Willingness to pay for PSE?

Using a high-stakes laboratory experiment to investigate the importance of price sensitivity and loan aversion

Boris Palameta et Jean-Pierre Voyer,
Social Research and Demonstration Corporation

SRDC SRSA
SOCIAL RESEARCH AND DEMONSTRATION CORPORATION | SOCIÉTÉ DE RECHERCHE SOCIALE APPLIQUÉE

Remerciements

- To our sponsors:
  - Canada Millennium Scholarship Foundation
  - Higher Education Quality Council of Ontario
- To Claude Montmarquette and Cathleen Johnston for experimental design and first phase of the analysis
- Thanks to Marc Frenette and Saul Scwhartz for reviews of early drafts

SRDC SRSA

The policy issue

- Efficiency and equity arguments for increasing PSE attainment
  - More jobs will require PSE:
    - Increase skilled immigration
    - Increase adult education
    - **Increase participation among underrepresented groups**
  - Underrepresented groups ⇨ ensuring equal opportunity to participate in higher education
- Ontario Budget 2010
  - "… the government's goal is to raise Ontario's post-secondary attainment rate [from 62 per cent] to 70 per cent."

SRDC SRSA

The problem

- Characteristics of the underrepresented are well-known
  - Low income, low parental education, Aboriginal, etc.
- Reasons for underrepresentation?
  - Non-financial
    - Ability, engagement, preparedness, likelihood of success
  - Financial
    - Ability to pay likely not a major issue ⇨ student loans address
    - Other potential barriers not well-understood ⇨ willingness to pay (price sensitivity)? Loan aversion?

SRDC SRSA

Research Question

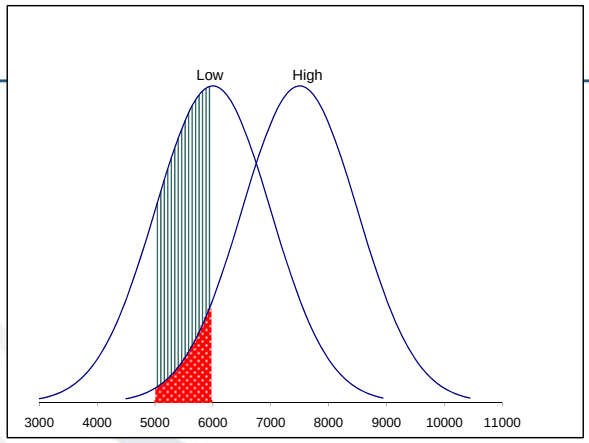
- To what extent do higher price sensitivity and loan aversion act as barriers to PSE participation among underrepresented groups?
  - Underrepresented groups:
    - Student from low income families
    - Students from families with no history of PSE (first generation students)
    - Aboriginal students
    - Students living with physical conditions impeding their activities
    - Student living beyond commuting distance from university
    - Boys

SRDC SRSA

Price sensitivity

- The PSE investment decision
  - How much would I earn now?
  - How much would I earn with a PSE?
  - At what cost would it be worthwhile to go? (willingness to pay threshold)
- Some evidence that underrepresented groups may have lower thresholds
  - Higher perceived costs, lower perceived benefits, lower likelihood of success

SRDC SRSA



Hypothetical "willingness to pay" thresholds for low- and high-income students

A reduction in price from 6,000 to 5,000 would result in a much smaller gain in PSE participation among high-income (red-shaded area) than among low-income (red + stripes).

Loan aversion

- A seemingly irrational aversion to borrowing, regardless of returns
  - Costs perceived as higher when they involve loans?
- Anecdotal accounts, not much evidence

Research Method

- High-stakes laboratory experiment
  - Decisions made by participants ⇨ real financial assistance for PSE vs. immediate cash
  - Price sensitivity: assess by looking at demand for PSE financing at various levels of experimentally-set price
  - Loan aversion: assess by looking at uptake of grants offered as stand-alones vs. in combination with (optional) loans

SRDC SRSA

Using experiments to measure preferences?

- Information used to design policy is mostly based on traditional empirical methodologies:
  - Outcome-based measures (multivariate analysis method)
  - Survey questions
  - Focus groups
- Experimental measures of preferences provide an additional source of information:
  - Potentially more accurate information
- Much more reliable than survey information or focus groups
  - Decisions involve real money; costly not to tell the truth
  - Anonymity further minimizes misinterpretation effects
  - Real, not hypothetical decisions
  - Control for situational variation by placing subjects in identical settings

SRDC SRSA

Sample

- 1,248 12th graders and CEGEP students
- 12 schools ⇨ Manitoba, Ontario, Quebec, and Saskatchewan

	N
Low income (< 40K)	191
Parent(s) no more than high school	262
Aboriginals	111
> 40 km from university	152
Physical condition that impairs activity	239
Immigrant parents	184

SRDC SRSA

Data sources

- Student survey (online)
  - Demographic info, aspirations, grades, perceptions of returns to PSE, employment, school engagement
- Parent survey (telephone or online)
  - Income, educational attainment, postal code
- Experimental measures (onsite)
  - Developed by CIRANO
  - Educational preferences, time preferences, risk preferences
- Numeracy assessment (onsite)
  - Developed and scored by Statistics Canada

SRDC SRSA

Experimental measures

- 48 time preference decisions
- 60 risk preference decisions
- 22 education financing vs. cash decisions
- One decision to be chosen at random, and honoured
  - Potentially high stakes, incentive to reveal true preference for each decision

SRDC SRSA

Time Preferences

NOTE TO PARTICIPANTS:

- The first series of choices are offers of money at different dates. Choice A is always closer to the present than Choice B.
- If one of these decisions is picked with your random draw at the end of today's session, the money will be paid to you by cheque on the promised date.

SRDC SRSA

Example of Time Preference Decision

You must choose A or B:

Choice A	Choice B
 $75 One week from today	 $87.50 One week and one month from today

Decision 12 ☐ $75 in one week ☐ $87.50 in one week and one month

The additional **$12.50** represents the money you would have earned in a savings account for one month at **200%** annual interest.

