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Willingness to Pay for Post-secondary Education Among Under-represented Groups

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I. Introduction

Despite Canada having one of the world's best-educated populations, numerous rationales have been presented to support the continued expansion and broadening of participation in post-secondary education (PSE). Not only do recent federal and provincial occupational projections suggest that future jobs will overwhelmingly require candidates with some form of PSE, the evidence on earnings premiums and private rates of return to PSE provide some indications that the labour market can still absorb large quantities of PSE graduates. Provinces have made higher PSE attainment a priority — for example, in the most recent Ontario budget, the government set as one of its goals to increase the PSE attainment rate from 62 per cent to 70 per cent (Ontario Ministry of Finance, 2010).

Yet, demographic trends suggest that maintaining, let alone increasing, the number of post-secondary graduates in coming years will prove challenging. Though there are currently supply-side constraints in some regions (principally urban Ontario), within 20 years, the pool of post-secondary-aged Canadians will be substantially shallower than it is today. To keep the supply of skilled workers at current levels, participation rates will have to keep climbing. As participation rates are already quite high among economically advantaged segments of the population, there is growing consensus that the best opportunity for growth in participation rates may be among groups that are currently under-represented in PSE, such as students from low-income families, students with no history of post-secondary education in their families and Aboriginal students. A strong case can be made as well that governments and PSE institutions should strive to close the gap in participation rates between under-represented groups and the rest of the population on the grounds that all Canadians should be provided with the same chances and opportunities to engage in PSE studies, independently of their socio-economic background. In short, increasing the participation rates of disadvantaged populations is an objective worth pursuing from both an efficiency and equity perspective.

Increasing participation among groups with low participation rates will require strategies to overcome complex and interrelated barriers. Such barriers may include inherent ability (e.g.,

ability to learn, literacy skills), preparedness and engagement in education, family background, information constraints, and financial considerations. A thorough review of all potential explanations for the under-representation of some groups in PSE is beyond the scope of this paper. Instead, we focus on financial barriers. Because Canada's student loan system ensures that most students who want to go to PSE have access to sufficient funds to pay for it (Frenette, 2007), it is often assumed that financial barriers are of secondary importance when it comes to access issues. However, *ability to pay* does not necessarily imply *willingness to pay*. We investigate two specific types of financial barriers that are linked to willingness to pay — namely, price sensitivity and loan aversion.

Our principal research question is **to what extent do higher price sensitivity and loan aversion act as barriers to PSE participation among under-represented groups?** Under-represented groups analysed in this report include:

- Students from low-income families;
- Students from families with no history of PSE (first generation students);
- Aboriginal students;
- Students living with physical conditions that impede their activities;
- Students living beyond commuting distance from university; and
- Boys.

The Role of Price Sensitivity

When it comes to looking at potential financial barriers to PSE participation, policy discussions are immediately directed towards the student financial aid system as the key policy instrument to address issues of affordability or access. An implicit assumption behind most student financial assistance schemes is that most qualified students perceive the benefits of PSE to outweigh the costs, but that some may lack immediate access to sufficient funds to enable participation. Thus, student financial assistance systems are set up primarily to enable participation by reducing these kinds of *liquidity constraints* through the provision of need-based loans.

However, this goal may be compromised if significant numbers of qualified students are unwilling to pay for PSE. One dilemma all students face is: go to PSE and forego immediate earnings, or enter the labour force and forego further education. The resolution of the dilemma depends on the perceived value of PSE as an investment; perceptions of high costs and uncertain returns may lead some to conclude that PSE would not be a good investment. Thus, for some, attendance may be subject to *price constraints*: willingness to pay for PSE may extend only to a certain threshold beyond which PSE is deemed to be too expensive.

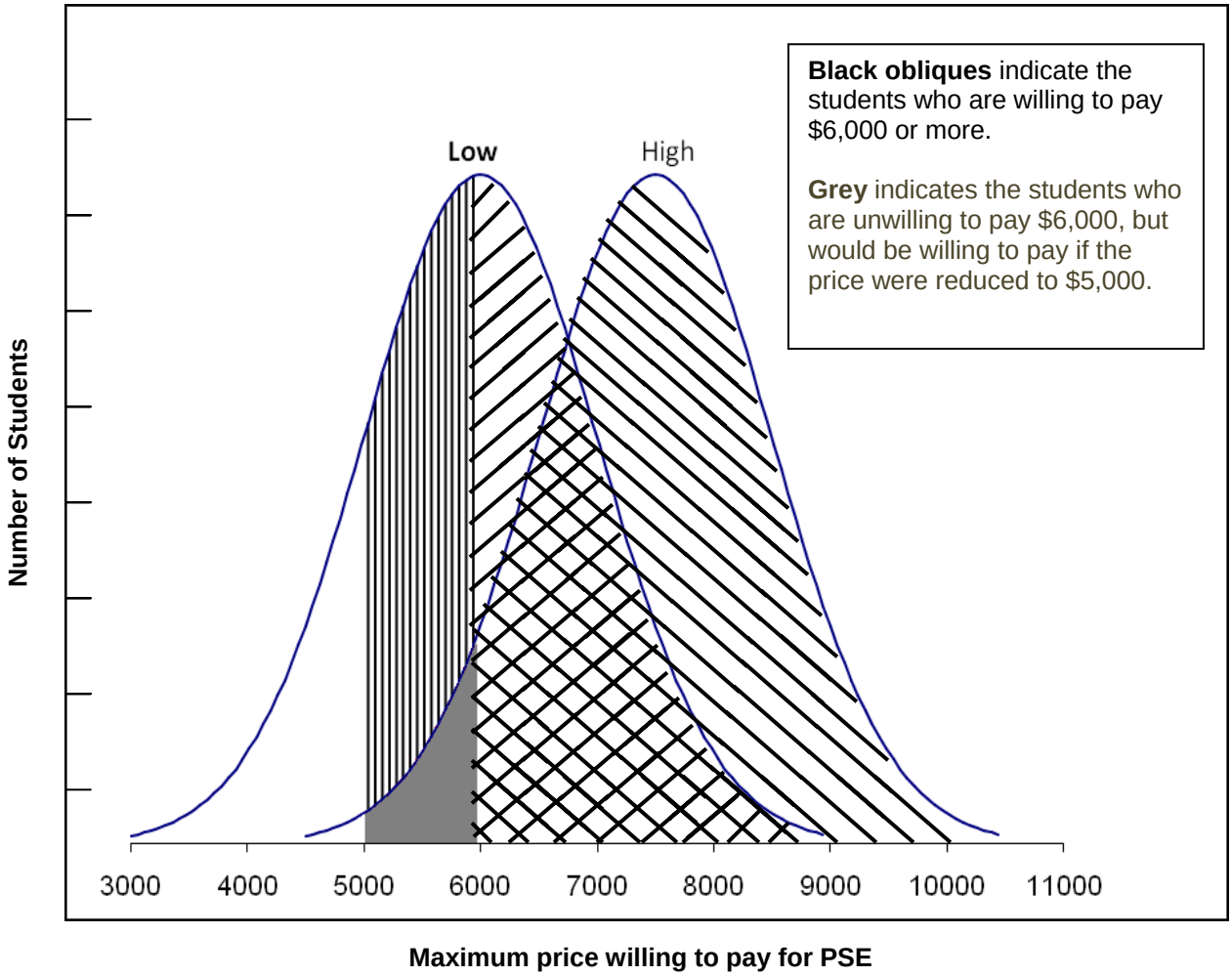
Different groups may have different willingness-to-pay thresholds. For example, Figure 1 shows two hypothetical distributions of willingness-to-pay thresholds, one for students from high-income families and the other for students from low-income families. It illustrates the point that if students from under-represented groups (in this example, those from low-income backgrounds) are generally less willing to pay a given price for PSE, then they will be *more price sensitive — that is, more responsive to changes in price*. For example, in Figure 1.1, a reduction in price from $6,000 to $5,000 will have far more of an impact on low-income students than on high-income students (most of whom are already willing to pay $6,000 or more).[1] Similarly, an increase in price from $5,000 to $6,000 would have far more of a (negative) impact on low-income students.

Though the figure below is hypothetical, there is some evidence that students use a cost-benefit framework (e.g., weighing potential economic returns against prospective debt loads) when considering PSE, and that group differences in perceived costs and benefits may lead to differences in participation rates. For example, Usher (2005) found that lower-income Canadians are more likely than others to overestimate the average costs and underestimate the average benefits of university education. These discrepancies in estimation occur at all ages, so that negative perceptions among students may be influenced and affirmed by friends and family. Another Canadian study developed and validated a detailed survey instrument designed to measure perceived benefits and costs of PSE along several dimensions (Acumen Research

[1] It is important to note that price reductions are not necessarily the only way to address price sensitivity. In principle, one could also shift the willingness-to-pay distribution of under-represented groups upward by shifting perceptions of costs and benefits, though no work has been done to test this.

Group, 2008). The results showed a strong link between perception and participation — students who perceived high costs in relation to benefits (including subgroups such as those whose parents had no university experience) were less likely to subsequently enrol in university, regardless of grades.

Figure 1: Hypothetical distributions of "willingness to pay" thresholds for low and high-income students



Note: A reduction in price from $6,000 to $5,000 would result in a much smaller gain in PSE participation among the high-income group (solid grey area) than among the low-income group (solid grey + grey stripes).

So, if students with low socioeconomic status behave as though they have lower willingness-to-pay thresholds — one could therefore hypothesize that they would also be more price sensitive. Thus, reducing the price of PSE (for example, by substituting non-repayable grants for loans) should increase the demand for PSE more among these groups than among their less price-sensitive counterparts who may already view PSE as a good investment. Unfortunately, direct evidence for this kind of effect (reviewed by Usher, 2006) is difficult to obtain. Several researchers have noted that participation tends to increase among those from low-income backgrounds when grants are increased, but it is unclear whether raising loan amounts instead would have had the same effect. To assess the effect of grants in isolation, one would need to look at what happens when loans are replaced with an equivalent amount of grants without altering the total assistance package.

The few studies that have investigated the impacts of "natural experiments" where policy or institution-level changes result in grant-for-loan substitutions have found some evidence of impacts on groups that are expected to be in the higher range of price sensitivity. For example, replacing loans with grants at one American university increased enrolment by 8 to 10 percentage points among low-income minority students (Linsenmeier, Rosen, & Rouse, 2006). A recent Canadian study showed that the introduction of two new federal grants (which were clawed back from loans for recipients, so that total aid remained fixed) was followed by a 7 percentage point increase in university attendance among boys who lived outside of commuting distance to the nearest university (Frenette, 2009).

The role of loan aversion

An additional factor that may impact participation is loan aversion, which is usually thought to extend beyond "normal" price sensitivity in the sense that PSE costs, benefits, and/or returns may be perceived more unfavourably when loans are involved in the financing. Thus, for a loan averse student, the price at which PSE is deemed to be a worthwhile investment might decrease (i.e., in Figure 1.1, their willingness-to-pay threshold would shift to the left) if borrowing is involved. This may lead to situations where students are willing, in principle, to invest in PSE

at a given price, but unwilling to take on loans to do so — thus renewing concerns about liquidity constraints acting as barriers to PSE access.

Loan aversion is often informally assumed to be an important barrier for under-represented groups, but empirical evidence is scant (Usher, 2006). American and British research has shown that students with low socioeconomic status have few examples of successful borrowing to draw from, and generally believe (and are advised by their parents and teachers) that student loans are risky and that exposure to debt should be minimized. In contrast, students with high socioeconomic status are more certain of the economic benefits of PSE; because of their parents' resources, they often do not need student loans, but those that do generally believe that the benefits of borrowing for PSE will exceed the costs (Christie & Munro, 2003; Perna, 2008).

A few experimental studies have shed some light on the issue. In a large experiment conducted for the Canadian Students Loan Branch of Human Resources and Skills Development Canada, Eckel, Johnson, and Montmarquette (2007) found that, overall, controlling for other factors, aversion to debt is not an important factor in determining whether subjects (adults aged 18 to 55) will take up higher education financing. Furthermore, subjects who had heavy debt loads were more willing than others to take on additional debt to finance higher education. However, while there was no evidence that entire subgroups were loan-averse, the original study noted that both high school students and post-secondary students presented sizeable probabilities of loan aversion (Johnson et al., 2003).

