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Higher Education Quality Council of Ontario
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Willingness to Pay for Post-secondary Education Among Under-represented Groups

Executive Summary

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Social Research and Demonstration Corporation

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Introduction

Buoyed by occupational projections suggesting that the majority of future jobs will require some form of post-secondary education (PSE), policy makers continue to support the expansion and broadening of PSE participation in Canada — 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. To keep the supply of skilled workers at current levels, participation rates will have to keep climbing. As participation is already quite high among economically advantaged segments of the population, there is growing consensus that the best opportunity for growth may be among groups that are currently under-represented in PSE, such as students from low-income families, students with no history of postsecondary education in their families and Aboriginal students.

Under-represented groups face a series of complex and interrelated barriers that may hinder their participation in PSE. In this study, we focus on one of the least investigated types of barrier, namely financial barriers. Though the loan-based student financial assistance system may address issues of affordability and ensure that most qualified students have the ability to pay for PSE, their willingness to pay is another matter. An implicit assumption behind 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 either a) unwilling to invest in PSE because they perceive the costs to outweigh the benefits, or b) unwilling to finance their PSE with loans, even if they perceive the benefits to outweigh the costs. Thus willingness to pay implies overcoming two distinct PSE access barriers:

1. **Price sensitivity**, where weighing the benefits of PSE against its potential costs may make some less willing to pay a given price for PSE and more sensitive to changes in price.

2. **Loan aversion**, where some may be reluctant to borrow to finance their PSE, even if they foresee positive returns.

The research 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 — proposed 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.

Our principal research question is to what extent are higher price sensitivity and loan aversion more prevalent, and thus likely to act as barriers to PSE participation, among under-represented groups?

The participants

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). Table 1 briefly summarizes the numbers of participants in several groups of interest and by selected characteristics.

Table 1 Sample sizes for various groups of interest

Low income (family income < $40,000)	191
First generation students	262
Aboriginal students	111
Beyond commuting distance (> 40 km) from university	146
Physical condition that impairs activity	239
Immigrant parents	184
Boys	577

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. They include 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).

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.

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.

The decisions

The major distinguishing feature of the methodology first used by Johnson et al. (2010), and now here, is 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).

Examples of the types of choices participants made are illustrated in Figure 1 below.

Figure 1 Examples 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
Decision 126	▪ $300	▪ $1,000 grant

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.[1]

Each participant made a total of 22 financing decisions, illustrated in Table 2 below.

Table 2 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	$1,000G +$1,000L	$25	0.321*
115	Hybrid	$1,000G +$1,000L	$300	0.458
116	Hybrid	$1,000G +$1,000L	$700	0.658
117	Hybrid	$400G + $400L	$300	0.683
118	Hybrid	$2,000G + $2,000L	$300	0.383
119	ICR hybrid	$1,000G +$1,000L	$25	0.321
120	ICR hybrid	$1,000G +$1,000L	$300	0.458
121	ICR hybrid	$1,000G +$1,000L	$700	0.658
122	ICR hybrid	$400G + $400L	$300	0.683
123	ICR hybrid	$2,000G + $2,000L	$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

**In the table, this number corresponds to footnote[2].*

1 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.

2 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.

As illustrated in Table 2, 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 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 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. [3]

The experimental sessions in which students made decisions about 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. Forty-eight such decisions were made, 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. 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. In some cases, the risky option had the higher expected value; 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.

Altogether, each participant made 130 decisions (48 involving time preferences, 60 involving risk preference, and 22 involving educational financing). 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 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 decision.

In addition, students completed a numeracy assessment after making their decisions. 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, such as demographic characteristics, educational aspirations and expectations, parent education and income, school engagement, grades, student employment, perceived benefits and costs of different kinds of PSE, and a host of other variables.

Results: Price sensitivity

As discussed, 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. 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.

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 2.