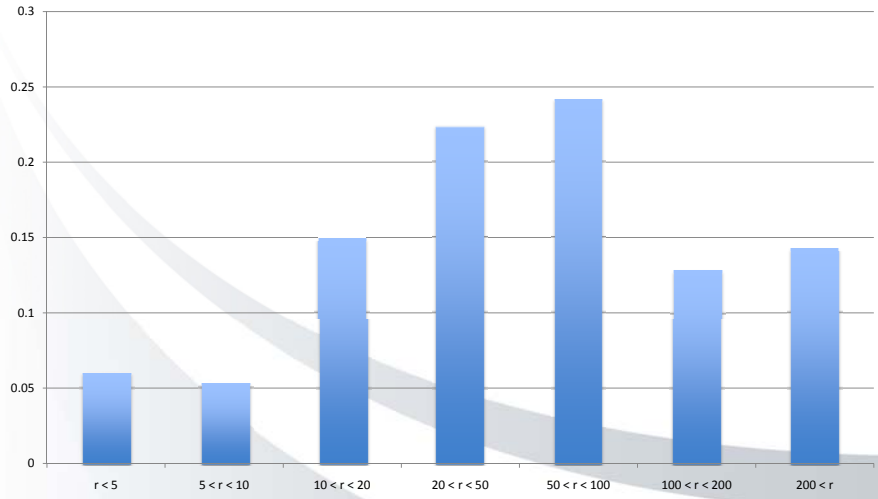
SRDC SRSA

Time Preferences

Time of $75 Earlier Payment	Annualized Rate of Return (%)	Later Payment Amount	
		One Month Investment	One Year Investment
tomorrow	5	75.31	78.75
One Week	10	75.63	82.50
One Month	20	76.25	90
3 Months	50	78.13	112.50
	100	81.25	150
	200	87.50	225

SRDC SRSA

Proportion of Participants Willing to Save

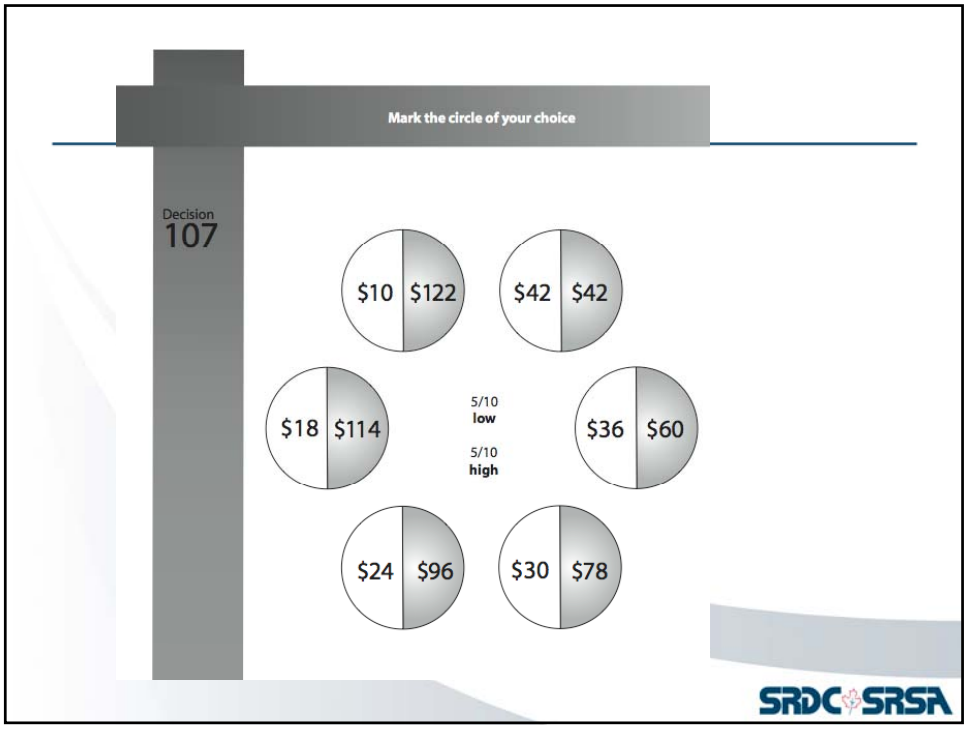


SRDC SRSA

Risk Preferences

- All Graphical Representations
- Two Basic Measures
  - Holt/Laury
    - 10 binary decisions
  - Eckel Grossman
    - 1 decsion chosen from SIX 50/50 gambles
  - (Binary Version of Eckel Grossman)

SRDC SRSA



Experimental measures: Examples of education financing vs. cash decisions

You must choose A or B:

	CHOICE A	CHOICE B
	$$ one week from today	A GRANT for FULL-TIME Education or Training
Decision 112	☐ $300	☐ $1000 GRANT
Decision 113	☐ $300	☐ $4000 GRANT

SRDC SRSA

Types of financial aid offered

- Grants ($500-$4000)
- Loans ($1000-$4000)
- Half grant, half loan hybrids ($800-$4000)
  - In some cases, the loans are income contingent
- In each case, the alternative is varying amounts of cash ($25-$700)

Definition of price

- Cost per dollar of financial aid
- For grants, it is simply the amount of cash given up per dollar of grant
  - E.g. $300 cash/$1000 grant = 0.30
- For loans, it is: (cash given up + loan amount deflated over 5 ½ yrs. – subsidized interest over 5 ½ yrs.)/Amount of the loan