A recent U.S. study suggests that framing income-contingent financial assistance as a potentially repayable grant rather than as a potentially forgivable loan may have a large influence on application rates (Field, 2009). In this study, applicants to New York University's (NYU) School of Law were randomly offered one of two different financial aid packages, both designed to be equivalent in monetary value. The first package consisted of tuition loans, which would be forgiven after graduation for those who chose to work in the public sector. The second package consisted of tuition waivers issued by NYU, with the understanding that they would have to be repaid by students who chose to work in the higher-paying private sector. Both offers

meant equally low debt for those who took jobs in the public sector and high debt for those who went into the private sector. Yet the second offer attracted significantly higher proportions of applicants — over 40 per cent, compared to under 30 per cent for the first offer — perhaps because it was framed as a grant (albeit one that would have to be repaid by those choosing a private sector job) rather than a loan.

Focus of this study

We use a high-stakes laboratory experiment to investigate the roles that price sensitivity and loan aversion may play in the under-representation of certain groups in PSE. This experimental approach — innovated by CIRANO and first reported in a previous paper by Johnson, Montmarquette and Voyer (2010) — involved subjecting high school students to a series of decisions, some of which involved potentially high-stakes choices between various combinations of grants and loans for full-time PSE and significant but smaller amounts of cash (see Design section). While the initial purpose of the study was to develop possible indicators of loan aversion, this approach also allowed us to manipulate the price students are required to pay for various types of PSE financing, and thus construct an experimentally derived measure of price sensitivity.

The fact that our experimental design allows us to develop indicators for both price sensitivity and loan aversion is particularly important, given that (as discussed in greater detail above) they pose two distinct PSE access problems. At a given price level, a **price sensitive student** may have sufficient liquidity to access PSE but be unwilling to pay for it, whereas a **loan averse student** may be willing to pay, but lack sufficient liquidity if they are not willing to borrow. The extent to which under-represented groups are prone to one or both of these barriers may suggest different pathways for the development of possible policy responses.

A series of findings resulting from this experiment have already been reported in a first paper by Johnson, Montmarquette, and Voyer (2010). This first paper demonstrated that students were indeed sensitive to the experimentally manipulated price of PSE financing, but found little

evidence for loan aversion. In this second paper, we expand on Johnson et al. (2010) in two ways:

i) By examining in greater detail group differences in price sensitivity, specifically the question of whether traditionally low-participating groups are more sensitive to price, and if so whether this greater sensitivity can be linked to potential mediating factors such as perceived returns to investment in PSE.

ii) By developing an alternative indicator of loan aversion, based on the negative effect concurrent loan offers may have on the demand for grants (i.e., the rate at which grants are chosen over cash).

Throughout this paper, wherever possible, results are shown for both the overall sample and the Ontario subsample, reflecting the specific interest from the Higher Education Quality Council of Ontario (HEQCO) for Ontario students.

II. Design[2]

The Experimental Approach

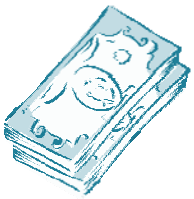
The major distinguishing feature of the methodology first used by Johnson et al. (2010) is the use of a high-stakes experimental design to reveal participants' demand for PSE financing at various levels of price. Participants were asked to make a number of choices between various types and levels of financing for full-time PSE (loans and/or grants up to $4,000) and significant but smaller amounts of money (up to $700). Four types of student aid were offered to participants, each valid for up to two years from the completion of the study: grants, loans, hybrids (½ loan, ½ grant), and income contingent repayment (ICR) hybrids (½ income contingent loan, ½ grant). For each type of student aid, participants were offered up to the maximum amount indicated — in the case of hybrids, for example, they could take any portion of the offered grant or loan up to the maximum amount of each. Students were told that grants were not repayable, that regular loans were repayable under the same conditions as those prescribed by the Canada Student Loans Program (that is, interest-free and no repayment required until six months after graduation), and that income contingent loans were the same as regular loans except that repayment would not be required while income remained below a certain threshold.

An example of a choice made by participants is illustrated in Figure 2.1 below. This particular example offers a choice between a $1,000 grant and $25 cash. Given that these offers of financial aid are only available for a limited time (two years from the date of the study), if a participant has no interest in acquiring additional education, he or she should opt for the cash. The complete set of decisions presented to participants can be found in Appendix A.

[2] Large portions of the Design and the Implementation sections are reproduced from the Johnson et al. paper (2010).

Figure 2.1: Example of Financial Aid Choice

You must choose A or B:

	CHOICE A	CHOICE B
		
	$$ one week from today	FULL-TIME Education or Training (Expenses refunded)
Decision 124	❒ $25	❒ $1,000 GRANT

Each participant made a total of 22 financing decisions, illustrated in Table 2.1 below, as well as a series of other monetary decisions involving time and risk preferences described later in this section. Before making their decisions, students were informed that at the end of the session one of their choices would be selected at random, and honoured. Not knowing which choice would be selected means that any of them could involve real stakes (and potentially high stakes in the case of education financing decisions), thus providing participants with a strong incentive to **reveal their true preference** for each choice.

Table 2.1: Educational Financing Decisions

Decision number	Type of financial aid	Maximum financial aid amount	Cash alternative	Price per $ of financial aid
109	Loan	$2,000	$25	0.629
110	Loan	$2,000	$300	0.767
111	Loan	$2,000	$700	0.967
112	Loan	$1,000	$300	0.917
113	Loan	$4,000	$300	0.692
114	Hybrid	$2,000	$25	0.321[3]
115	Hybrid	$2,000	$300	0.458
116	Hybrid	$2,000	$700	0.658
117	Hybrid	$800	$300	0.683
118	Hybrid	$4,000	$300	0.383
119	ICR Hybrid	$2,000	$25	0.321
120	ICR Hybrid	$2,000	$300	0.458
121	ICR Hybrid	$2,000	$700	0.658
122	ICR Hybrid	$800	$300	0.683
123	ICR Hybrid	$4,000	$300	0.383
124	Grant	$1,000	$25	0.025
125	Grant	$1,000	$100	0.100
126	Grant	$1,000	$300	0.300
127	Grant	$1,000	$700	0.700
128	Grant	$500	$300	0.600
129	Grant	$2,000	$300	0.150
130	Grant	$4,000	$300	0.075

The price of PSE financing options was manipulated by varying the amounts of cash participants had to give up when choosing different amounts of loans and grants. As the amount of implicit subsidy embodied in each type and level of financing varies, we can compare this implicit subsidy with the cash alternative offered and determine a price per dollar of financial aid

[3] Costs of hybrids and ICR hybrids are calculated based on the assumption that the maximum amounts of both the grant and loan portion will be taken up, and that loans will be fully repaid.

for each decision. For instance, if participants choose a $1,000 grant rather than a $25 cash alternative (Decision 124), the price they would pay would be $25/$1,000, or 2.5 cents per dollar of financial aid. If they choose a loan rather than the cash alternative, they have given up the cash alternative but gotten the use of the subsidized loan for approximately 5 ½ years, interest free. For example, if participants choose a $1,000 loan rather than $300 cash alternative (Decision 112), the price of the financial aid would include the $300 they gave up to get the loan, plus the inflation depreciated payback at the end of approximately 5 ½ years, less the value of subsidized interest for approximately 5 ½ years. In other words, the price per dollar of the subsidized loan would be [*Cash* + inflation-adjusted value of the loan – subsidized interest] / loan amount. For decision 112, the price per dollar would be [300 + (1000-113.86)-269.14]/1000 = $0.917.[4]

Other Research Instruments

Students and their parents also completed surveys, so that revealed preferences for variously priced financial aid (and, by extension, for PSE at various prices) could be linked to individual and group characteristics. The student and parent surveys adapted questions and scales from such sources as Statistics Canada's Youth in Transition Survey and Census of the Population, as well the Acumen Research Group's Perceived Return on Investment in PSE instrument. They yielded information on demographic characteristics, educational aspirations and expectations, parental education and income, school engagement, grades, student employment, perceived benefits and costs of different kinds of PSE, and a host of other variables.

In addition, the experimental sessions designed to capture the preference for student financial aid were also used to collect experimentally derived indicators of time and risk preferences. Time preference was measured by offering choices between two payments of different value to be made at different points in time. The later payment always had a greater value than the earlier payment, thereby rewarding the subject for delaying gratification, i.e., rewarding saving.

[4] For loans, a 2 per cent inflation rate, 3 per cent real interest rate, and 5 ½ years of interest subsidy were assumed.

Participants were offered a series of binary choices, in which the following parameters were varied: size of the initial endowment, rate of return to saving, timing of the earlier payment and waiting time for the later payment (Eckel, Johnson, & Montmarquette, 2002 and 2005; Harrison, Lau, & Williams, 2002). Thus a comprehensive indicator of each subject's willingness to forgo smaller returns sooner for larger returns later was obtained.

Risk preference was assessed by giving participants choices between "safe" and "risky" options involving monetary gambles. Two sets of risk preference choices were used: one set was a graphical representation of the Holt and Laury (2002) 10-binary decision instrument, scaled three different ways; the second set were five graphical versions of one out of six 50/50 gambles based on Eckel and Grossman (2008). In some cases, the risky option had the higher expected value (for example, a 50:50 chance of getting either $77 or $2, versus a 50:50 chance of getting either $40 or $32); in other cases, the safe option had the higher expected value. Thus each participant's tendency to choose riskier options even when they had a lower expected value (risk proneness), or safer options even when riskier ones had a higher expected value (risk aversion) could be measured.

Time preference decisions are indicated as numbers 1 to 48, and risk preference decisions as numbers 49 to 108, in Appendix A. Decisions involving time and risk preferences were presented in the same session and subject to the same revealed preferences methodology as those involving financial aid (decisions 109 to 130). That is, participants were told beforehand that one of the 130 decisions they were about to make would be randomly selected at the end of the session, and whatever choice they made in that decision would be honoured and compensated accordingly. Not knowing which decision would be selected motivated participants to choose according to their real preference each time.

Finally, students also completed a numeracy assessment (provided and scored by Statistics Canada) after making their choices.

Validity of Laboratory Experiments

A critical assumption underlying this and other laboratory experiments is that results can be extrapolated to real-world behaviour — a frequent criticism is that they cannot. Nonetheless, economists have begun to recognize that lab experiments can be a major source of information and are not necessarily less valid than other forms of experimentation (e.g., Falk & Heckman, 2008). Levitt and List (2006) argue that the results of lab experiments are more likely to apply to real-world behaviour if the following conditions are met:

i) No strong moral component or lack of congruence between moral and profit-maximizing actions that could be influenced by the extra scrutiny that participants are subjected to in a lab experiment.
ii) Stakes should be high enough to warrant computational demands placed on participants.
iii) Non-random selection of participants is not an important factor.
iv) Expertise or experience is not important or is quickly learned.
v) The lab context mirrors important aspects of the real-world problem.

The design of the experiment described here seems to meet most or all of these conditions. The first condition mainly applies to experiments on social preferences — the educational decisions made in this study are unlikely to have an influence on the well-being of others. As for the second condition, the stakes were not only high in terms of dollar value, they also implied at least some level of commitment to future behaviour — if for example, a grant was selected, it could only be used by becoming a full-time student within two years. Though students participated on a voluntary basis — which is likely to lead to some level of non-random selection — there were incentives for both those interested and not interested in PSE, and participation rates were high. As for experience, some students may not have been immediately ready to make high-stakes decisions about PSE, but there was a one to two-week time lag between signing up and participating in the lab component of the study, giving students and their families ample opportunities to discuss the issues involved if they had not done so already. Moreover, as students were in their final years of high school, the timing of the experiment coincided with real-life decisions they were all in the process of making about whether or not to pursue further

schooling. It could be argued that the limited information about PSE financing given during the lab sessions (though readily available in much greater detail from other sources) made some participants better informed than they would have been otherwise, and perhaps moved some uncertain students towards deciding on PSE financing over cash. Any bias this creates, however, would likely underestimate true differences between under-represented groups (which are likely to include a higher proportion of marginal students) and others.

III. Implementation

From October 2008 to March 2009 nearly 1,250 Canadian students, mostly ranging in age from 16 to 18, participated in 75 experimental sessions. This sample was drawn from both urban and non-urban sites across Canada and was made up of full-time students, most of whom were enrolled in high school and some in CEGEP.