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

Figure 2 Rates of choosing varying types and amounts of financial aid over $300 cash

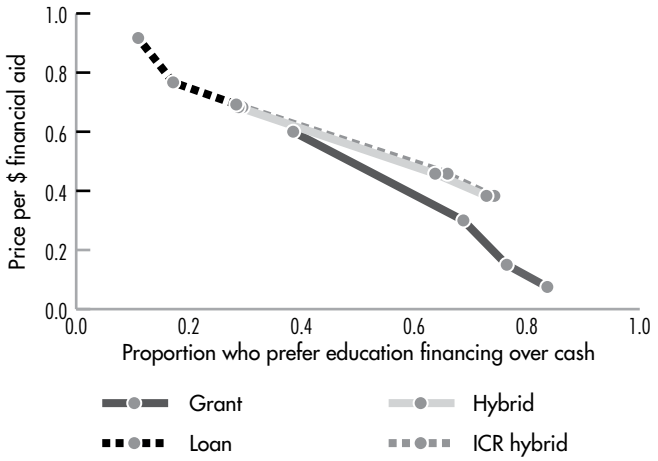


Figure 2 depicts a demand curve for financial aid resulting from choices made by all participants on decisions where the cash amount was $300 and the amount of financial aid varied. The graph indicates that the proportion of respondents who choose education over cash decreases as price is increased, no matter what the type of financial aid. Johnson et al. (2010) 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, demand for financial aid declines with price, showing that students are generally responsive to experimentally manipulated price.

We now explore in greater detail a further dimension of participants' responses: how price sensitivity varies between groups. 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? Our study investigates whether willingness to pay for financial aid drops off more sharply and at lower price points for some groups than others.

Prior to conducting the price sensitivity analysis, criteria for selecting a) the sample and b) the decisions on which to base the analysis were established. 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 the price sensitivity analysis.

As well, 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. More specifically, there is evidence that significant numbers of students from high-income families 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 — this evidence is reviewed more extensively and discussed in greater detail in the full report.

Hence, the price sensitivity analysis was limited to decisions involving lower-priced non-repayable grants, specifically those priced between 0.025 and 0.30 — a range within which one would expect windfall-taking to have the least effect on demand for financial aid, since even those with little need of financial assistance would likely choose grants over much smaller amounts of cash if they intended on pursuing 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 others. In particular, greater sensitivity to price was shown by students from low-income backgrounds, those with less educated parents, Aboriginal students, and boys. Students from immigrant origins were less price-sensitive than those with Canadian-born parents, while those who lived beyond easy commuting distance to university were neither more nor less price-sensitive than those who lived closer to a university. Those who reported a physical impairment that impeded their daily activities were not more price-sensitive per se, but had a lower demand for PSE financing at all price levels.

These results are illustrated in greater detail below, in Figures 3a and b to 9a and b. Figures 3a to 9a show observed group differences in proportion that chose grants over cash at each price level. Because these observed group differences may be attributable to differences in various characteristics such as grades, time preferences/discounting, perceived returns to PSE, etc., Figures 3b to 9b show what the predicted group differences in demand for grants at each price level would be if all other characteristics were equal between the groups. These predicted probabilities are derived from a regression analysis, described in greater detail in the full report.

Figure 3a Observed proportion of students from low-income families (< $40,000) and high-income families (> $100,000) who choose a grant over cash at different price levels

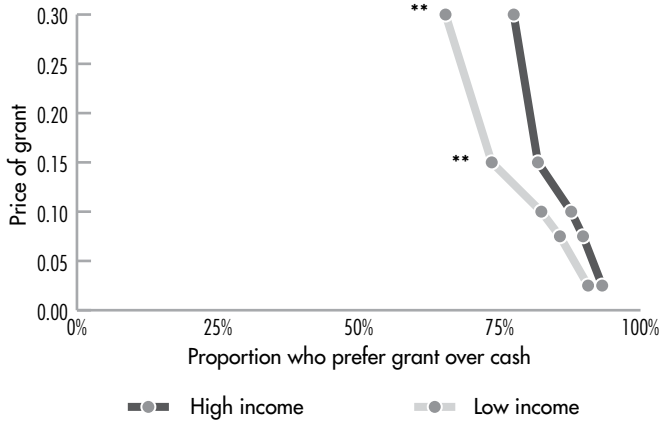
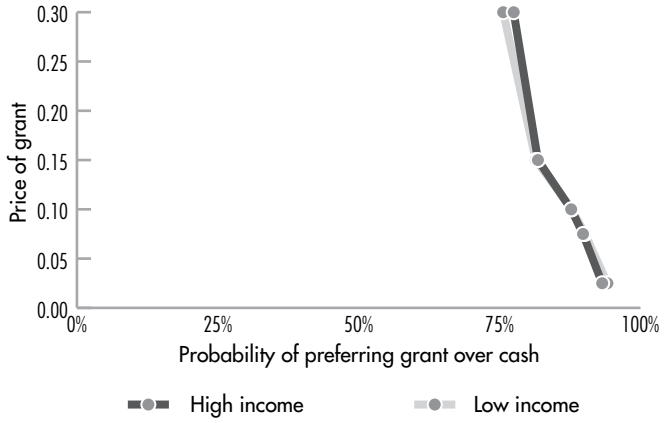


Figure 3b Predicted probability if all observed characteristics other than income were equal



Significantly different from high income at:
*** P < 0.01; ** P < 0.05; * P < 0.10.

