivation	- 0.007	0.000	- 0.007
Expected future income	- 0.004	- 0.019	0.015
Study a risky investment	0.047	0.028	0.019
Attractiveness of grants	- 0.108	- 0.108	0.000
Willingness to borrow	0.253	0.253	0.000
Amount of loans (N=134)			
Ethnicity (allochtonous)	0.271	0.215	0.056
Parental education	0.011	0.000	0.011
Parental income	- 0.012	0.000	- 0.012
Gender (female)	0.151	0.197	- 0.046
Entrance qualification (vwo)	- 0.030	0.000	- 0.030
Grade point average	- 0.011	0.000	- 0.011
Extrinsic motivation	0.194	0.214	- 0.020
Expected future income	- 0.022	- 0.038	0.015
Study a risky investment	- 0.027	- 0.046	0.019
Attractiveness of grants	- 0.128	- 0.128	0.000
Willingness to borrow	0.268	0.268	0.000

Table VI.1:   SEM standardised effects for independent variables (continued)

Variables	Total effect	Direct effect	Indirect effect
Having a job or not (N=1810)			
Ethnicity (allochtonous)	- 0.003	0.000	- 0.003
Parental education	- 0.132	- 0.111	- 0.021
Parental income	0.008	0.000	0.008
Gender (female)	0.061	0.053	0.008
Entrance qualification (vwo)	- 0.074	- 0.044	- 0.030
Grade point average	- 0.059	- 0.053	- 0.006
Extrinsic motivation	0.099	0.093	- 0.005
Expected future income	0.007	0.008	- 0.002
Study a risky investment	- 0.068	- 0.057	- 0.011
Attractiveness of grants	0.061	0.061	0.000
Willingness to borrow	- 0.083	- 0.083	0.000
Job earnings (N=960)			
Ethnicity (allochtonous)	0.055	0.069	- 0.014
Parental education	- 0.125	- 0.118	- 0.007
Parental income	0.016	0.000	0.016
Gender (female)	- 0.009	0.000	- 0.009
Entrance qualification (vwo)	- 0.185	- 0.194	0.009
Grade point average	0.012	0.000	0.012
Extrinsic motivation	0.024	0.000	0.024
Expected future income	0.052	0.048	0.004
Study a risky investment	- 0.128	- 0.097	- 0.031
Attractiveness of grants	0.171	0.171	0.000
Willingness to borrow	- 0.054	- 0.054	0.000
Number of hours worked (N=1567)			
Ethnicity (allochtonous)	0.079	0.078	- 0.001
Parental education	- 0.101	- 0.056	- 0.045
Parental income	- 0.016	0.000	- 0.016
Gender (female)	0.010	0.000	0.010
Entrance qualification (vwo)	- 0.164	- 0.160	- 0.004
Grade point average	- 0.065	- 0.065	- 0.001
Extrinsic motivation	0.005	0.000	0.005
Expected future income	0.016	0.016	0.000
Study a risky investment	- 0.016	- 0.012	- 0.004
Attractiveness of grants	0.020	0.020	0.000
Willingness to borrow	- 0.022	- 0.022	0.000

Table VI.1: SEM standardised effects for independent variables (continued)

Variables	Total effect	Direct effect	Indirect effect
Science & engineering or not (N=1810)			
Ethnicity(allochtonous)	- 0.057	- 0.054	- 0.003
Parental education	0.004	0.000	0.004
Parental income	- 0.034	- 0.037	- 0.003
Gender (female)	- 0.407	- 0.383	- 0.024
Entrance qualification (vwo)	0.026	0.000	0.026
Grade point average	0.152	0.148	0.004
Extrinsic motivation	0.005	0.000	0.005
Expected future income	0.033	0.030	0.003
Study a risky investment	- 0.011	- 0.015	0.004
Attractiveness of grants	- 0.024	- 0.024	0.000
Willingness to borrow	0.021	0.021	0.000
Loans	- 0.031	- 0.031	0.000
University of hbo (N=1091)			
Ethnicity (allochtonous)	0.006	0.000	0.006
Parental education	0.162	0.113	0.049
Parental income	0.012	0.000	0.012
Gender (female)	-0.066	0.000	-0.066
Entrance qualification (vwo)			
Grade point average	0.152	0.132	0.020
Extrinsic motivation	-0.083	-0.135	0.052
Expected future income	0.201	0.196	0.005
Study a risky investment	0.049	0.047	-0.002
Attractiveness of grants	- 0.011	- 0.011	0.000
Willingness to borrow	0.084	0.084	0.000
Loans	0.00	0.00	0.00

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