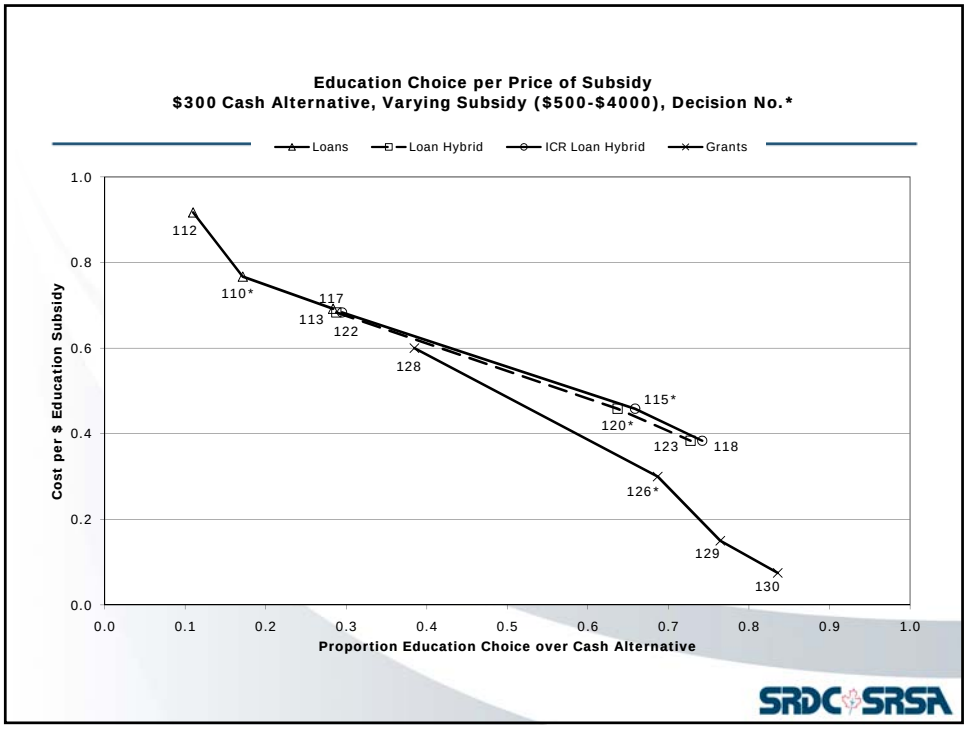
Education Choices

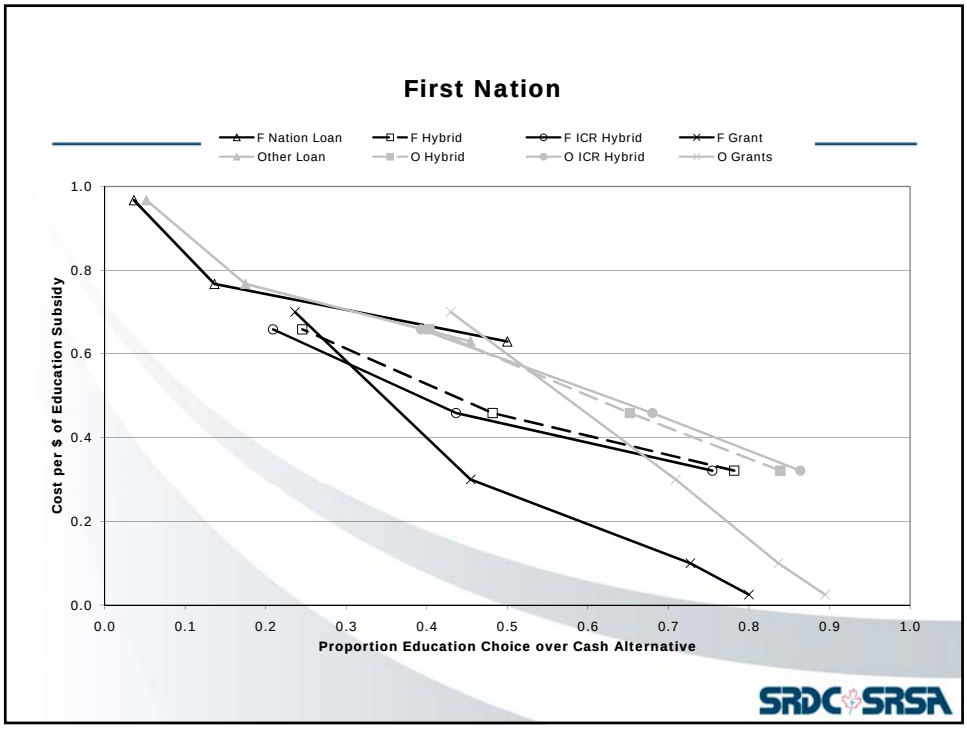
Decision Number	Type of Subsidy	Maximum Subsidy Amt.	Cash Alternative	Cost per $ Edu Subsidy	Proportion take-up
109	Loan	$2000	$25	0.629	0.458
110	Loan	$2000	$300	0.772	0.172
111	Loan	$2000	$700	0.972	0.051
112	Loan	$1000	$300	0.917	0.110
110*	Loan	$2000	$300	0.772	0.172
113	Loan	$4000	$300	0.692	0.284
114	Hybrid	$2000	$25	0.321	0.834
115	Hybrid	$2000	$300	0.458	0.637
116	Hybrid	$2000	$700	0.658	0.390
117	Hybrid	$1000	$300	0.611	0.288
115*	Hybrid	$2000	$300	0.458	0.637
118	Hybrid	$4000	$300	0.383	0.728