Low-income students

Figures 3a and b compare those from low-income backgrounds (family income less than $40,000), with those from high-income backgrounds (family income $100,000 or more). Figure 3a shows that as the price increases from 0.025 to 0.30, the gap in demand for grants between high and low-income students widens from not significantly different than zero to 12 percentage points. These results indicate higher price sensitivity among those from low-income backgrounds — as price increases, their demand for grants declines at a steeper rate than that of high-income students.

However, Figure 3b shows that the difference in price sensitivity between those from high and low-income backgrounds is largely attributable to observed differences in characteristics such as parental education, grades, time discounting, and perceived returns on investment in PSE — on all of which those from low-income backgrounds show significant deficits compared to their high-income counterparts. When all observed group differences (except income) are equalized, the predicted probabilities that low-income students will choose grants over cash are no different than those of their high-income counterparts.

Which characteristics in particular lead to higher price sensitivity among low-income students? Further analysis on high-achieving students from high and low-income backgrounds shows that it is not a matter of grades. Even at high grade levels, price sensitivity is linked to income — high-income students choose 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.

These income-based differences in price sensitivity among high achievers are likely attributable to differing perceptions about returns to investment in PSE. Though high-achieving students from high and low-income backgrounds appear to value the monetary and non-monetary benefits of PSE equally, they view the costs associated with PSE quite differently — low-income students showing more concerns about debt load and tensions with their families and peers (identity anxiety). In addition, high-achieving, low-income students appear to have a significantly higher belief that they have options outside of PSE.

First generation students

Results for first generation students largely mirror those for low-income students, with the observed gap in proportion choosing grants between those with high school-educated parents and those with at least one university-educated parent widening as price increases from 0.025 to 0.30 (Figure 4a). Further analysis shows that the greater price sensitivity displayed by first generation students is largely attributable to their lower grades and perceptions of returns to investment in PSE. When grades and other observed characteristics are equalized, the differences in demand for grants disappear and in some cases are even reversed (Figure 4b). Thus, first generation students who are otherwise identical to students with more educated parents sometimes show an even higher demand for grants.

Figure 4a Observed proportion of first generation students and students with university-educated parents who choose a grant over cash at different price levels

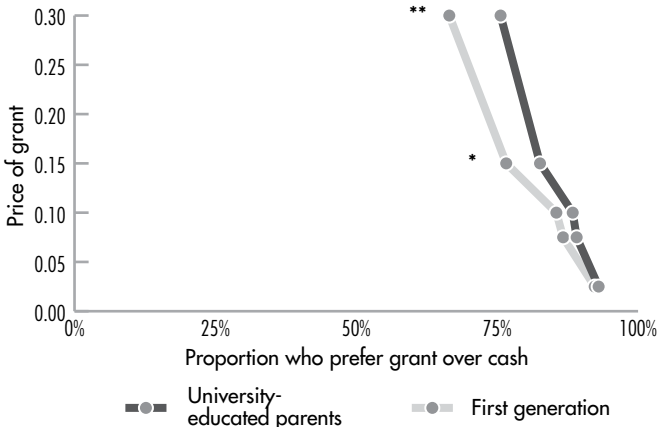
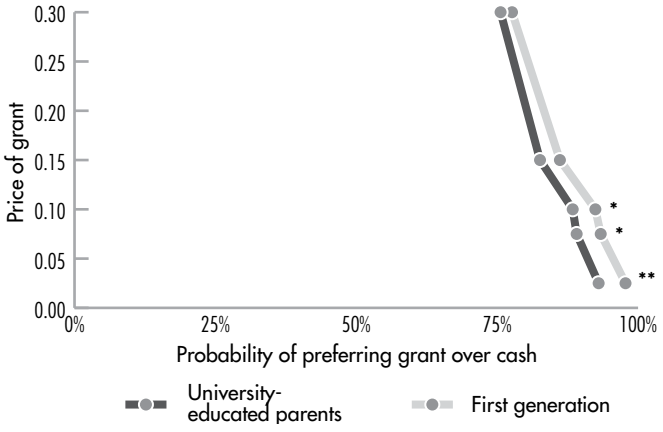


Figure 4b Predicted probability if all observed characteristics other than parental education were equal



Significantly different from high income at:
*** P < 0.01; ** P < 0.05; * P < 0.10.