Sample Selection

To generate meaningful comparisons by population group, the original project design called for 1,400 respondents with the goal of recruiting a minimum of 200 participants per identified group of interest — that is, high and low income, first generation, Aboriginal students, and those beyond commuting distance (40 km) from the nearest university — in three or four different provinces. Although not a focus of the initial sampling strategy, an effort was made to document students with immigrant parents and students with physical conditions that might impair their daily activities for use in the analysis. A small number of participants over the age of 18 were included primarily because one participating high school had adult learners who had returned to school. The older students represented approximately six per cent of the sample.

Participants consisted of 1,248 students in their final year of high school or first year of CÉGEP, from 12 participating schools in four provinces (Québec, Ontario, Manitoba, and Saskatchewan). The Ontario sample was drawn from four schools (one in Campbellford, one in North Bay, and two in Thunder Bay). Table 2.2 briefly summarizes the numbers of participants in several groups of interest and by selected characteristics, both for the full sample and the Ontario subsample.

Table 2.2: Sample sizes for various groups of interest

	Full sample	Ontario subsample
Total	1,248	365
Low income (family income < $40,000)	191	69
First generation	262	85
Aboriginal students	111	28
Beyond commuting distance (> 40 km) from university	146	50
Physical condition that impairs activity	239	64
Immigrant parents	184	29
Boys	577	166

First generation students were defined as those who had no parent with a completed degree or certificate at higher than a high-school level.

Aboriginal students were defined as those who reported Aboriginal identity, treaty Indian status, or band membership. The sample includes 60 who reported Métis identity, 39 with First Nations identity, and 12 who reported "Other" identity. Thirty-eight reported being band members (from 32 different bands). Aboriginal students were spread throughout the sample, with 38 going to school in Saskatchewan, 30 in Manitoba, 28 in Ontario, and 14 in Quebec.

Commuting distance from university was computed by entering home postal codes (provided by all students) and postal codes of the nearest university into a geocoding program, which converted both postal codes into latitude and longitude; distance was then calculated according to the method used in Frenette (2002).[5]

Physical impairment was defined according to whether students reported that they had a physical condition that reduced the amount or kind of activity that they could do at home, school, work, or in other contexts such as leisure or transportation.

[5] The subsample of students more than 40 km from the nearest university reported in Table 2.2 was obtained from computations made using online geocoding freeware. A second online program yielded a slightly larger subsample (n=173). Although subsequent tables and regression analyses in this report define the subsample according to the first program (n=146), sensitivity analyses were conducted substituting the second, larger subsample and a third subsample consisting only of those students who were designated by both programs to be more than 40 km from the nearest university, with no substantial change to the results.

Students with immigrant parents were defined as those who were either born outside of Canada, or born in Canada but with at least one parent born outside of Canada.

Recruitment

Initial recruitment was done at the level of schools and school administrators, in an effort to select schools with the range of student characteristics we were seeking. Recruitment of students at targeted schools relied on the cooperation of school administrators. School administrators at participating schools were sent information packets and were aware of the purpose of the study and the potentially high stakes involved for students. The school administrator packets included speaking points to promote the study to the students without prompting the students to behave in a particular way. School administrators were invaluable in assisting the field team by making computers available to students to complete their web surveys, providing space during and after school time for the in-person experimental sessions, and in helping out with the collection of parental consent.

Interested students took home a packet with a letter to parents. The packet included an overview of the study, times when they could participate (typically within a week or two of packet distribution) and answers to frequently-asked questions. Packets also included instructions for completing the online survey, each with a unique ID. Lastly parents received a letter explaining that they would be contacted by telephone for their consent and asked to answer a five-minute survey (typically students supplied their home phone numbers when they received their recruitment packet). In general, recruitment advertising included a brief description of the research partners, the time commitment involved, participation times available, the show-up fee, the potential to earn extra money or financing for PSE, and assurance of confidentiality and privacy. The online survey and survey of parents can be found in Appendix B.

Experimental protocol

Participants who had previously completed their online surveys and obtained consent from their parents were able to schedule experimental sessions where choices involving student financial aid were made. The experimental sessions were held at different locations in the schools

participating students attended, including classrooms, libraries, career counselling rooms, activity rooms, and auditoriums. As the demand for different session times in different locations varied, a total of 75 sessions were conducted with a maximum of 50 participants in any session. For showing up on time, each participant received a $20 show-up fee. This fee guaranteed that they would not leave the experiment empty-handed and allowed the experimenters to show the participants that they keep their word in terms of making promised payments. It also helped participants feel committed to finishing the experiment, and, most importantly, encouraged the participants to show up on time.

Upon arrival, the experimenter reminded participants that all information collected would be kept confidential and used for research purposes only. During the introduction to the experiment, participants were fully informed of the compensation for which they would be eligible upon completion of the study, including opportunities to receive both monetary rewards (in the form of a cheque) and non-monetary rewards in the form of educational financing. All participants were provided with the following information regarding educational financing:

1) All types of financing must be for direct or indirect expenses related to a full-time program of study at an educational institution recognized by the Canada Student Loans and Grants program.
2) The financial support would only be awarded if the participant, not a family member or friend, enrolled within two years from the date of the experimental session. Financial aid received through this study could not be disbursed to pay for past educational investments.
3) Grants are not repayable. Loans are repayable upon the completion of the study or if the participant drops out of the program of study, under the conditions prescribed by the Canada Student Loans Program (that is, interest-free and no repayment required until six months after completion, after which interest would be set at prime plus 2.5 per cent). Income contingent repayment loans are like regular loans except that repayment can be suspended, but not forgiven, if the income of the participant falls below a certain threshold.

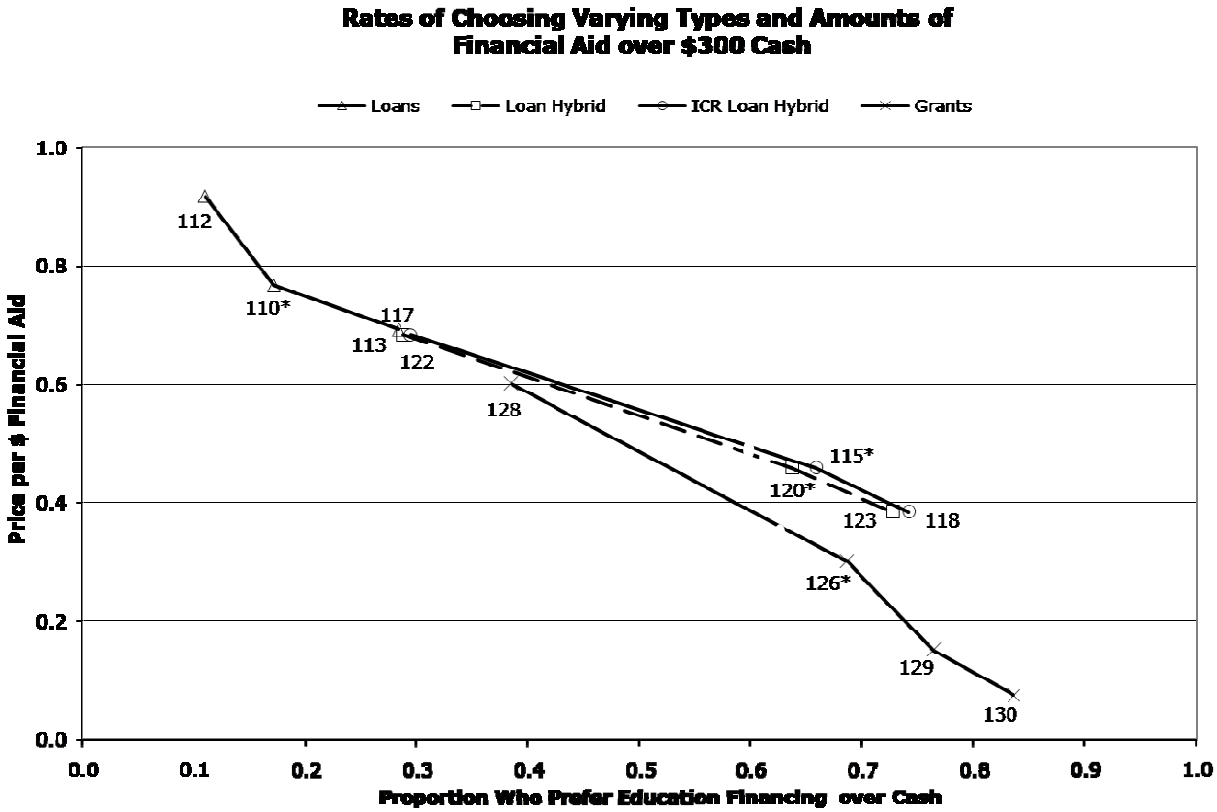
To familiarize participants with the experimental decisions and the random-draw payment procedure, they first participated in a practice session consisting of 22 examples, featuring each kind of decision they would have to make (time preferences, risk preferences, and educational financing). Three to five experimenters were on hand to assist those who needed help and answer any questions. After completing all 130 actual decisions, participants proceeded with their numeracy assessments while experimenters checked the decisions for possible missing or illegible answers. After completing their numeracy assessments, each participant met privately with an experimenter, and used a bingo ball cage where each decision number was matched with one correspondingly numbered ping pong ball to randomly select the decision they would be paid for. Each decision had an equal probability of being selected. Participants were given the option of signing a form authorizing the experimenters to contact them at some point in the future for possible follow-up research. Overall, experimental sessions took from one hour and forty minutes to three hours; participants who took longer usually did so because they took more time on the numeracy assessment.

IV. Demand for Student Financial Aid

As discussed above, prices for student financial aid were derived experimentally by varying the amount of cash participants had to give up when choosing different amounts and types of PSE financial aid. Price is defined as the amount of cash given up per $1 of financial aid.

In general, the experiment showed that as prices went up, the percentage of those choosing financial aid declined. In the Johnson et al. (2010) paper, this was well illustrated in a series of charts similar to Figure 4.1 below. Figure 4.1 depicts a demand curve for financial aid resulting from the choices made by all participants, with the proportion of respondents that chose the education-over-cash alternative by type of financial aid on the horizontal axis, and the cost per dollar of financial aid, or the price of the financial aid, on the vertical axis. The set of choices presented in this particular graph represent decisions where the cash is kept constant (at $300) and the amount of financial aid varies. The decision numbers correspond to those reported in Table 2.1.

Figure 4.1



The Johnson et al. (2010) paper also provided alternative demand curves constructed with decisions where the amount of financial aid is kept constant and the cash alternative is allowed to vary. No matter how one slices it, responses from participants showed that demand for financial aid declines with price.

The paper then presented a series of demand curves by subgroups, illustrating that for many of the subgroups of interest — e.g., Aboriginal students, students from low-income families and first generation students — the demand for financial aid seems to lie much below average over a certain range of prices, implying that these groups may generally display lower interest in PSE.

Differences in price sensitivity between groups

We now explore in greater detail a further dimension of participants' responses: how price sensitivity varies between groups. Price sensitivity is defined as the rate at which the demand for financial aid declines with increases in price. Note that, in the context of this study, the demand for financial aid is assumed to stem from the demand for PSE. Therefore, sensitivity to the price of financial aid should mirror sensitivity to the price of PSE.

From a policy perspective, price sensitivity addresses the following question: given that most prospective applicants have the ability to pay for PSE (thanks to the student loan system), are there nevertheless differences between groups in willingness to pay, and are these differences magnified as price increases? As mentioned in the Introduction, ability to pay is simply a matter of immediate liquidity (do I have access to sufficient funds to pay for PSE?), whereas willingness to pay involves weighing PSE as a potential investment (at what price would the investment be worthwhile?). Our study investigates whether willingness to pay for financial aid drops off more sharply and at lower price points for some groups than others. If these experimentally derived group differences in price sensitivity align with well-established group differences in PSE participation, it would provide indirect evidence that existing participation gaps may be at least partially a function of price sensitivity and potential mediating factors linked with price sensitivity, such as perceived returns to PSE.

Prior to conducting further price sensitivity analysis, criteria for selecting a) the sample and b) the decisions on which to base the analysis were established, are described below. Individuals who neither expected to go beyond high school nor chose financial aid over cash a single time were deemed to have no interest in PSE at any price and were excluded from further analysis, leaving 1,208 participants (out of the original 1,248) on which to conduct price sensitivity analysis.