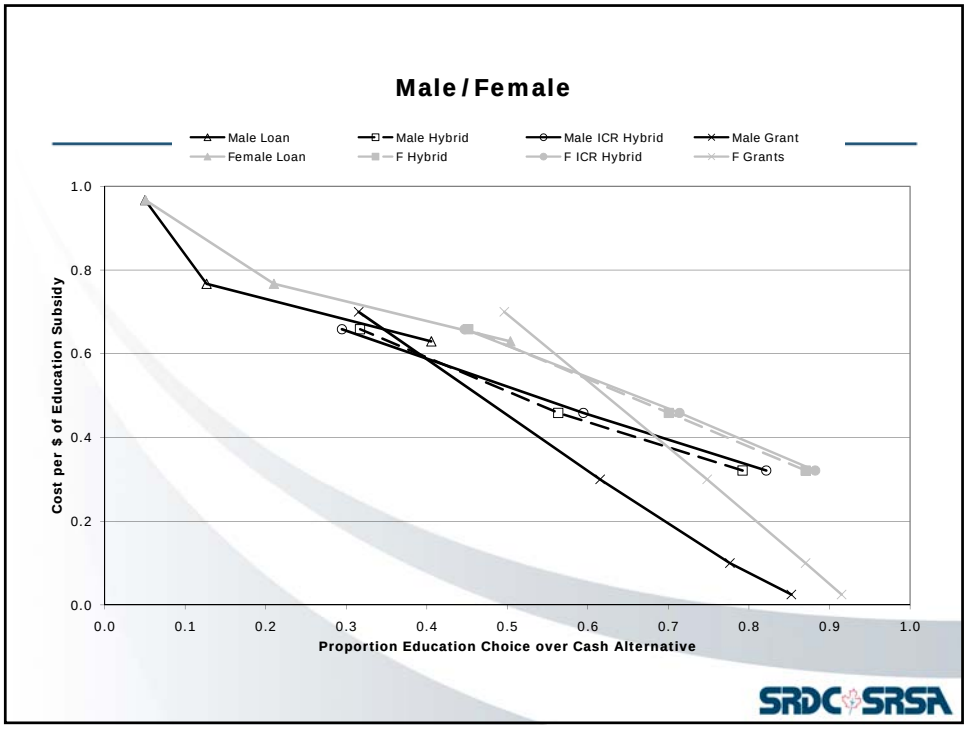
SRDC SRSA

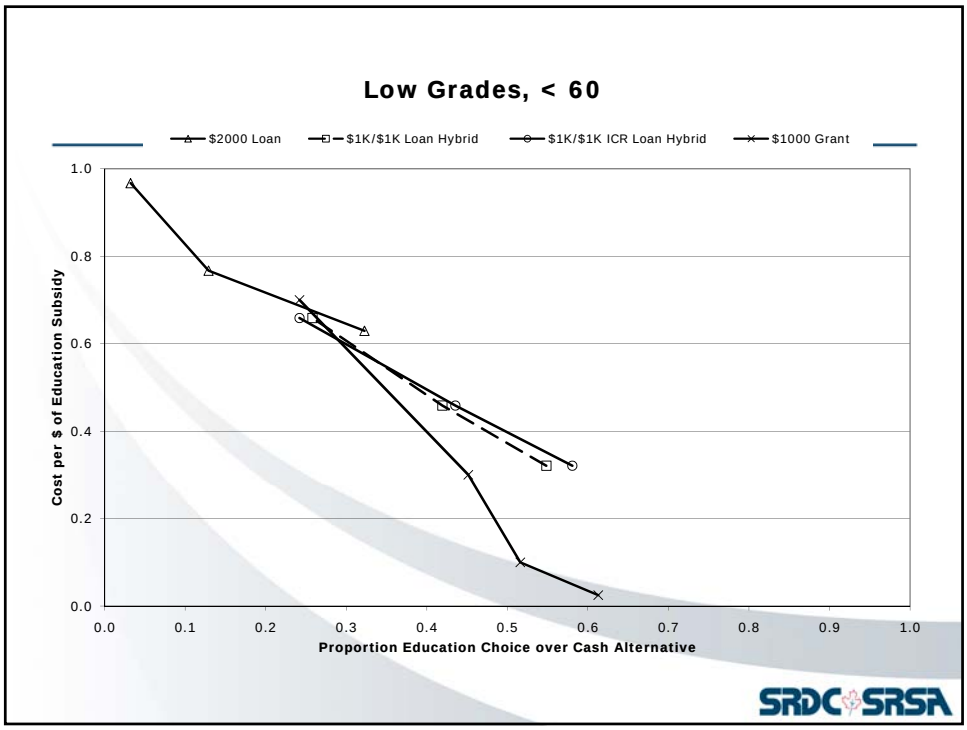
Education Choices

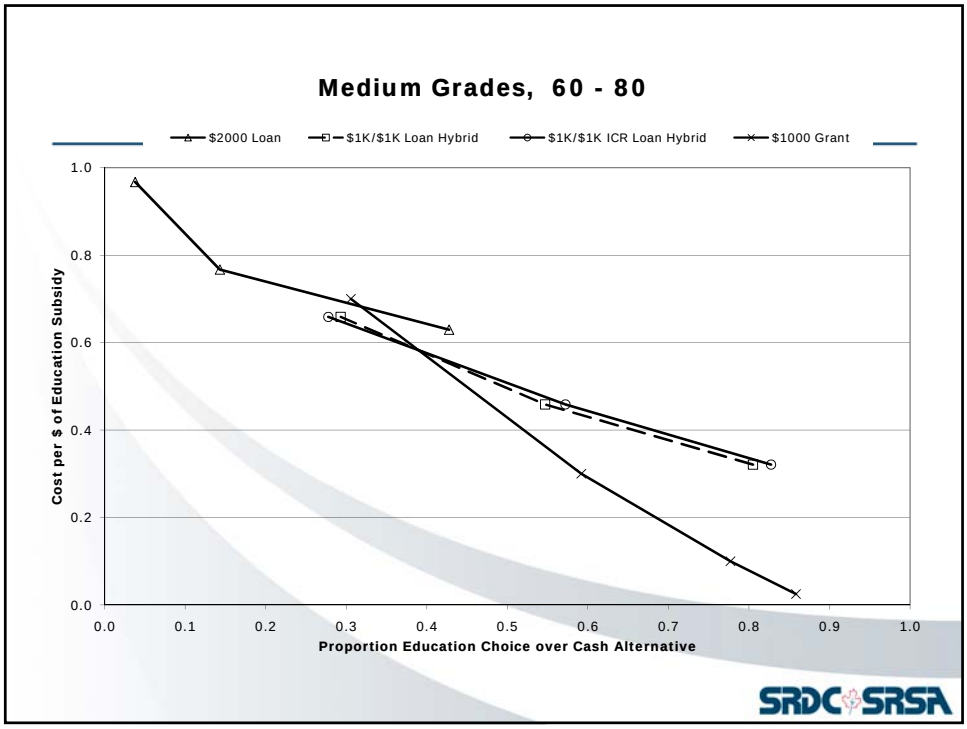
Decision Number	Type of Subsidy	Maximum Subsidy Amt	Cash Alternative	Cost per $ Edu Subsidy	Proportion take-up
119	ICR Hybrid	$2000	$25	0.321	0.854
120	ICR Hybrid	$2000	$300	0.458	0.659
121	ICR Hybrid	$2000	$700	0.658	0.377
122	ICR Hybrid	$1000	$300	0.611	0.295
120*	ICR Hybrid	$2000	$300	0.458	0.659
123	ICR Hybrid	$4000	$300	0.383	0.742
124	Grant	$1000	$25	0.025	0.886
125	Grant	$1000	$100	0.100	0.823
126	Grant	$1000	$300	0.300	0.687
127	Grant	$1000	$700	0.700	0.413
128	Grant	$500	$300	0.600	0.385
126*	Grant	$1000	$300	0.300	0.687
129	Grant	$2000	$300	0.150	0.764
130	Grant	$4000	$300	0.075	0.836