Figure 5a Observed proportion of students with immigrant parents and students with Canadian-born parents who choose a grant over cash at different price levels

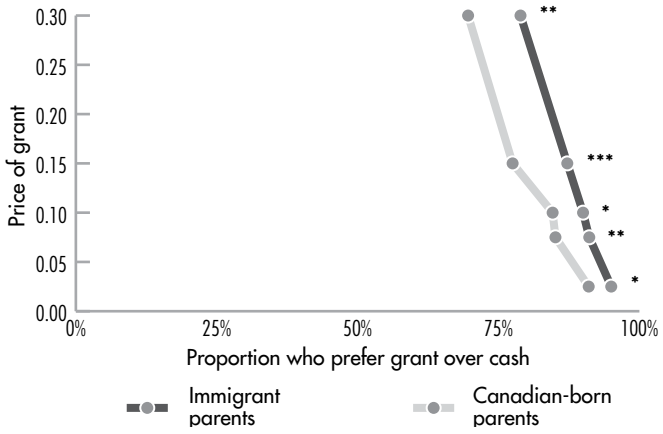
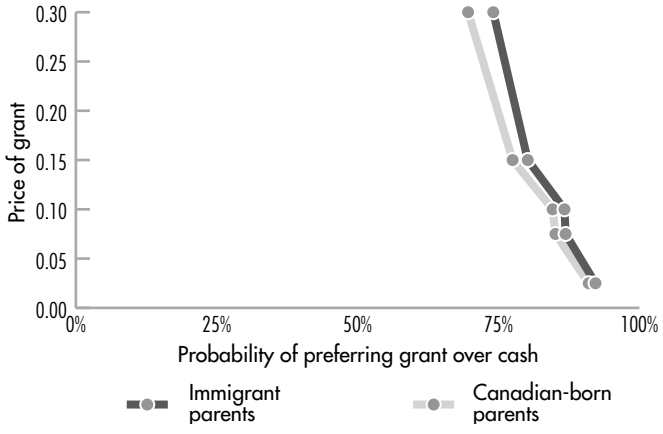


Figure 5b Predicted probability if all observed characteristics other than parental country of birth were equal



Significantly different from Canadian-born parents at:
*** P < 0.01; ** P < 0.05; * P < 0.10.

Students with immigrant parents

An interesting exception to the association between low income and heightened price sensitivity occurs among students with immigrant parents. Although such students are far more likely to be in a low-income family than those with Canadian-born parents, they nevertheless have a significantly higher demand for grants and are less price-sensitive (Figure 5a), likely because their parents are more likely to be university-educated than the parents of other low-income students. Indeed, students with immigrant parents tend to have higher grades, higher levels of school engagement and more favourable perceptions of returns to PSE. Once these factors are accounted for, students of immigrant origin no longer differ significantly in their demand for grants or price sensitivity, relative to otherwise identical students with Canadian-born parents (Figure 5b).

Aboriginal students

Price sensitivity among Aboriginal students is especially striking (Figure 6a). As the price increases from 0.025 to 0.30 cents per dollar, the gap in demand for grants between Aboriginal and non-Aboriginal students widens from 8 to 25 percentage points. Even after accounting for factors such as differences in income, parental education, grades, time discounting, perceived returns to university and school engagement, Aboriginal students remain significantly more price-sensitive than others. The predicted gap in demand for grants between Aboriginal students and students who are otherwise identical in all observed characteristics is 18 percentage points at the highest price level (Figure 6b). 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 didn't 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.