A consideration of which decisions to include when examining potential group differences in price sensitivity was mindful of the fact that at some price levels, cash windfall taking may obscure educational preferences, more so for some groups than others. For example, consider

two groups of students, one from a high-income background who can rely on substantial support from their parents and the other with lower-income parents who must rely on other means to finance their PSE. At relatively low price levels, the two groups should behave in a similar fashion. That is, those who are interested in PSE should prefer a low-priced grant over cash, either because they need the financial assistance provided by the grant or, if they do not need assistance, because the grant subsidy represents a much larger windfall compared to the cash alternative. For each group, their choice reflects their true educational preference, and a choice of cash would indicate a lack of interest in PSE at that price.

However at higher prices, choices become more reliable indicators of price sensitivity for those who need assistance than for those who do not. For example, if someone who needs financial assistance chooses cash over a loan, one can assume that their interest in PSE falls off at that price level. On the other hand, someone who does not require assistance because of parental support has no incentive to choose a loan over what would essentially be a cash windfall; the price of PSE has already been reduced for them, and there is no way of gauging their interest in PSE at the experimentally set price level. This kind of windfall-taking may make it appear as though those who do not require financial assistance are more price sensitive than they actually are. A possible example of this is illustrated in Table 4.1, in which the demands for financial aid among students from high- and low-income backgrounds are compared.[6]

Table 4.1 shows that as the price increases from 0.025 to 0.30 cents per dollar, the gap in demand for a grant between high- and low-income students widens from not significantly different than zero to 12 percentage points. In Ontario, the high-to-low income gap is even more pronounced, peaking at 19 percentage points at price 0.30. This appears to be a result of those in the high-income group in Ontario being even less sensitive to price increases than their counterparts outside Ontario, thus magnifying the difference between high and low income in Ontario.[7]

[6] High income is defined here as a family income of at least $100,000 per year while low income corresponds to a family income below $40,000 per year.

[7] Of course, any differences between Ontario and non-Ontario students are difficult to generalize beyond this study, given the small size of the Ontario subsample, and unrepresentative composition of both the overall sample and the Ontario subsample.

Table 4.1: Price sensitivity comparison between those from low (<40K, full sample n=182, Ontario n=68) and high (≥100K, full sample n=236, Ontario n=83) income backgrounds

Decision	Price	Overall Sample Fin. Aid Choice			Ontario Subsample Fin. Aid Choice		
		Low-Inc	High-Inc	Gap (High-Low)	Low-Inc	High-Inc	Gap (High-Low)
2000L-$700	0.97	3.9%	4.7%	0.8	5.9%	6.0%	0.1
1000L-$300	0.92	10.4%	12.7%	2.3	10.3%	18.1%	7.8
2000L-$300	0.77	19.8%	19.1%	-0.7	20.6%	25.3%	4.7
4000L-$300	0.69	33.0%	29.2%	-3.8	30.9%	32.5%	1.6
2000L-$25	0.63	53.9%	44.9%	-9.0*	51.5%	48.2%	-3.3
1000G-$700	0.70	37.9%	45.3%	7.4	39.7%	53.0%	13.3
500G-$300	0.60	35.2%	43.6%	8.4*	38.2%	49.4%	11.2
1000G-$300	0.30	65.4%	77.5%	12.1***	67.7%	86.8%	19.1***
2000G-$300	0.15	73.6%	81.8%	8.2**	75.0%	91.6%	16.6***
1000G-$100	0.10	82.4%	87.7%	5.3	82.4%	95.2%	12.8**
4000G-$300	0.075	85.7%	89.8%	4.1	91.2%	96.4%	5.2
1000G-$25	0.025	90.7%	93.2%	2.5	91.2%	96.4%	5.2

t-test: *** P < 0.01; ** P < 0.05; * P < 0.10.

These results seem to indicate a higher sensitivity to price increases among those from low-income backgrounds, which is consistent with much of the literature on PSE access. However, as price continues to increase beyond 0.30, the gap in demand for financing between high- and low-income students narrows and is even reversed for the least expensive loan.

This pattern of gap widening, then narrowing and reversing, can only be explained by the fact that significant numbers of high-income students with interest in PSE but no need of financial assistance start to prefer immediate cash windfalls to financial aid as prices increase beyond a certain level. Put another way, those who expect significant subsidization from parents and thus have little need for other kinds of financial support might nevertheless prefer a delayed windfall in the form of a grant over an immediate cash windfall when the former is more than three times higher than the latter. However, as grants become more expensive, they may be tempted to choose the immediate cash windfall instead, and should certainly be expected to choose a cash windfall over an unneeded loan.

Since it seems more likely that the sharp drop in demand for financial aid among high-income students at prices greater than 0.30 is a result of windfall-taking rather than a sudden drop in

demand for PSE, further analysis on group differences in price sensitivity will therefore be focused on the price band between 0.025 and 0.30 — this is a range within which one would expect windfall-taking to have the least effect on demand for financial aid, since inexpensive grants would likely be preferred to cash among those taking windfalls.[8]

Tables illustrating price sensitivity for other groups of interest (Aboriginal students vs. those who do not report Aboriginal identity, treaty Indian status, or band membership, first generation vs. non-first generation, disabled vs. non-disabled, beyond commuting distance to university vs. within commuting distance, boys vs. girls) are shown below.

Price sensitivity among Aboriginal students is especially striking (Table 4.2); as price increases from 0.025 to 0.30, their grant acceptance rate plummets from 85 per cent to 48 per cent. Even at the lowest price, there is a still a statistically significant 8 percentage point gap between Aboriginal students and others.

[8] Further evidence of the impact of windfall-taking at prices beyond 0.30 can be found by comparing Table 4.1 with Table 4.6, in which — since the groups being compared are boys and girls, and there are no group differences in income — parental support and windfall-taking should impact both groups equally. At prices up to 0.30, the results for boys vs. girls mirror those for high- vs. low-income students — that is the under-represented group (low income or boys) is more responsive to price increases leading to a steadily increasing gap in demand for financing between groups. However, unlike the gap between income groups, the gap between girls and boys continues to rise as grant price increases to 0.70, and is still significant at most levels of loan price. Thus, when there are no income differences between groups (as with boys and girls), windfall-taking is likely to be evenly distributed between the groups and therefore unlikely to have an effect on price sensitivity comparisons. However, when there are income differences (as is the case for most other group comparisons), it is likely to lead to anomalous results at price levels higher than 0.30.

Table 4.2: Price sensitivity comparison between those from Aboriginal students (AB; overall n=104, Ontario n=28) and others (non-AB; overall n=1104, Ontario n=331) backgrounds

Decision	Price	Overall Sample Fin. Aid Choice			Ontario Subsample Fin. Aid Choice		
		AB	Non-AB	Gap (Non-AB - AB)	AB	Non-AB	Gap (Non-AB - AB)[9]
2000L-$700	0.97	3.9%	5.3%	1.4	0.0%	6.7%	6.7
1000L-$300	0.92	7.7%	11.7%	4.0	3.6%	13.6%	10.0
2000L-$300	0.77	14.4%	18.0%	3.6	14.3%	22.1%	7.8
4000L-$300	0.69	32.7%	29.0%	-3.7	32.1%	33.2%	1.1
2000L-$25	0.63	53.9%	46.7%	-7.2	64.3%	48.9%	-15.4
1000G-$700	0.70	25.0%	44.3%	19.3***	25.0%	48.6%	23.6**
500G-$300	0.60	24.0%	41.2%	17.2***	21.4%	45.3%	23.9**
1000G-$300	0.30	48.1%	73.1%	25.0***	53.6%	78.9%	25.3***
2000G-$300	0.15	65.4%	80.3%	14.9***	60.7%	86.7%	26.0***
1000G-$100	0.10	76.9%	86.2%	9.3**	78.6%	89.4%	10.8*
4000G-$300	0.075	79.8%	87.0%	7.2**	82.1%	92.5%	10.4*
1000G-$25	0.025	84.6%	92.2%	7.6**	89.3%	94.6%	5.3

t-test: *** P < 0.01; ** P < 0.05; * P < 0.10.

Results for first generation students (Table 4.3) largely mirror those for low-income students, with a widening gap between those with high school-educated parents and those with at least one university-educated parent as price increases from 0.025 to 0.30 (again, the widening is particularly evident in the Ontario subsample).

[9] Because of the small sample size of the AB group in Ontario, the results of significance testing shown in this column should be interpreted with caution.

Table 4.3: Price sensitivity comparison between those with high-school educated parents (HS; overall n=248, Ontario n=82) and university-educated parents (UN; overall n=431, Ontario n=124)

Decision	Price	Overall Sample Fin. Aid Choice			Ontario Subsample Fin. Aid Choice		
		HS	UN	Gap (UN -HS)	HS	UN	Gap (UN-HS)
2000L-$700	0.97	5.7%	5.8%	0.1	7.3%	7.3%	0.0
1000L-$300	0.92	12.9%	11.4%	-1.5	13.4%	13.7%	0.3
2000L-$300	0.77	19.8%	19.3%	-0.5	18.3%	29.8%	11.5*
4000L-$300	0.69	30.2%	29.9%	-0.3	28.1%	35.5%	7.4
2000L-$25	0.63	53.6%	45.2%	-8.4**	51.2%	53.2%	2.0
1000G-$700	0.70	39.1%	45.0%	5.9	39.0%	51.6%	12.6*
500G-$300	0.60	36.3%	46.2%	9.9**	39.0%	48.4%	9.4
1000G-$300	0.30	66.5%	75.6%	9.1**	69.5%	83.1%	23.6**
2000G-$300	0.15	76.6%	82.6%	6.0*	75.6%	93.6%	28.0***
1000G-$100	0.10	85.5%	88.4%	2.9	82.9%	95.2%	12.3***
4000G-$300	0.075	86.7%	89.1%	2.4	89.0%	96.0%	7.0*
1000G-$25	0.025	92.3%	93.0%	0.7	92.7%	96.8%	4.1

t-test: *** P < 0.01; ** P < 0.05; * P < 0.10.

As is the case with Aboriginal students, students reporting some form of physical disability show a significantly lower acceptance of grants at all price points (Table 4.4), although unlike Aboriginal students, the gap between disabled and non-disabled does not widen with increases in price.

Table 4.4: Price sensitivity comparison between those with physical conditions that impede their activities (DIS; overall n=228, Ontario n=62) and those without such conditions (non-DIS; overall n=980, Ontario n=297)

Decision	Price	Overall Sample Fin. Aid Choice			Ontario Subsample Fin. Aid Choice		
		DIS	Non-DIS	Gap (Non-DIS - DIS)	DIS	Non-DIS	Gap (Non-DIS - DIS)
2000L-$700	0.97	4.4%	5.4%	1.0	1.6%	7.1%	5.5**
1000L-$300	0.92	10.5%	11.5%	1.0	6.5%	14.1%	7.6*
2000L-$300	0.77	13.6%	18.7%	5.1*	11.3%	23.6%	12.3**
4000L-$300	0.69	29.0%	29.4%	0.4	30.7%	33.7%	3.0
2000L-$25	0.63	46.5%	47.6%	1.1	56.5%	48.8%	-7.7
1000G-$700	0.70	37.7%	43.8%	6.1*	45.2%	47.1%	1.9
500G-$300	0.60	34.2%	41.0%	6.8*	35.5%	45.1%	9.6
1000G-$300	0.30	62.3%	73.0%	10.7***	67.7%	78.8%	11.1*
2000G-$300	0.15	71.1%	80.8%	9.7***	75.8%	86.5%	10.7**
1000G-$100	0.10	78.1%	87.1%	9.0***	82.3%	89.9%	7.6*
4000G-$300	0.075	81.1%	87.6%	6.5**	87.1%	92.6%	5.5
1000G-$25	0.025	84.2%	93.3%	9.1***	85.5%	96.0%	10.5**

t-test: *** P < 0.01; ** P < 0.05; * P < 0.10.