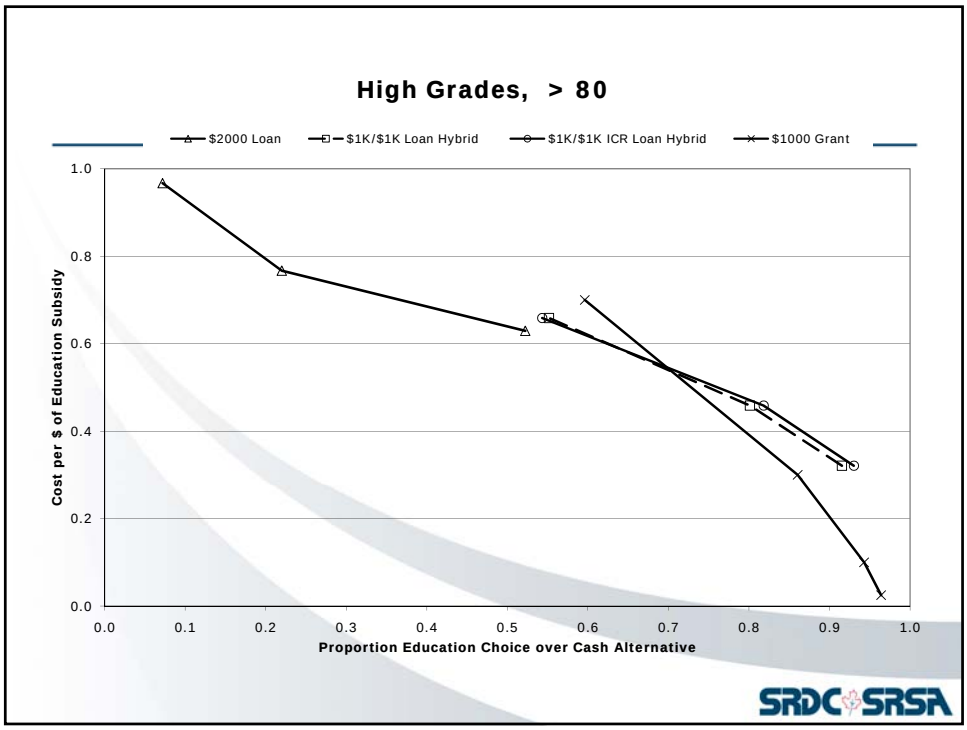

Education Choice per Price of Subsidy
$300 Cash Alternative, Varying Subsidy ($500-$4000), Decision No.*
Loans
Loan Hybrid
ICR Loan Hybrid
Grants
Cost per $ Education Subsidy
Proportion Education Choice over Cash Alternative
112
110*
117
113
122
128
115*
120*
123
118
126*
129
130
SRDC SRSA

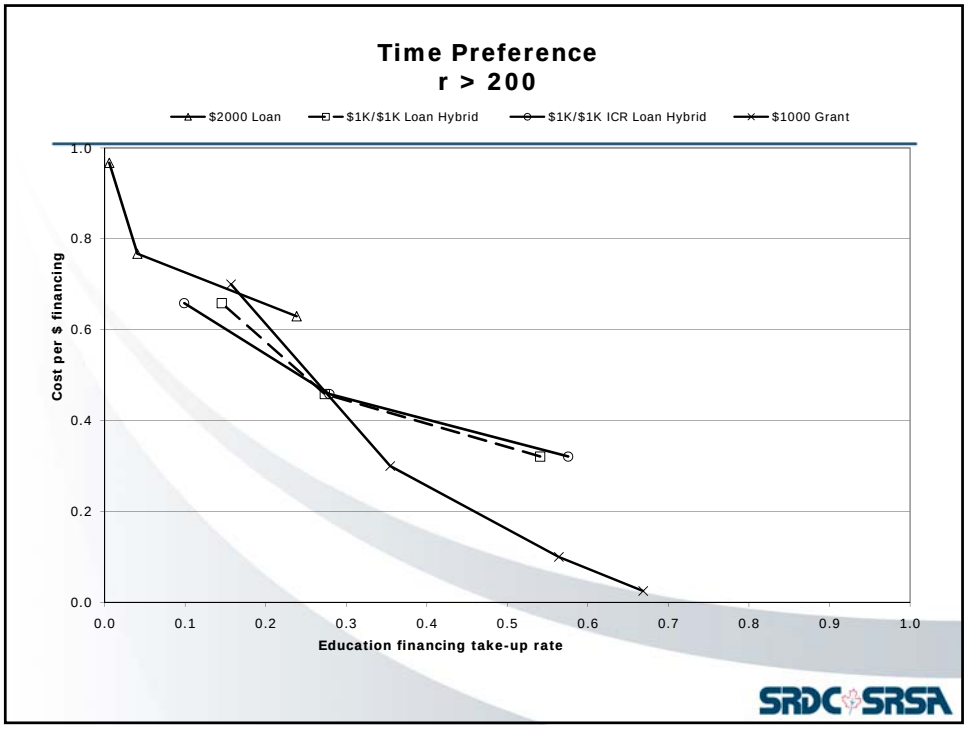

First Nation
F Nation Loan
F Hybrid
F ICR Hybrid
F Grant
Other Loan
O Hybrid
O ICR Hybrid
O Grants
Cost per $ of Education Subsidy
Proportion Education Choice over Cash Alternative
SRDC SRSA