Figure 6a Observed proportion of Aboriginal students and non-Aboriginal students who choose a grant over cash at different price levels

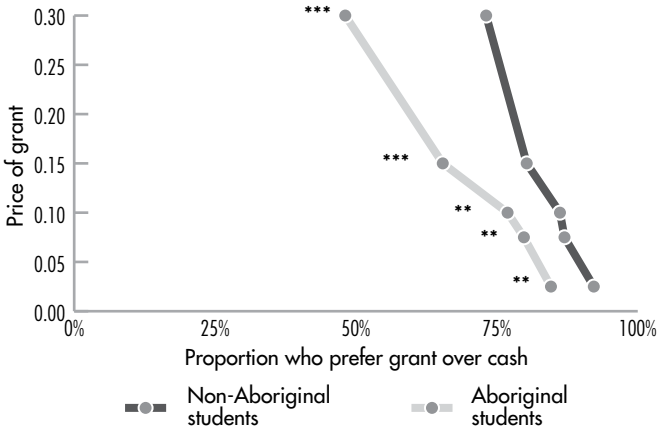
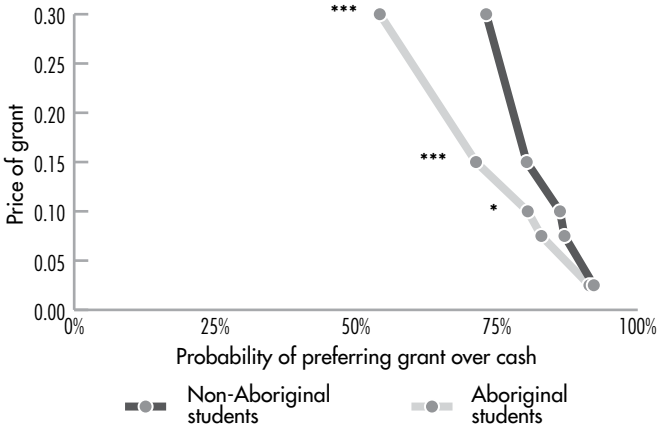


Figure 6b Predicted probability if all observed characteristics other than Aboriginal origin were equal



Significantly different from non-Aboriginal students at:
*** P < 0.01; ** P < 0.05; * P < 0.10.

Figure 7a Observed proportion of disabled students and non-disabled students who choose a grant over cash at different price levels

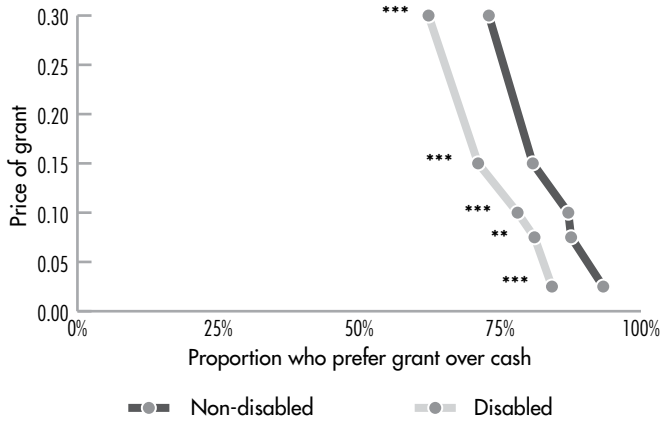
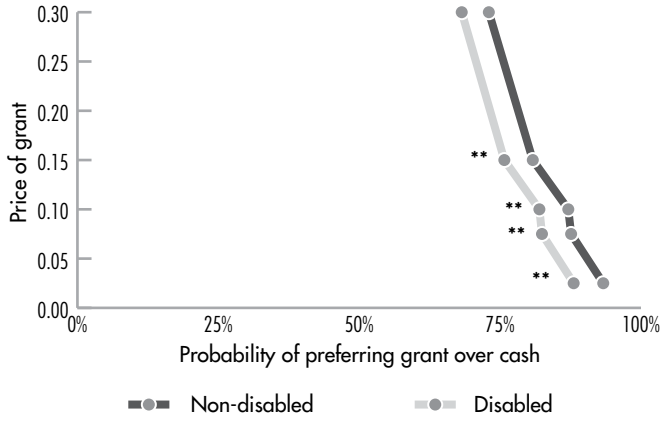


Figure 7b Predicted probability if all observed characteristics other than physical disability were equal



Significantly different from non-disabled at:
*** P < 0.01; ** P < 0.05; * P < 0.10.

Students with physical disabilities

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 lower demand for grants at all price points (Figure 7a), and for the most part continue to do so even after accounting for differences in family income, parental education, time discounting, perceived returns to PSE, and school engagement (Figure 7b). 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.