Table 4.5: Price sensitivity comparison between those beyond 40 km from the nearest university (FAR; overall n=144, Ontario n=48) and those living within 40 km (CLOSE; overall n=1064, Ontario n=311)

Decision	Price	Overall Sample Fin. Aid Choice			Ontario Subsample Fin. Aid Choice		
		FAR	CLOSE	Gap (CLOSE-FAR)	FAR	CLOSE	Gap (CLOSE-FAR)
2000L-$700	0.97	5.6%	5.2%	-0.4	8.3%	5.8%	-2.5
1000L-$300	0.92	14.6%	10.9%	-3.7	14.6%	12.5%	-2.1
2000L-$300	0.77	25.0%	16.7%	-8.3**	18.8%	21.9%	3.1
4000L-$300	0.69	40.3%	27.8%	-12.5***	37.5%	32.5%	-5.0
2000L-$25	0.63	59.0%	45.8%	-13.2***	52.1%	49.8%	-2.3
1000G-$700	0.70	43.8%	42.5%	-1.3	52.1%	46.0%	-5.1
500G-$300	0.60	41.0%	39.6%	-1.4	45.8%	43.1%	-2.7
1000G-$300	0.30	66.7%	71.5%	4.8	70.8%	77.8%	7.0
2000G-$300	0.15	77.1%	79.2%	2.1	81.3%	85.2%	3.9
1000G-$100	0.10	84.7%	85.5%	0.8	85.4%	89.1%	3.7
4000G-$300	0.075	84.7%	86.6%	1.9	89.6%	92.0%	2.4
1000G-$25	0.025	91.7%	91.5%	-0.2	89.6%	94.9%	5.3

t-test: *** P < 0.01; ** P < 0.05; * P < 0.10.

The gap in grant acceptance between those beyond easy commuting distance (40 km) and those within easy commuting distance to a university shows a tendency to grow with increasing price, but never attains statistical significance (Table 4.5). More distant students tend to accept loans at a significantly higher rate compared to more proximate students; however, this result should be interpreted with caution, as students within 40 km of a university tend to come from higher-income families and their relatively low loan acceptance rates may be partially due to a higher tendency towards windfall-taking.

Sex differences reveal a pattern consistent with the PSE participation literature, i.e., greater price sensitivity, and significantly lower acceptance of financial aid at most price levels, among boys (Table 4.6).

Table 4.6: Price sensitivity comparison between boys (BOY; overall n=549, Ontario n=160) and girls (GIRL; overall n=659, Ontario n=199)

Decision	Price	Overall Sample Fin. Aid Choice			Ontario Subsample Fin. Aid Choice		
		BOY	GIRL	Gap (GIRL-BOY)	BOY	GIRL	Gap (GIRL-BOY)
2000L-$700	0.97	5.3%	5.2%	-0.1	6.9%	5.5%	-1.4
1000L-$300	0.92	8.7%	13.5%	4.8***	11.3%	14.1%	2.8
2000L-$300	0.77	13.3%	21.4%	8.1***	16.3%	25.7%	8.4**
4000L-$300	0.69	26.1%	32.0%	5.9**	31.3%	34.7%	3.4
2000L-$25	0.63	42.6%	51.3%	8.7***	46.9%	52.8%	5.9
1000G-$700	0.70	33.2%	50.5%	17.3***	33.8%	57.3%	23.5***
500G-$300	0.60	30.2%	47.7%	17.5***	33.1%	51.8%	18.7***
1000G-$300	0.30	64.7%	76.2%	11.5***	71.9%	80.9%	9.0**
2000G-$300	0.15	74.5%	82.7%	8.2***	81.9%	86.9%	5.0
1000G-$100	0.10	81.6%	88.6%	7.0***	84.4%	92.0%	7.6**
4000G-$300	0.075	84.0%	88.3%	4.3**	90.0%	93.0%	3.0
1000G-$25	0.025	89.6%	93.2%	3.6**	93.8%	94.5%	0.7

t-test: *** P < 0.01; ** P < 0.05; * P < 0.10.

V. The Determinants of Price Sensitivity

The descriptive data presented above reveal that price is clearly an important factor in explaining the demand for student financial aid; as the price increases, demand drops. However, some groups were more sensitive to price increases than others, which suggests that reducing prices may serve to reduce gaps in demand for PSE between groups. For example, decreasing the price from 0.30 to 0.025 narrowed the gap between those from low- and high-income backgrounds from 12 percentage points to basically zero. But what are the factors that make disadvantaged groups such as low-income, Aboriginal students, and first generation students more price sensitive in the first place? This is what we explore now.

Linear probability models

A series of linear probability models were specified to investigate various factors that might help to explain group differences in price sensitivity. As explained in the preceding section, only choices involving grants in the price band between 0.025 and 0.30 were included in the analysis. The level of analysis is the individual decision, so there are 1,208 times five decisions made by each individual, for a total of 6,040 observations; the outcome variable being estimated is the probability of choosing a grant, given its price, and the characteristics of the individual making the decision.[10]

Eight models were estimated using the overall sample, and are illustrated below in Table 5.1 (the same models were also specified for the Ontario subsample and are shown in Table 5.2, though the small sample size makes for considerably less statistical power). The first seven models estimated respectively the effects of income, Aboriginal status, parental education, physical disability, distance from university, sex, and immigrant status, in isolation with no other covariates included. The eighth includes individual characteristics such as grades, numeracy, school engagement, working, an experimental measure of time preference/patience (defined as

[10] SAS *proc genmod* was used to obtain robust estimates of standard errors, correcting for both the potential clustering effect that may result from using repeated observations of the same individuals (by using the REPEATED option), and the heteroskedasticity that may result from specifying linear probability models.

willingness to choose a higher cash reward with an associated time delay over a lower, but more immediate reward), and a scalar measure of perceived returns to investment in PSE (based on Acumen's (2008) survey instrument designed to measure perceived benefits and costs of PSE along several dimensions[11]).

Model 1 confirms and extends the importance of income, as discussed above. The significant negative coefficient (-0.356) on the cross-variable <40*Price illustrates the greater price sensitivity of the lowest income group (those with incomes <40K) compared to the reference group (those with incomes > 100K). For each 0.10 increase in price, demand for financial aid among low-income students drops by (0.3561x0.10), or 3.6 percentage points more than it does among high-income students — in other words, the gap in demand between high- and low-income students widens by 3.6 percentage points for every 0.10 increase in price. The rate at which demand for financial aid drops with increasing price among those in other income groups below 100K is also significantly higher than in the reference group, though the steepest drop occurs in the lowest income group.

Model 3 shows the effect of low parental education, which largely mirrors that of low income. Those whose parents have attained less than a university degree are generally less receptive to educational subsidies. Students whose parents have no attainment higher than a college diploma are roughly 3.5 percentage points less likely than those with university-educated parents to accept financial aid at any price between 0.025 and 0.30. Those whose parents have a high school diploma or less are considerably more price sensitive than those with university-educated parents — the gap in financial aid demand between the two groups widens by (0.311 X 0.1), or 3 percentage points for every 0.10 increase in price.

Model 8 shows that most of the increased price sensitivity among those with family incomes under $100,000 and those with high school- or less-educated parents is accounted for once other variables are added to the basic model. Note that the coefficients for price by income

[11] The perceived returns to investment in PSE score was obtained by summing the original instrument's benefit dimensions (monetary benefits and non-monetary benefits) , then subtracting cost dimensions (debt avoidance and identity anxiety) and dimensions that measure reservations about PSE (indecision concerns and belief in PSE alternatives).

group are much reduced, and no longer statistically significant, and the coefficient for parents with high school or less actually becomes positive and significant. Thus, a large part of the difference in price sensitivity between students from economically and educationally disadvantaged backgrounds may be associated with differences in grades, school engagement, patience, and/or perceived returns on investment in university, many of which may in turn be traced back to differences in parental education and parental influences on the way their children engage in and prepare for their own education. These ideas will be examined in greater detail in the next section.

Table 5.1: Linear Probability Models, Showing Group Differences in Price Sensitivity, Overall Sample

Parameter	MODEL 1 Estimate	MODEL 2 Estimate	MODEL 3 Estimate	MODEL 4 Estimate	MODEL 5 Estimate	MODEL 6 Estimate	MODEL 7 Estimate	MODEL 8 Estimate
Intercept	0.923***	0.926***	0.940***	0.938***	0.923***	0.906***	0.917***	0.909***
Price	-0.723***	-0.683***	-0.635***	-0.724***	-0.722***	-0.903***	-0.772***	-2.021***
Income<40K	-0.018							0.011
40K≤Income<70	0.004							0.032
70K≤Income<100	-0.021							-0.009
Income≥40, no further info	0.0004							0.007
Income missing	-0.035							-0.045
Income ≥100K				(Reference category)				
<40*price	-0.356**							-0.099
(40-70)*price	-0.198*							-0.044
(70-100)*price	-0.254**							-0.159
≥40*price	0.002							0.127
miss*price	-0.086							0.179
≥100K*price				(Reference category)				
Aboriginal student		-0.037						0.009
Price*Aboriginal student		-0.696***						-0.658***

Parameter	MODEL 1 Estimate	MODEL 2 Estimate	MODEL 3 Estimate	MODEL 4 Estimate	MODEL 5 Estimate	MODEL 6 Estimate	MODEL 7 Estimate	MODEL 8 Estimate
Parent- High School or less			-0.002					0.050**
Parent- College			-0.034*					0.012
Parent- Missing			-0.049					0.020
Parent- University				(Reference category)				
Price*Parent High School or less			-0.311**					-0.100
Price*Parent College			-0.123					0.054
Price*Parent Missing			-0.037					0.073
Price*Parent University				(Reference category)				

>40 KM from University		0.003			-0.011
Price* >40 KM from University		-0.171			0.079
Female			0.031*		-0.008
Price*Female			0.294***		0.192**
Immigrant Origin				0.042**	0.009
Price*Immigrant Origin				0.200*	0.119
Physically Disabled	-0.077***				-0.053**
Price*Physically Disabled	-0.098				0.016
Grades < 70					-0.121***
Grades 70-79					(Reference category)
Grades ≥ 80					0.014
Price*Grades < 70					0.131
Price*Grades 70-79					(Reference category)
Price*Grades ≥ 80					0.340***
Long time horizon/patience					0.004***
Price*Long time horizon/patience					0.020***
Perceived Returns on Investment in University					0.003***
Price* PRoI-U					0.008**
Work ≥ 20 hrs/week					0.019
Work < 20 hrs/week					0.032*
Does Not Work					(Reference category)
Price* Work ≥ 20 hrs/week					-0.148
Price* Work < 20 hrs/week					-0.017
Price*Does Not Work					(Reference category)
Numeracy score					0.0002
Price* Numeracy score					0.0004
School Engagement Scale					-0.0006
Price*School Engagement					0.012

z-score: *P<0.10; **P<0.05; ***P<0.01 (School variables and Price*School interactions included, but not shown).

An interesting exception to the association between low income and heightened price sensitivity occurs among students with immigrant parents. Though such students are far more likely to be in a low-income family than those with Canadian-born parents, they are nevertheless significantly more accepting of grants and less price sensitive (Model 7), possibly because their parents are more likely to be university-educated than the parents of other low-income students. Indeed, once parental education and other variables are included (Model 8), the coefficients for Immigrant Origin and Price*Immigrant Origin are no longer statistically significant. Caution

should be exercised in interpreting these results, however, since the average effect of being of immigrant origin may conceal considerable heterogeneity. Previous research has found great variability in PSE participation among immigrant groups depending on country of origin (Abada, Hou, & Ram, 2008; Finnie & Mueller, 2009).

Some differences between groups cannot be fully explained by the model. For example, the Aboriginal student by price interaction coefficient hardly changes from Model 2 to Model 8. Even after accounting for factors such as income, parental education, grades, time preferences, perceived returns to university, and school engagement, Aboriginal students remain significantly more price-sensitive than others. For every 0.10 increase in price, the gap in demand for financial aid between Aboriginal students and otherwise similar students who do not identify as Aboriginal (at least according to the characteristics measured here) widens by 6.6 percentage points. The fact that price still matters much more for Aboriginal students who are otherwise identical, in terms of observed characteristics, to non-Aboriginal students suggests that characteristics we did not capture in our surveys may be more important than observed characteristics in explaining the difference. Price reductions would reduce the gap in demand for PSE financing between Aboriginal students and others, but knowing more about the unobserved characteristics underlying the gap may also help to design possible interventions that could reduce it even more.

The results for students reporting some form of physical disability are also striking, not because they show greater price sensitivity per se, but because they show a significantly (5.3 percentage point) lower demand for grants at all price points, even after accounting for differences in family income, parental education, time discounting, perceived returns to PSE, and school engagement. These results suggest that for this population price reductions would have a minimal effect, and that finding out more about unobserved characteristics underlying the discrepancy in demand for financing between disabled students and others would be of paramount importance in mounting an intervention strategy.