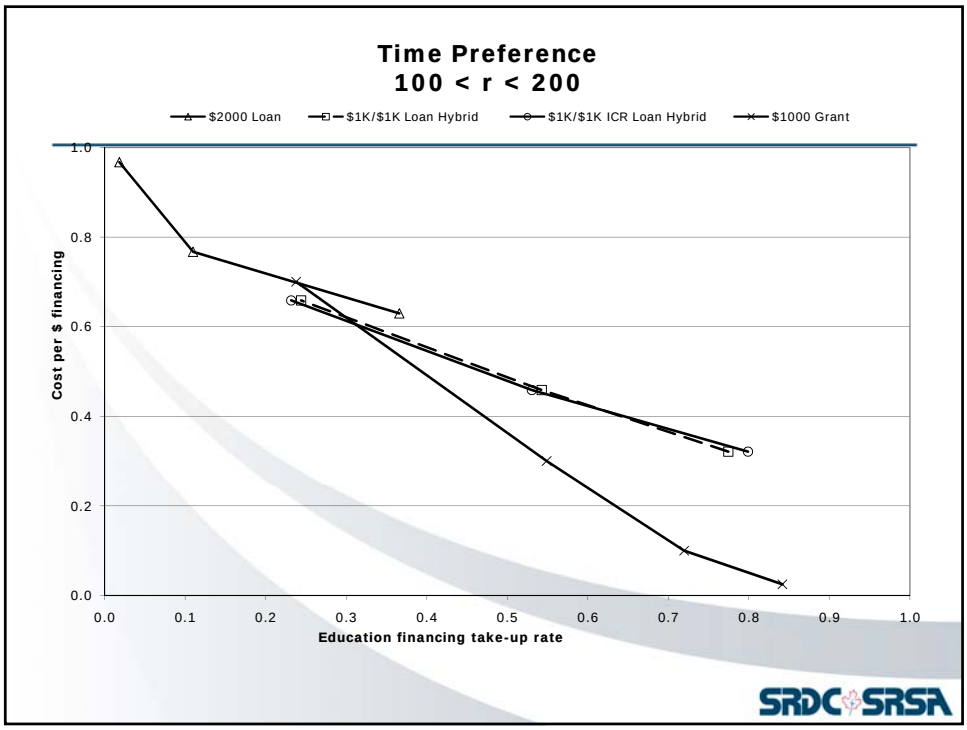

Male / Female
Male Loan
Male Hybrid
Male ICR Hybrid
Male Grant
Female Loan
F Hybrid
F ICR Hybrid
F Grants
Cost per $ of Education Subsidy
Proportion Education Choice over Cash Alternative
0.0
0.2
0.4
0.6
0.8
1.0
0.1
0.3
0.5
0.7
0.9
SRDC SRSA

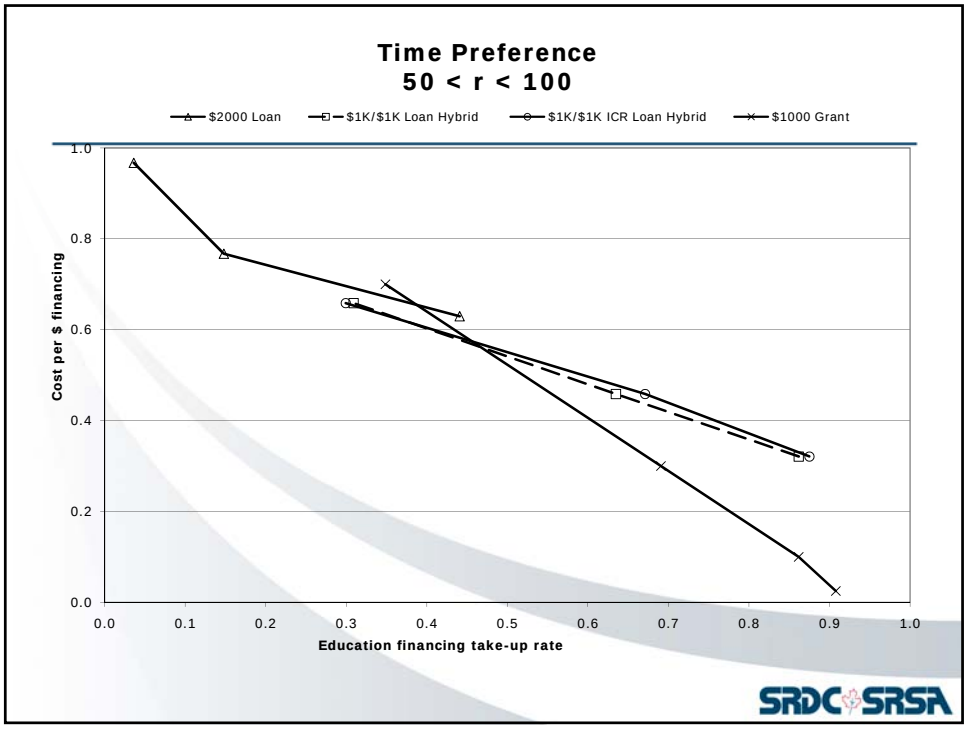

Low Grades, < 60
$2000 Loan
$1K/$1K Loan Hybrid
$1K/$1K ICR Loan Hybrid
$1000 Grant
Cost per $ of Education Subsidy
Proportion Education Choice over Cash Alternative
0.0
0.2
0.4
0.6
0.8
1.0
0.1
0.3
0.5
0.7
0.9
SRDC SRSA

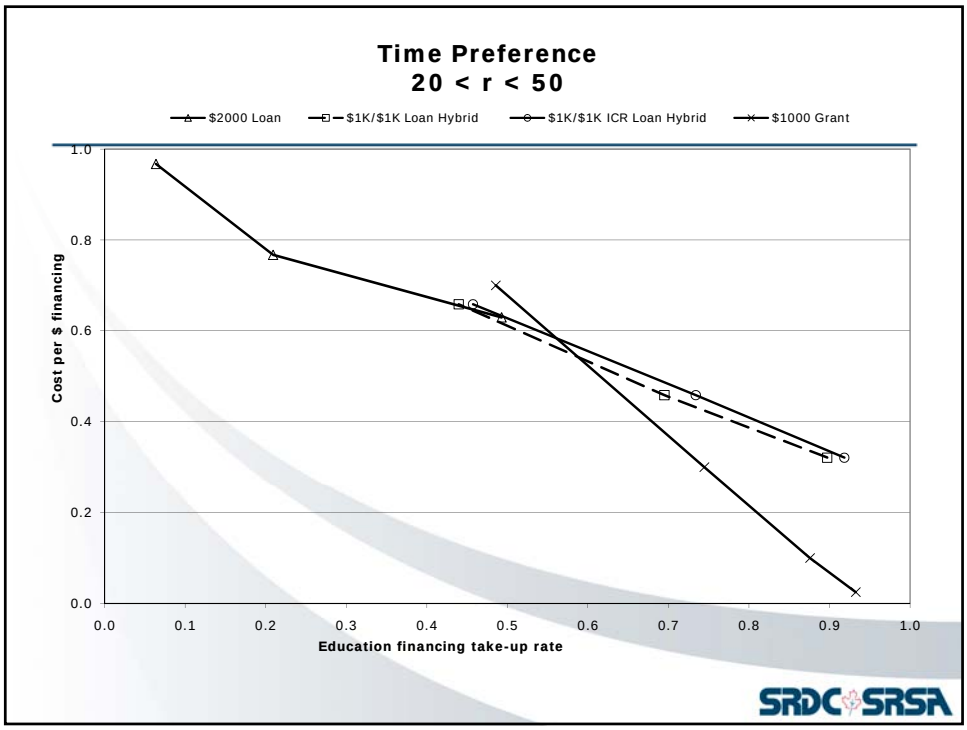

Medium Grades, 60 - 80
$2000 Loan
$1K/$1K Loan Hybrid
$1K/$1K ICR Loan Hybrid
$1000 Grant
Cost per $ of Education Subsidy
Proportion Education Choice over Cash Alternative
0.0
0.2
0.4
0.6
0.8
1.0
0.1
0.3
0.5
0.7
0.9
SRDC SRSA