Boys

Sex differences reveal a pattern consistent with the PSE participation literature, i.e., greater observed price sensitivity, and significantly lower demand for financial aid at most price levels, among boys (Figure 8a). To some extent these differences are attributable to the fact that boys tend to have lower grades, greater time discounting, lower levels of school engagement, and less favourable perceptions of returns to investment in PSE. However, even when all of these observed characteristics are accounted for, boys still show greater price sensitivity, and a 5 percentage point lower demand for financing at the highest price point (Figure 8b).

Figure 8a Observed proportion of male students and female students who choose a grant over cash at different price levels

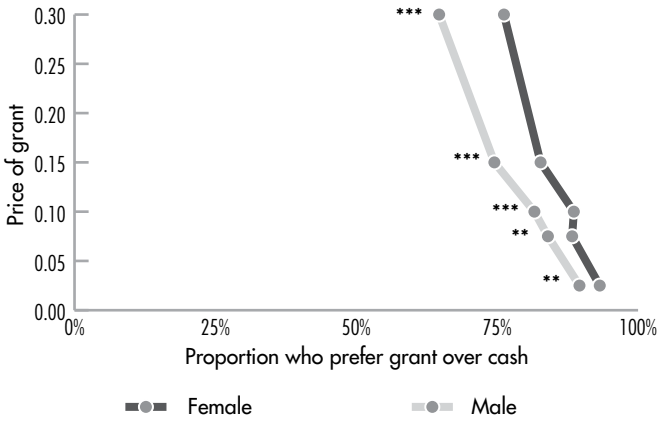
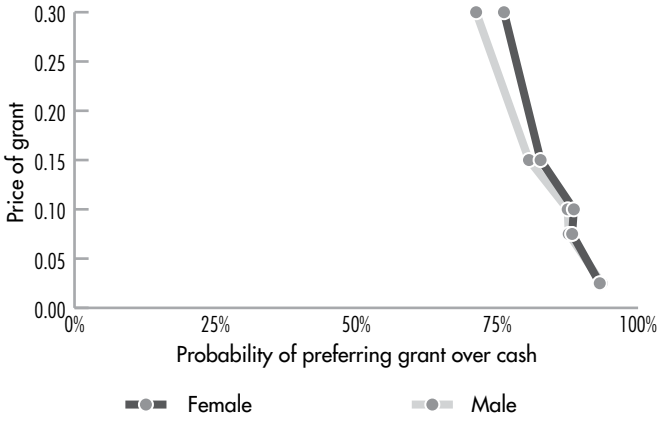


Figure 8b Predicted probability if all observed characteristics other than sex were equal



Significantly different from female at:
*** P < 0.01; ** P < 0.05; * P < 0.10.

Figure 9a Observed proportion of students living beyond 40 km from the nearest university and students living within 40 km of the nearest university who choose a grant over cash at different price levels

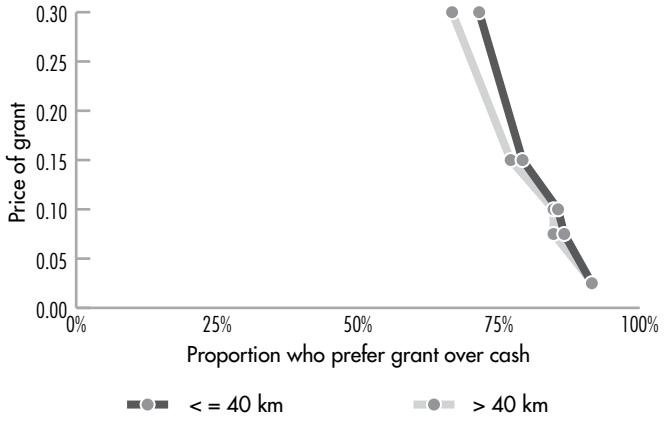
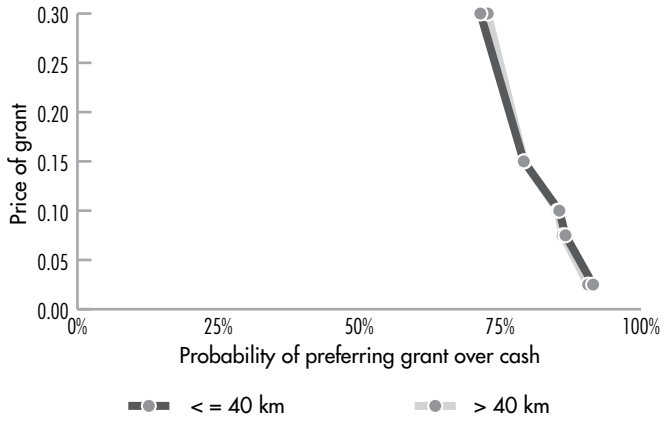


Figure 9b: Predicted probability if all observed characteristics other than distance from university were equal



Significantly different from those living = < 40 km to the nearest university at:
*** P < 0.01; ** P < 0.05; * P < 0.10.