In addition, the model fails to fully account for sex differences, with girls remaining less price sensitive than boys even with the full set of covariates included in the model. The gap in

demand for PSE financing between male and female students who are otherwise identical in all measured characteristics widens by 1.9 percentage points for every 0.10 increase in price.

For the most part, similar results were found in the Ontario subsample (Table 5.2). Lower likelihoods of choosing grants over cash and/or higher price sensitivities are found among students from low-income families, those with less than university-educated parents, those with physical impairments, and boys. Unlike in the full sample, there are no differences between children of immigrants and others. Patience, grades, and perceived returns on investment in PSE come out again as important determinants of the probability of choosing a grant over cash and/or price sensitivity. Aboriginal students again continue to show more sensitivity to prices even when all other measured individual characteristics are taken into consideration — however, other subgroups do not. In contrast to the full sample, the difference between boys and girls in the Ontario subsample appears to be fully explained by individual characteristics such as grades, patience, and perceptions of PSE. Recall, however, that these results are to be treated with caution due to the limited size of the sample.

Table 5.2: Linear Probability Models, Showing Group Differences in Price Sensitivity, Ontario Subsample

Parameter	MODEL 1 Estimate	MODEL 2 Estimate	MODEL 3 Estimate	MODEL 4 Estimate	MODEL 5 Estimate	MODEL 6 Estimate	MODEL 7 Estimate	MODEL 8 Estimate
Intercept	0.952***	0.959***	0.997***	0.968***	0.959***	0.946***	0.953***	0.918***
Price	-0.544***	-0.578***	-0.520***	-0.619***	-0.623***	-0.784***	-0.629***	-2.075***
Income<40K	-0.049							0.021
40K≤Income<70	-0.025							0.038
70K≤Income<100	-0.039							-0.014
Income ≥40, No Further Info	-0.032							0.010
Income missing	-0.036							0.083*
Income ≥100K			(Reference category)					
<40*price	-0.533**							-0.228
(40-70)*price	-0.412**							-0.237
(70-100)*price	-0.235							-0.148
≥40*price	0.131							0.191
miss*price	0.089							0.183
≥100K*price			(Reference category)					
First Nations		-0.056						0.004
Price*First Nations		-0.762**						-0.719**

Parameter	MODEL 1 Estimate	MODEL 2 Estimate	MODEL 3 Estimate	MODEL 4 Estimate	MODEL 5 Estimate	MODEL 6 Estimate	MODEL 7 Estimate	MODEL 8 Estimate
Parent- High School			-0.066*					-0.026
Parent- College			-0.059**					-0.031
Parent- Missing			-0.197					-0.200
Parent- University			(Reference category)					
Price*Parent High School			-0.335					0.015
Price*Parent College			-0.116					0.162
Price*Parent Missing			0.520***					0.027
Price*Parent University			(Reference category)					
>40 KM from University					-0.031			-0.034
Price* >40 KM from University					-0.107			-0.216
Female						0.016		0.004
Price*Female						0.264*		0.050
Immigrant Origin							0.025	-0.015
Price*Immigrant Origin							-0.104	-0.133
Physically Disabled				-0.077*				-0.069
Price*Physically Disabled				-0.104				0.049
Grades < 70								-0.133***
Grades 70-79								(Reference category)
Grades ≥ 80								-0.045
Price*Grades < 70								0.323
Price*Grades 70-79								(Reference category)
Price*Grades ≥ 80								0.728***
Long time horizon/patience								0.002*
Price*Long time horizon/patience								0.023***
Perceived Returns on Investment in University								0.004***
Price* PRoI-U								0.002
Work ≥ 20 hrs/week								0.019
Work < 20 hrs/week								-0.026
Does Not Work								(Reference category)
Price* Work ≥ 20 hrs/week								0.227
Price* Work < 20 hrs/week								0.154
Price*Does Not Work								(Reference category)
Numeracy score								0.0001
Price* Numeracy score								0.0000
School Engagement Scale								0.002
Price*School Engagement								0.010

z-score: *P<.10; **P<.05; ***P<.01 (School variables and Price*School interactions included, but not shown).

Explaining group differences in price sensitivity

As mentioned in the discussion above, Model 8 reveals some potentially important variables that may account for differences in price sensitivity between students of high- and low-income backgrounds, and between students with high school- and university-educated parents. Grades, patience (i.e., a reduced tendency to discount future benefits), perceived returns to investment in PSE (perceived returns to university are shown, but similar results are obtained when perceived returns to college or trade school are substituted), and school engagement appear to be particularly important. Detailed analysis on high-achieving students may further illuminate the roles that some of these individual characteristics may play in explaining group differences based on parental income and education.

Table 5.3 compares high-achieving students (grades 80 per cent to 89 per cent[12]) from high- and low-income backgrounds. Even at high grade levels, price sensitivity appears to be linked to income, with higher income students choosing grants at a 90 per cent rate or higher at all price levels, while low-income students grant choice drops to 80 per cent at prices above 0.10.

Further examination reveals that, though students from high- and low-income backgrounds appear to value the monetary and non-monetary benefits of PSE equally (in fact, low-income students actually value the non-monetary benefits of college more), they view the costs associated with PSE quite differently. Low-income students scored significantly higher on the debt avoidance subscale (which includes questions such as “I’m hesitant to undertake a PSE because of the amount of debt I’m likely to accumulate by the time I graduate” and “The costs of PSE have become so high that they outweigh any future financial benefits”) as well as the identity anxiety subscale (which includes questions like “I’m hesitant to purse a PSE because it would create tensions with the people I grew up with”), regardless of whether the questions were asked about university, college, or trade school.

[12] Students with grades of 90 per cent or above are far more common among those from high-income backgrounds — thus including them would raise the average ability/achievement level much more for the high income group. Limiting the analysis to those with grades between 80 per cent and 89 per cent allows us to better compare students of roughly the same ability from low- and high-income backgrounds.

In addition, high-achieving, low-income students appear to have a significantly higher belief that they have options outside of PSE — that is, a greater tendency to agree with statements such as “Good jobs can be found without a PSE” and “You can learn enough about the real world without a PSE”. This tendency is especially evident with respect to perceptions of college and trade school, PSE pathways that students who want to avoid high debt loads might normally be expected to favour.

It is possible that these different attitudes about debt, identity, and alternatives to PSE can be traced back to parental educational attainment, since high-achieving, low-income students are far more likely than their high-income counterparts to have parents with no more than a high school education. In contrast, the majority of high-achieving, high-income students have at least one parent with a university degree.

Table 5.3: A comparison of those with grades of 80 per cent to 89 per cent from low (<40K, n=52) and high (>100K, n=89) income backgrounds

	Low-income	High-income	Gap (High-Low)
Grant choice (%), price=.30	78.9	89.9	11.0*
Grant choice (%), price=.15	82.7	92.1	9.4*
Grant choice (%), price=.10	92.3	95.5	3.2
Grant choice (%), price=.075	92.3	96.6	4.3
Grant choice (%), price=.025	96.2	96.6	0.4
Perceived returns to PSE (subscale scores)			
Monetary benefits – university	22.4	22.5	0.1
Non-monetary benefits – university	12.7	12.7	0
Debt avoidance – university	11.2	8.3	-2.9***
Identity anxiety – university	7.3	5.9	-1.4***
Indecision concerns – university	9.9	8.8	-1.1
Belief in alternatives to university	10.8	10.3	-0.6
Monetary benefits – college	19.6	19.0	-0.6
Non-monetary benefits – college	11.2	10.3	-0.9**
Debt avoidance – college	10.6	8.2	-2.4***
Identity anxiety – college	7.1	6.2	-0.9**
Indecision concerns – college	9.7	9.2	-0.5
Belief in alternatives to college	11.5	10.4	-1.1**
Monetary benefits – trades	19.1	19.7	0.6
Non-monetary benefits – trades	10.8	10.6	-0.2
Debt avoidance – trades	10.2	8.3	-1.9***

Identity anxiety – trades	7.3	6.3	-1.0**
Indecision concerns – trades	10.1	9.8	-0.3
Belief in alternatives to trade school	12.2	10.6	-1.5***

	Low-income	High-income	Gap (High-Low)
Patience (experimental score)	17.8	20.9	3.1
School engagement (scale score)	47.9	47.7	-0.2
Parents, no more than high school (%)	40.3	10.1	-30.2***
Parents, at least one college diploma (%)	28.9	23.6	-5.3
Parents, at least one university degree (%)	28.9	65.2	36.3***

t-test: *** P < 0.01; ** P < 0.05; * P < 0.10.

Table 5.4 compares high-achieving students (grades 80 per cent to 89 per cent) with high school- and university-educated parents. In contrast to income, at high grade levels parental education appears to have little bearing on price sensitivity, with no significant differences in financial aid demand between those with high school- and university-educated parents at any price level. Thus, the higher sensitivity to price increases observed in Model 3 among those with high school-educated parents appears to be largely accounted for by their generally lower grades.

Like low-income students, students with high school-educated parents perceive costs associated with PSE debt to be more of a burden than those with university-educated parents. However, differences in the debt avoidance subscale scores between those with high school- and university-educated parents are quite a bit smaller than those between low- and high-income students.

Unlike low-income students, identity anxiety does not appear to be a barrier for high-achieving first generation students. Furthermore, the greater costs perceived by first generation students are compensated for by perceptions of significantly greater monetary and non-monetary returns to a college level education. Thus, although high-achieving first generation students appear to be no less likely than their counterparts with university educated parents to seek financial aid for higher education, their greater concerns about debt (perhaps stemming from the fact that they

are far more likely to come from a low- rather than a high-income background) may lead them to favour college over the more expensive university option.

Table 5.4: A comparison of those with grades of 80 per cent to 89 per cent with high-school-educated parents (HS; n=72) and university-educated parents (UN; n=162)

	HS	UN	Gap (UN-HS)
Grant choice (%), price=.30	81.9	85.2	3.3
Grant choice (%), price=.15	93.1	88.3	-4.8
Grant choice (%), price=.10	94.4	93.8	-0.6
Grant choice (%), price=.075	97.2	93.8	-3.4
Grant choice (%), price=.025	97.2	95.7	-1.5
	HS	**UN**	**Gap (UN-HS)**
Perceived returns to PSE (subscale scores)			
Monetary benefits – university	22.6	22.6	0
Non-monetary benefits – university	12.7	12.8	0.1
Debt avoidance – university	9.8	8.4	-1.5***
Identity anxiety – university	6.5	6.1	-0.4
Indecision concerns – university	9.4	9.1	-0.3
Belief in alternatives to university	10.4	9.8	-0.6
Monetary benefits – college	19.9	18.8	-1.1**
Non-monetary benefits – college	11.3	10.5	-0.8**
Debt avoidance – college	9.3	8.0	-1.3***
Identity anxiety – college	6.4	6.5	0.1
Indecision concerns – college	8.5	9.3	0.8
Belief in alternatives to college	10.8	10.1	-0.7
Monetary benefits – trades	19.7	19.2	-0.5
Non-monetary benefits – trades	10.8	10.5	-0.3
Debt avoidance – trades	9.2	8.0	-1.2***
Identity anxiety – trades	6.8	6.8	0
Indecision concerns – trades	9.8	10.0	0.2
Belief in alternatives to trade school	11.1	10.5	-0.5
Patience (experimental score)	18.5	21.1	2.6
School engagement (scale score)	49.5	49.2	-0.3
Low income, < 40K (%)	29.2	9.3	-19.9***
High income, ≥ 100K (%)	12.5	35.8	23.3***

t-test: *** P < 0.01; ** P < 0.05; * P < 0.10.

To summarize the results on price sensitivity, in general, demand for financial aid declined with experimentally manipulated price, but more so for some groups than others. Greater price sensitivity was shown by those from low-income backgrounds, those with less-educated parents, Aboriginal students, and boys, while those who reported a physical condition that impeded their activity were not more price-sensitive per se, but they showed a reduced demand for student financial aid at every price level.