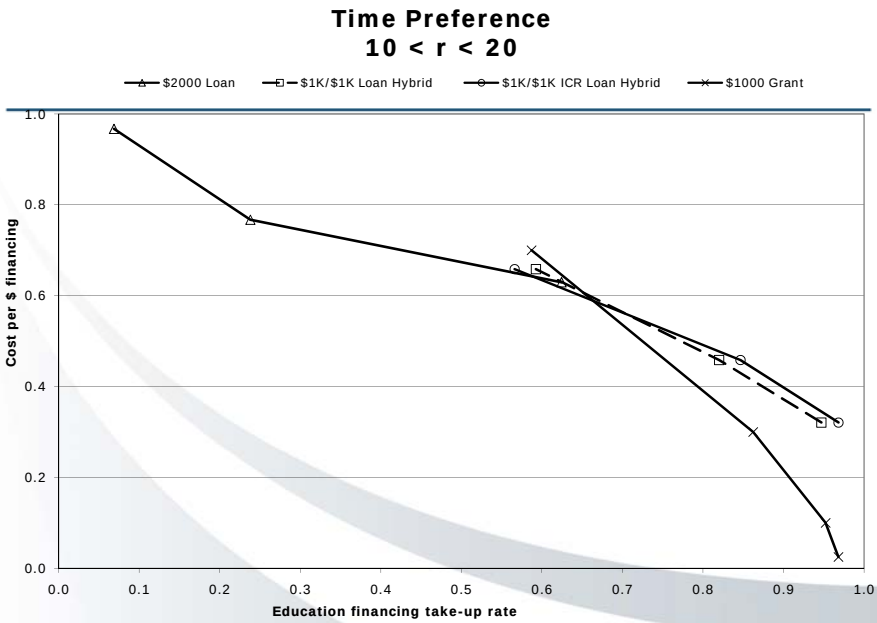

High Grades, > 80
$2000 Loan
$1K/$1K Loan Hybrid
$1K/$1K ICR Loan Hybrid
$1000 Grant
Cost per $ of Education Subsidy
Proportion Education Choice over Cash Alternative
0.0
0.2
0.4
0.6
0.8
1.0
0.1
0.3
0.5
0.7
0.9
SRDC SRSA


Time Preference
r > 200
$2000 Loan
$1K/$1K Loan Hybrid
$1K/$1K ICR Loan Hybrid
$1000 Grant
Cost per $ financing
Education financing take-up rate
0.0
0.2
0.4
0.6
0.8
1.0
0.1
0.3
0.5
0.7
0.9
SRDC SRSA


Time Preference
100 < r < 200
$2000 Loan
$1K/$1K Loan Hybrid
$1K/$1K ICR Loan Hybrid
$1000 Grant
Cost per $ financing
Education financing take-up rate
0.0
0.2
0.4
0.6
0.8
1.0
0.1
0.3
0.5
0.7
0.9
SRDC SRSA


Time Preference
50 < r < 100
$2000 Loan
$1K/$1K Loan Hybrid
$1K/$1K ICR Loan Hybrid
$1000 Grant
Cost per $ financing
Education financing take-up rate
0.0
0.2
0.4
0.6
0.8
1.0
0.1
0.3
0.5
0.7
0.9
SRDC SRSA


Time Preference
20 < r < 50
$2000 Loan
$1K/$1K Loan Hybrid
$1K/$1K ICR Loan Hybrid
$1000 Grant
Cost per $ financing
Education financing take-up rate
0.0
0.2
0.4
0.6
0.8
1.0
0.1
0.3
0.5
0.7
0.9
SRDC SRSA



Price sensitivity

Going back to the original research questions:

1) Are participants responsive to price?
   - Yes. Price is by far the best predictor of choosing education financing over a cash alternative.
   - Nonetheless, responsiveness to price varies according to individual and group characteristics.

2) Are underrepresented groups more price sensitive? Are they more responsive to changes in price (reductions and increases)?

Price sensitivity – investigating group differences

- Possible misalignments between choices and true educational preferences.
  - Expectations of parental financial support could result in participants choosing cash windfall instead of loan
  - This is likely to differentially affect loan take-up among those from higher-income backgrounds.
- Grant choice is more aligned with true educational preferences
  - At high prices, the difference is small, some may prefer the immediate windfall.

SRDC SRSA

Investigating group differences

Decision	Price	Inc. < 40K	Inc. ≥ 100	Gap
2000L vs. $700	0.97	3.9%	4.7%	0.8
1000L vs. $300	0.92	10.4%	12.7%	2.3
2000L vs. $300	0.77	19.8%	19.1%	-0.7
4000L vs. $300	0.69	33.0%	29.2%	-3.8
2000L vs. $25	0.63	53.9%	44.9%	-9.0*
1000G vs. $700	0.70	37.9%	45.3%	7.4
500G vs. $300	0.60	35.2%	43.6%	8.4*
1000G vs. $300	0.30	65.4%	77.5%	12.1***
2000G vs. $300	0.15	73.6%	81.8%	8.2**
1000G vs. $100	0.10	82.4%	87.7%	5.3
4000G vs. $300	0.075	85.7%	89.8%	4.1
1000G vs. $25	0.025	90.7%	93.2%	2.5

Decision	Price	Boys	Girls	Gap
2000L vs. $700	0.97	5.3%	5.2%	-0.1
1000L vs. $300	0.92	8.7%	13.5%	4.8***
2000L vs. $300	0.77	13.3%	21.4%	8.1***
4000L vs. $300	0.69	26.1%	32.0%	5.9**
2000L vs. $25	0.63	42.6%	51.3%	8.7***
1000G vs. $700	0.70	33.2%	50.5%	17.3***
500G vs. $300	0.60	30.2%	47.7%	17.5***
1000G vs. $300	0.30	64.7%	76.2%	11.5***
2000G vs. $300	0.15	74.5%	82.7%	8.2***
1000G vs. $100	0.10	81.6%	88.6%	7.0***
4000G vs. $300	0.075	84.0%	88.3%	4.3**
1000G vs. $25	0.025	89.6%	93.2%	3.6**