Distance

Finally, the observed gap in demand for financing 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 (Figure 9a). Figure 9b shows that once differences in observable characteristics between students who live closer and further away from university are accounted for, their predicted probabilities of choosing grants over cash are basically identical at all price points.

Results: Loan aversion

Having examined differences in price sensitivity among various groups of interest, our attention now turns to loan aversion. As mentioned 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?

We derive an indicator of loan aversion by exploiting 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). The left-hand side of Table 3 shows groups of decisions that were used to derive loan- aversion rates; for each group of decisions, loan aversion was defined as accepting a grant when it is offered alone, but not when it is offered in combination with an optional loan or income-contingent repayment (ICR) loan. For example, those who chose the grant over cash for Decision 124 involving a choice between a $1,000 grant and $25 cash were "at risk" for being loan-averse twice, depending on whether they failed to accept the same grant when it was offered in combination with an optional loan (Decision 114) or an optional ICR loan (Decision 119).

Table 3 shows rates of loan aversion for each of four groups of decisions, both for the overall sample, and for various under-represented groups. As illustrated, 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

Table 3 Group differences in loan-aversion rates, conditional upon having chosen a given grant

Decision	Overall	Income < 40K	Aboriginal	Parents with HS or less	Disabled	Distance from univ. > 40 km	Boy
Of those choosing a $1,000G over $25 cash							
▪ Percentage choosing $25 cash over $1,000G+$1,000L	**7.0%**	6.7%	6.8%	6.1%	7.3%	5.8%	8.3%
▪ Percentage choosing $25 cash over $1,000G+$1,000ICR	**4.7%**	4.9%	6.8%	5.2%	5.2%	3.6%	4.7%
Of those choosing a $2,000G over $300 cash							
▪ Percentage choosing $300 cash over $2,000G+$2,000L	**9.4%**	11.2%	17.7%**	13.3%**	10.5%	10.3%	12.7%***
▪ Percentage choosing $300 cash over $2,000G+$2,000ICR	**8.2%**	7.5%	14.7%**	11.1%**	8.6%	6.0%	10.0*
Of those choosing a $1,000G over $300 cash							
▪ Percentage choosing $300 cash over $1,000G+$1,000L	**13.0%**	16.8%**	16.0%	13.9%	14.8%	17.2%	16.1%**
▪ Percentage choosing $300 cash over $1,000G+$1,000ICR	**10.4%**	13.5%	18.0%*	10.3%	13.4%	10.1%	11.3%
Of those choosing a $1,000G over $700 cash							
▪ Percentage choosing $700 cash over $1,000G+$1,000L	**22.5%**	26.1%	26.9%	17.5%	32.6%**	26.6%	24.2%
▪ Percentage choosing $700 cash over $1,000G+$1,000ICR	**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.

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

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 — when these factors are accounted for, group differences in loan aversion disappear.

More detailed analysis in the full report illustrates that those who showed at least one instance of loan aversion score lower in numeracy, as well as significantly lower on our experimental measure of time preference/patience, compared to those who never displayed loan aversion. 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. This reinforces the point made earlier that, despite some overlaps, the loan-averse and the price-sensitive represent distinct populations.

Among all participating students, 340 out of the 1,120 (30.4 per cent) who chose at least one stand-alone grant 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 a) making a loan-averse decision at least twice, and b) 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).

Why are some students loan-averse? Since the loan part of a hybrid financing offer 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. The fact that numeracy seems to have an effect on loan aversion suggests that discomfort with processing numerical information may play a role in the decision-making. 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.

Conclusions and policy implications

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. There is an increasing interest among researchers (although, 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 amounts of aid. Demand for financial aid declined with experimentally manipulated price, more so for some groups than 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 sensitive 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 PSE stand to benefit the most from it (Brand & Xie, 2010). If so, then educational expansion for under-represented groups becomes 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. 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. 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 observed 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 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. Although 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.

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 numbers 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 (less than $25,000 a year) participate in student aid programs means that these programs are not reaching many of those who might benefit from them 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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