Various explanatory factors — especially grades, patience (i.e., a tendency not to discount future rewards), and perceptions of returns to PSE — account for most of the higher price sensitivity shown by students from lower-income families and from families with less-educated backgrounds. Further analysis shows that price sensitivity difference among those with high school- and university-educated parents are largely explained by grades. However, grades alone cannot account for the higher price sensitivity shown by low-income students, as income-based differences in price sensitivity occur even among those with high grades. Higher levels of price sensitivity among high-achieving low-income students can be traced back to higher perceived costs of PSE, especially costs associated with prospective debt load and identity anxiety. Interestingly, the type of PSE does not seem to matter much — among high achievers, perceived debt and identity-related costs seem to be more of a barrier for low-income students than for their high-income counterparts, regardless of whether the questions are asked about university, college, or trade school. Furthermore, among high achievers, low-income students are more likely to perceive alternative pathways to success besides PSE, particularly when the questions are asked about college and trade school. This implies that rather than turning towards lower cost PSE options because of concerns about debt load, some may turn away from PSE entirely, even though their high school grades suggest that they have the ability to pursue PSE.

For other groups, such as Aboriginal students, boys, and those with activity-impeding physical conditions, significant deficits in demand for financial aid and/or price sensitivity remain even after important factors such as grades, perceptions of PSE costs and benefits, etc. are accounted for. This suggests that the specific learning needs of these groups are generally not being accommodated within the prevailing educational culture, and that research should be

focused on heretofore unobserved factors that may explain gaps in demand for PSE between these groups and others.

VI. Loan Aversion

Definition and incidence of loan aversion

Having examined differences in price sensitivity among various groups of interest, our attention now turns to loan aversion. As discussed in the introduction, loan aversion is potentially quite distinct from price sensitivity; it may have different determinants and give rise to different access problems. Someone who is price sensitive may be willing to take on loans to finance PSE, provided the price is sufficiently low to make it a good investment; whereas someone who is loan averse may be willing to pay a higher price for PSE, but reluctant to borrow to do so, and thus have difficulty raising sufficient liquidity. This section will investigate two major questions. First, to what extent does loan aversion exist? Second, what are the characteristics of the loan averse — are under-represented groups more likely to be loan averse?

An indicator of loan aversion may be derived by taking advantage of the fact that some financing choices were presented as pure grants, while others were presented as loan/grant combinations (with the understanding, as in all choices, that the actual take-up of any part of the choice was purely optional[13]). Acceptance rates of stand-alone grants vs. grant-loan combinations may vary according to the financial assistance priorities of students as detailed below in Table 6.1.

Table 6.1: Expected demand for stand-alone grants (e.g., $1,000 grant vs. $300 cash) and grant/loan combinations (e.g., $1,000 grant + optional $1,000 loan vs. $300 cash), according to student financing priorities

Priority	Expected demand
Increase liquidity	Grant/loan combination > Stand-alone Grant
Reduce price	Grant/loan combination = Stand-alone Grant
Loan aversion	Grant/loan combination < Stand-alone Grant

[13] In fact, as of April 2010, of 30 students who claimed the loan/grant combinations they won in the random draw, 25 (83 per cent) claimed only the grant portion.

Thus, based on the typology above, loan aversion can be defined as accepting a grant only when it is stand-alone, not when it is offered in combination with a loan.[14] One can examine the rates of loan aversion for each of eight possible stand-alone grants and grant/loan combinations, as detailed in Table 6.2 below.

Table 6.2: Observed acceptance rates for stand-alone grants and grant/loan combinations, among those who chose at least one of the two

$1,000 stand-alone grant vs. $25; ($1,000 grant +$1,000 loan) vs. $25:

	Combination only	Both	Stand-alone grant only
Overall sample:	1.1%	92.0%	6.9%
Ontario subsample:	1.0%	93.8%	5.3%

$1,000 stand-alone grant vs. $25; ($1,000 grant +$1,000 ICR loan) vs. $25:

	Combination only	Both	Stand-alone grant only
Overall sample:	1.1%	94.3%	4.7%
Ontario subsample	1.7%	94.2%	4.1%

$2,000 stand-alone grant vs. $300; ($2,000 grant +$2,000 loan) vs. $300:

	Combination only	Both	Stand-alone grant only
Overall sample:	4.4%	86.6%	9.0%
Ontario subsample:	3.5%	87.9%	8.6%

$2,000 stand-alone grant vs. $300; ($2,000 grant +$2,000 ICR loan) vs. $300:

	Combination only	Both	Stand-alone grant only
Overall sample:	5.0%	87.3%	7.8%
Ontario subsample:	4.7%	88.1%	7.2%

$1,000 stand-alone grant vs. $300; ($1,000 grant +$1,000 loan) vs. $300:

	Combination only	Both	Stand-alone grant only
Overall sample:	5.4%	82.3%	12.3%
Ontario subsample:	5.8%	81.2%	13.0%

$1,000 stand-alone grant vs. $300; ($1,000 grant +$1,000 ICR loan) vs. $300:

	Combination only	Both	Stand-alone grant only
Overall sample:	5.9%	84.3%	9.8%
Ontario subsample:	6.4%	85.4%	8.1%

$1,000 stand-alone grant vs. $700; ($1,000 grant +$1,000 loan) vs. $700:

[14] Johnson et al. (2010), using the same data set, defined an experimental indicator of loan aversion according to the extent to which individuals are grant-seeking — that is, inclined to accept all grants offered, but no loans. However, as explained in more detail in Section IV, behaviour that appears to be grant-seeking may actually result from the taking of cash windfalls among those who do not require financial assistance. Grant-seekers are therefore likely to be a mix of those who are averse to loans and those who do not need loans.

	Combination only	Both	Stand-alone grant only
Overall sample:	14.5%	66.3%	19.3%
Ontario subsample:	13.4%	68.6%	18.0%

$1,000 stand-alone grant vs. $700; ($1,000 grant +$1,000 ICR loan) vs. $700:

	Combination only	Both	Stand-alone grant only
Overall sample:	11.5%	69.2%	19.2%
Ontario subsample:	10.2%	70.6%	19.3%

Among those who choose either a particular stand-alone grant or the grant/loan combination (but not both), it is more common to behave as though one is loan averse (i.e., choose the grant alone, but not in combination with a loan) than as though one is seeking to increase liquidity (i.e., choose the combination, but not the grant alone). This is true even if the repayment of the loan is made to be income-contingent (ICR loan).

Based on the definition above, roughly 5 per cent to 20 per cent of both the overall sample and the Ontario subsample is loan averse, depending upon the price of the offered grant. As price increases, a higher percentage of students are inclined to choose the stand-alone grant, but not the grant/loan combination. Since the loan is optional, those who simply want the grant appear to be behaving irrationally by choosing it only when it is offered as a stand-alone. One explanation may be a framing effect, in the sense that information that appears to be extraneous to the grant offer (i.e., the simultaneous offer of an optional loan) may in fact have an impact on the acceptance of the offer; in fact, the simultaneous presence of a loan offer may devalue the grant in the minds of some students. However, it is also possible that some students avoid the grant/loan combination for rational reasons, that is, they do not trust themselves not to take up the optional loan and are willing to pay a price to avoid the temptation.

The determinants of loan aversion

As illustrated in Table 6.3, under-represented groups show a significantly higher propensity to be loan averse for some decisions. For example, 18 per cent of Aboriginal students, 13 per cent of those with high school-educated parents, and 13 per cent of boys who chose a $2,000 grant over $300 cash did not choose the same grant when it was offered in combination with an optional $2,000 loan — compared to 9 per cent of the general population. Disabled and low-

income students also sometimes show significantly higher loan aversion rates than their non-disabled and high-income counterparts.

Table 6.3: Group differences in loan aversion rates, conditional upon having chosen a given grant

Decision	**Overall**	Inc < 40K	Aboriginal	Parents HS	Disabled	Univ > 40km	Boy
1000G > $25							
$25 > 1000G+1000L	**7.0%**	6.7%	6.8%	6.1%	7.3%	5.8%	8.3%
$25 > 1000G+1000ICR	**4.7%**	4.9%	6.8%	5.2%	5.2%	3.6%	4.7%
2000G > $300							
$300 > 2000G+2000L	**9.4%**	11.2%	17.7%**	13.3**	10.5%	10.3%	12.7***
$300 > 2000G+2000ICR	**8.2%**	7.5%	14.7%**	11.1%**	8.6%	6.0%	10.0*
1000G > $300							
$300 > 1000G+1000L	**13.0%**	16.8%**	16.0%	13.9%	14.8%	17.2%	16.1**
$300 > 1000G+1000ICR	**10.4%**	13.5%	18.0%*	10.3%	13.4%	10.1%	11.3%
1000G > $700							
$700 > 1000G+1000L	**22.5%**	26.1%	26.9%	17.5%	32.6%**	26.6%	24.2%
$700 > 1000G+1000ICR	**21.7%**	27.5%	26.9%	21.7%	27.9%	28.1%	23.1%

t-test: *** P < 0.01; ** P < 0.05; * P < 0.10.

A linear probability model was specified to investigate various factors that might help to explain group differences in loan aversion. The analysis was focused on individuals who chose at least one stand-alone grant from among the four in Table 6.3 (n=1120). Each of these individuals had a total of eight possible decisions to make about grant/loan combinations and grant/ICR loan combinations, for a total of 1120 x 8 = 8,960 decisions. Note that loan aversion is defined at the level of the decision — a participant may be loan averse for one decision, but not for another. Each decision was scored based on whether a student indicated loan aversion, so that decisions where both a stand-alone grant and a loan/grant combination were accepted were scored 0, while those where the stand-alone grant was accepted, but the combination was rejected were scored 1.[15] Thus the outcome variable being estimated is the probability of making

[15] Everyone who accepted at least one of the four stand-alone grants was included in the analysis; if an individual did not accept a particular grant, their score on the loan aversion indicator was left blank for that decision. As before, SAS *proc genmod* was used to obtain robust estimations of standard errors to correct for the potential clustering effect that may result from using repeated observations of the same individuals, and the heteroskedasticity that may result from specifying linear probability models.

a loan-averse decision, and the regression estimates show the characteristics of individuals who are more likely to make that decision. The results are shown below in Table 6.4 for both the overall sample and the Ontario subsample.

Table 6.4: Linear probability model showing characteristics that are related to loan aversion

	Full sample		Ontario subsample	
Parameter	No covariates[16]	All covariates[17]	No covariates	All covariates
Intercept		0.184***		0.299***
Price of stand-alone grant		0.269***		0.269***
Income < 40K	0.030	0.001	0.012	-0.036
40K ≤ Income < 70K	0.024	-0.009	0.038	-0.005
70K≤ Income <100K	0.004	-0.016	0.022	0.003
Income ≥ 100K		(Reference category)		
Income ≥ 40K, but otherwise missing	0.011	0.009	0.038	0.032
Income missing	0.016	0.018	0.179	0.191
Parents no more than High School	0.027*	-0.012	0.031	-0.012
Parents no more than College	0.044***	0.010	0.044*	0.013
Parent education missing	0.016	-0.045	0.085	-0.136
At least one parent University degree		(Reference category)		
Aboriginal students	0.046	0.018	0.004	0.012
> 40 Km from nearest university	0.011	0.028	0.042	0.034
Female	-0.028**	-0.018	-0.018	-0.024
Immigrant parents	-0.030**	-0.025	0.019	0.025
Physical condition impedes activity	0.026	0.009	0.042	0.027
Grades < 70		0.040**		0.073**
Grades 70-79		(Reference category)		
Grades ≥ 80		-0.003		0.011
Numeracy score		-0.0003**		-0.0006**
Long time horizon/patience		-0.003***		-0.004***
Perceived returns on investment in university scale		-0.002***		-0.002*

z-score: *P<.10; **P<.05; ***P<.01 (School variables included in model, but not shown).

[16] Estimates with no other covariates in the model except intercept and price.
[17] Estimates with all other covariates in the model.

The results show that overall some under-represented groups are slightly, but significantly more likely to make loan averse decisions. For example, in the full sample boys are about 3 percentage points more likely than girls to make a loan averse decision. In both the full sample and Ontario subsample, those with less than university-educated parents are about 3 to 4 percentage points more likely to make a loan averse decision. Interestingly, those with immigrant parents are significantly less likely to be loan averse in the full sample. Table 6.4 also illustrates that group differences in loan aversion are no longer statistically significant once other important variables, such as grades, numeracy, time preferences, and perceived returns on investment in university are included in the model.