Group differences

Aboriginal people much more price sensitive than others

Decision	Price	Aboriginal	Not Aboriginal	Gap
1000G vs. $300	0.30	48.1%	73.1%	25.0***
2000G vs. $300	0.15	65.4%	80.3%	14.9***
1000G vs. $100	0.10	76.9%	86.2%	9.3**
4000G vs. $300	0.075	79.8%	87.0%	7.2**
1000G vs. $25	0.025	84.6%	92.2%	7.6**

First generation more price sensitive than those with more educated parents

Decision	Price	HS parent(s)	University parent(s)	Gap
1000G vs. $300	0.30	66.5%	75.6%	9.1**
2000G vs. $300	0.15	76.6%	82.6%	6.0*
1000G vs. $100	0.10	85.5%	88.4%	2.9
4000G vs. $300	0.075	86.7%	89.1%	2.4
1000G vs. $25	0.025	92.3%	93.0%	0.7

SRDC SRSA

Group differences

Disabled – less demand for PSE financing

Decision	Price	Disabled	Not Disabled	Gap
1000G vs. $300	0.30	62.3%	73.0%	10.7***
2000G vs. $300	0.15	71.1%	80.8%	9.7***
1000G vs. $100	0.10	78.1%	87.1%	9.0***
4000G vs. $300	0.075	81.1%	87.6%	6.5**
1000G vs. $25	0.025	84.2%	93.3%	9.1***

Children of immigrants – more demand for PSE financing

Decision	Price	Immigrant	Non-immigrant	Gap
1000G vs. $300	0.30	78.9%	69.6%	-9.3**
2000G vs. $300	0.15	87.2%	77.5%	-9.7***
1000G vs. $100	0.10	90.0%	84.6%	-5.4*
4000G vs. $300	0.075	91.1%	85.5%	-5.6**
1000G vs. $25	0.025	95.0%	91.0%	-4.0*

SRDC SRSA

Determinants of price sensitivity

- Linear probability models
  - Drop those with no interest in PSE and no take-up of financing (N=40)
  - Level of analysis is the individual decision (N=1208 individuals x 5 decisions each = 6040 decisions)
  - outcome variable being estimated is the probability of choosing a grant, given its price and the characteristics of the individual making the decision

SRDC SRSA

Determinants of price sensitivity

- Accounting for grades, numeracy scores, school engagement, time preferences, and perceived returns on investment in PSE…
  - No longer significant: low vs. high income, more vs. less-educated parents, immigrant vs. non-immigrant parents
  - Still significant: Aboriginal vs. non-Aboriginal, disabled vs. non-disabled, boys vs. girls

SRDC SRSA

Loan aversion

- Acceptance rates of stand-alone grants vs. grant/loan combinations
  - E.g. a) $1000 grant vs. $300; b) ($1000 grant + $1000 loan) vs. $300
  - 8 such comparisons in our sample
  - Possible financing choices
    - Choose only the combination (increases liquidity)
    - Choose both the stand-alone and the combination (reduces price)
    - Choose only the stand-alone (loan aversion)

SRDC SRSA

Loan aversion

Example:

- **Stand-alone: $1000 stand-alone grant vs. $300**
- **Combination: ($1000 grant + $1000 loan) vs. $300**
- Among those who chose at least one of the two:
  - Choose both = 82.3%
  - Choose combination only = 5.4%
  - Choose stand-alone grant only = 12.3%

SRDC SRSA

Loan aversion

- What proportion of participants are loan averse?
  - Sample: 1120 who chose at least one stand-alone grant
  - Dependingg on the decision, between 5% and 20% of the overall sample chose a grant when it was offered as a stand-alone but not when it was offered in combination with an optional loan.
  - Overall, 30% of grant takers fail to accept the same grant when it was paired with an optional loan
  - Possible explanations:
    - Framing effect: the simultaneous presence of a loan offer may devalue the grant in the mind of students.
    - Students don't trust themselves not to take up the optional loan

SRDC SRSA

Loan aversion

- Do underrepresented groups show a greater propensity for loan aversion?
  - Slightly higher propensity for some decisions.
  - For example, 18% of Aboriginal students, 13% of those with high-school educated parents, and 13% of boys who chose a $2000 grant over $300 cash did not choose the same grant when it was offered in combination with an optional $2000 loan – compared to only 9% of the general population.
  - In general, loan aversion appears to be 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.

SRDC SRSA

Loan aversion

	Loan averse at least once	Never loan averse
Numeracy (mean)	284	295***
Patience/time horizon (experimental score)	15.4	19.4***
Perceived returns to PSE (subscale scores)		
Monetary benefits – university	21.6	22.3***
Nonmonetary benefits – university	12.2	12.5*
Debt avoidance – university	10.4	9.7***
Identity anxiety – university	6.8	6.5
Monetary benefits – college	19.4	19.5
Nonmonetary benefits – college	11.1	11.1
Debt avoidance – college	9.6	8.9***
Identity anxiety – college	6.7	6.6
Monetary benefits – trades	19.6	19.6
Nonmonetary benefits – trades	11.1	10.8
Debt avoidance – trades	9.3	8.8**
Identity anxiety – trades	6.9	7.0

Significantly different from loan averse group, at ***P<.01, **P<.05, *P<.10, t-tests

SRDC SRSA

Summary and policy implications

- Evidence for greater price sensitivity among some underrepresented groups.
- For some groups (low income, first generation), differences in demand for financing disappear as prices are reduced.
  - Suggests targeted subsidies as one potential policy lever.
- Also, differences in price sensitivity are largely explained by differences in grades, school engagement, time horizons, and perceptions of returns to PSE.
  - Policy response : early interventions targeting all these factors?
  - Greater price sensitivity among high-ability, low-income students suggests possible policy levers targeted at concerns about identity and information constraints about costs and benefits of PSE.
- For other groups (Aboriginal students, boys), differences remain even at the lowest prices and with all co-variates accounted for.

SRDC SRSA

Summary and policy implications

- Experimental evidence for loan aversion
- 30% displayed at least one instance of accepting a grant but failing to accept the same grant when it was paired with an optional loan
- Linked to low numeracy, short time horizon, and a perception that the debt-related costs of PSE are high relative to its monetary benefits
- Policy response
  - Target information constraints, financial literacy?
  - Frame student financial aid differently (e.g., decouple grants from need-based aid application)

SRDC SRSA