In general, though some under-represented groups show a slightly greater tendency to loan aversion, the link is weaker and less clearcut than it is for price sensitivity. Loan aversion appears to be more a function of low numeracy, a tendency to discount future rewards, and perceptions that the costs of PSE may be high relative to its benefits. As shown in Table 6.5 below, those who showed at least one instance of loan aversion score on average 11 points lower in numeracy, as well as significantly lower on our experimental measure of time preference/patience, compared to those who never displayed loan aversion. Recall that numeracy had no link with demand for grants or price sensitivity; the fact that it seems to have an effect on loan aversion above and beyond that of grades suggests that discomfort with processing numerical information may play a role in the decision-making. In addition, loan aversion is linked with the tendency to be sceptical and indecisive about university, and to believe that it has fewer monetary and non-monetary benefits and greater costs associated with debt load.

Note also that the loan averse, as defined here, are not necessarily more price-sensitive than the norm. Demand for some grants is slightly, but significantly lower among those who are loan averse, but the rate at which demand drops with price is no different between those who make at least one loan averse decision and those who are never loan averse. In fact, in the Ontario subsample, those who are never loan averse appear to be slightly more price sensitive — as price rises from 0.025 to 0.30, their demand for grants drops by 20 percentage points, compared to 15 percentage points among those who are loan averse. This reinforces the point

made earlier that, despite some overlaps, the loan averse and the price sensitive represent distinct populations.

Table 6.5: A comparison of those who showed at least one instance of loan aversion and those who were never loan averse

	Overall sample		Ontario subsample	
	Loan averse (n=340)	Not loan averse (n=780)	Loan averse (n=102)	Not loan averse (n=240)
Grant choice (%), price=.30	73.5	77.8	81.4	80.4
Grant choice (%), price=.15	85.2	85.1	91.2	87.9
Grant choice (%), price=.10	89.4	93.3**	90.2	94.2
Grant choice (%), price=.075	90.9	93.1	94.1	96.3
Grant choice (%), price=.025	96.5	99.7***	96.1	100**
Numeracy (mean)	284	295***	283	297**
Patience (experimental score)	15.4	19.4***	15.7	19.6***
Perceived returns to PSE (subscale scores)				
Monetary benefits – university	21.6	22.3***	21.5	22.3**
Non-monetary benefits – university	12.2	12.5*	12.3	12.5
Debt avoidance – university	10.4	9.7***	11.0	9.7***
Identity anxiety – university	6.8	6.5	7.4	6.9
Indecision concerns – university	10.5	9.7***	10.6	9.7*
Belief in alternatives to university	10.7	10.6	10.5	10.4
Monetary benefits – college	19.4	19.5	19.2	19.9*
Non-monetary benefits – college	11.1	11.1	11.1	11.3
Debt avoidance – college	9.6	8.9***	10.1	9.5
Identity anxiety – college	6.7	6.6	7.4	7.2
Indecision concerns – college	9.4	9.1	9.5	9.3
Belief in alternatives to college	11.0	10.7	10.9	10.9
Monetary benefits – trades	19.6	19.6	19.2	19.7
Non-monetary benefits – trades	11.1	10.8	10.9	10.8
Debt avoidance – trades	9.3	8.8**	9.8	9.3
Identity anxiety – trades	6.9	7.0	7.5	7.4
Indecision concerns – trade school	10.0	9.8	10.2	9.8
Belief in alternatives to trade school	11.2	11.2	11.3	11.3

Significantly different from loan averse group, at ***P<0.01, **P<0.05, *P<0.10, t-tests.

As Table 6.5 shows, 340 out of 1,120 (30.4 per cent) of those who were “at risk” of being loan averse made at least one loan averse decision. Most of those who were classified as loan averse made more than one such decision — in fact, 197 (or 58 per cent) of the 340 participants

who were loan averse at least once made two or more loan averse decisions. Of these 197, 112 made a loan averse decision on at least half of the occasions they had an opportunity to do so. Therefore, a stricter definition of loan aversion, based on i) making a loan averse decision at least twice, and ii) doing so on at least half of one's opportunities results in a "hard" loan aversion rate of 112/1120, or 10 per cent (compared to the "soft" rate of 30 per cent, based on those who made at least one loan averse decision).

VII. Conclusions

This study sheds light on the roles that price sensitivity and loan aversion may play in the planning and decision-making process for PSE participation. Frenette (2007) and others have found that financial constraints are rarely a barrier for students who want to attend even the most expensive form of PSE, i.e., university. However, though the loan-based student financial assistance system may ensure that most of those who want to go on to PSE have the ability to pay for it, their willingness to pay is another matter. The "willingness to pay" concept encompasses two distinct PSE access barriers:

1) **Price sensitivity**, where weighing the benefits of PSE against its potential costs (especially debt load) may make some less willing to pay a given price for PSE, and more responsive to changes in price.
2) **Loan aversion**, where some may be reluctant to borrow to finance their PSE, even if they foresee positive returns.

There is an increasing interest among researchers (though, as yet, little empirical support) in the notion that price sensitivity and loan aversion may be more prevalent in certain groups, particularly groups that have been historically under-represented in PSE (such as those from low-income backgrounds, those who have parents with low educational attainment, Aboriginal students, disabled students, etc.).

This paper contributes to the sparse literature in this area. The price of PSE financial aid was experimentally manipulated by varying the amounts of immediate cash participants had to give up to choose various types and amounts of aid. Because demand for loans was likely influenced by both the experimentally set price and unobserved factors such as need for financial assistance and levels of parental support, the analysis was focused on non-repayable grants (the idea being that even those with little need of financial assistance would choose grants over much smaller amounts of cash if they intended on going to PSE). Even within the narrow price band of non-repayable aid investigated here, demand for financial aid declined with experimentally manipulated price, more so for some groups than for others.

In particular, greater price sensitivity was shown by those from low-income backgrounds, those with high school-educated parents, Aboriginal students, and boys. Those who reported a physical condition that impeded their activity were not more price-sensitive per se, but they showed a reduced demand for student financial aid at every price level. Because this study only looked at demand for student aid, it is unclear to what extent price sensitivity is linked with actual PSE participation — answering this question definitively would require following up with participants who gave their permission to be re-contacted, and tracing their PSE outcomes back to their experimentally measured responses to price. Nonetheless, there is considerable overlap between groups identified as low-participating in other studies and those identified as especially price sensitive in this study, suggesting that these groups may be under-represented in PSE in part because they are more to the cost of PSE.

It is possible to argue that there is an economic rationale underlying some of these group differences in price sensitivity. For example, there is evidence that the rate of return on PSE is higher for girls than boys, and has been increasing over time, which suggests that the gender gap in participation has been increasing because girls have been following the rewards (Christofides, Hoy, & Yang, 2009). However, it is also possible that much of the PSE decision-making among under-represented groups is based on underestimation of economic returns; indeed there is recent evidence that those with the lowest propensity for getting a post-secondary education stand to benefit the most from it (Brand & Xie, 2010). If so, then educational expansion for under-represented groups become even more urgent.

Given that price sensitivity may be one of the factors behind PSE participation gaps, the policy question then becomes to what extent interventions should be focused on reducing the price of PSE versus targeting the factors associated with higher price sensitivity. In this study, two groups — those from low-income backgrounds and those with high school-educated parents — show significantly lower demand for financial aid only at the relatively high price levels, which suggest that policy levers that reduce price, such as targeted grants, could work for these

groups.[18] However, it is unclear what level of price reductions may be necessary to close participation gaps.

Price reductions may not be the only option. When factors such as grades, perceptions of PSE costs and benefits, and tendency to discount the future are taken into account, price sensitivity differences between high- and low-income students, and between those with high school- and university-educated parents, vanish. This suggests that even with modest levels of price reductions, gaps in demand could be closed further by designing interventions to target some of these factors. It is often assumed that, because a low-income background may have long-term detrimental effects on factors critical to academic success such as ability to learn, policy makers who wish to reduce equity gaps in education are limited to choosing between early interventions focused on factors that affect cognitive development and price reductions. However, low income may also impact PSE participation through channels that are not necessarily linked to academic achievement. In the current study, the relationship between family income and price sensitivity remained intact even among high-achieving students, and could likely be traced to differing perceptions of returns to PSE.[19] High-achieving students from both high- and low-income backgrounds appear to value the monetary and non-monetary benefits of PSE equally. However, those from low-income backgrounds perceive the costs associated with prospective debt load and identity anxiety to be significantly higher. Perceptions of returns to PSE may be especially amenable to policy response. Interventions could be targeted at information constraints regarding the likely returns of investment in PSE. In a collective learning context, they may also help establish social norms and address concerns about identity issues.

For some groups, such as Aboriginal students, boys, and those with activity-impeding physical conditions, significant deficits in demand for financial aid remain even after important factors such as grades, perceptions of PSE costs and benefits, etc., are accounted for. This suggests that, at a fundamental level, the needs of these groups are not being accommodated within the

[18] The impact of getting a grant could potentially be examined by re-contacting participants, and comparing PSE access outcomes of those who, by luck of the draw, were awarded grants and those with similar levels of price sensitivity who were not awarded any of the grants they chose.

[19] This is consistent with mounting cross-national evidence that, even at high levels of ability, expectations of participating in PSE and participation rates are highly dependent on socioeconomic background (Frenette, 2007; OECD, 2007).

prevailing education culture, and that further research is needed to investigate some of the heretofore unobserved factors that may underlie the gaps in demand for PSE between these groups and others. Complex social and cultural barriers are likely to be particularly important for Aboriginal students. School districts that have produced better than expected outcomes for Aboriginal students have done so by collaborating with local Aboriginal communities, raising cross-cultural awareness, improving language and other support services, and incorporating Aboriginal content into curriculum (Richards, Hove, & Afolabi, 2008). In addition, since many Aboriginal students who pursue PSE rely primarily on non-repayable "band funding", that is funding available through programs operated by the department of Indian and Northern Affairs Canada, some may lack sufficient information on alternative funding options (Malatest & Stonechild, 2008), even though real levels of band funding have dropped by almost 10 per cent since 1997 (Berger & Parkin, 2008).

Besides price sensitivity, this study also shows experimental evidence for loan aversion, a phenomenon that had previously been investigated largely at the anecdotal level. Thirty per cent of our sample displayed at least one instance of accepting a grant but failing to accept the same grant when it was paired with an optional loan. Ten per cent made at least two such loan averse decisions and were loan averse on at least half the occasions they had to make such decisions. Though disadvantaged groups may be slightly more prone to this kind of loan aversion, in general, it appears to be more linked to relatively low numeracy, a tendency to discount future benefits, and doubt about the returns to PSE, especially university.

The relatively weak link between under-represented groups and loan aversion suggests that if policy responses targeted at price sensitivity succeed in getting more members of under-represented groups to invest in PSE, they may not necessarily be especially averse to borrowing to do so. On the other hand, the relatively high prevalence of loan aversion overall suggests a more general problem, i.e., substantial numbers of people who are otherwise receptive to PSE at a given price are reluctant to take on loans to finance their studies. As a result, a number of these individuals may still face significant liquidity constraints and choose not to pursue PSE.

An obvious policy response is to support a wider range of options for students to finance their PSE, for example cooperative education programs that allow students to earn employment income and academic credit simultaneously. It is also possible that interventions targeting information constraints and financial literacy/capability training may be effective in dealing with loan aversion, but interventions focused on framing student financial aid differently may be especially promising. For example, descriptions of student loans could focus more on their "hidden grant" aspect, that is the subsidization rate associated with keeping loans interest-free while the student is at school. Financial institutions actively and successfully target students with promotional statements about borrowing costs, while government student financial aid programs appear unappealing to a significant number of students, many of whom intend or even prefer to finance their education with credit cards or bank loans rather than government loans (Canada Millennium Scholarship Foundation, 2009). The fact that less than half of PSE students from low-income families participate in student aid programs means that these programs are not reaching many of those who might benefit from them the most.

Consideration could also be given to decoupling grants from the current need-based aid application system, whereby a student can only obtain a grant after first applying and qualifying for a loan (Canada Millennium Scholarship Foundation, 2009). The fact that a prospective student's first exposure to the financial assistance application process is, by default, a loan application may affect applicants' perceptions negatively (e.g., some may feel that they have to take a loan in order to be eligible for a grant, that grants are secondary to loans, or that grants must also be paid back eventually, etc.), especially among those who may be loan averse or debt avoidant to begin with. Thus, significant numbers of students who would ordinarily be interested in grants may be deterred from going through the loan application process that is currently required to access grants. Allowing students to apply for grants independently may, on the other hand, lead them to consider loans as a supplemental means of funding, once they have been reassured that the price of PSE has been reduced for them. These and other ideas could be the focus of follow-up studies targeted at decreasing both price sensitivity and loan aversion.

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