

Does Student Financial Aid Cause More Participation In and Graduation From University?

Evidence from the Quebec Student Aid Reform

Matthieu Chemin

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MESAMEASURING THE EFFECTIVENESS OF STUDENT AID

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The MESA Project

The Measuring the Effectiveness of Student Aid Project, or the MESA Project, is a four year research effort being conducted by the Canadian Education Project and the School for Policy Studies at Queen's University on behalf of the Canada Millennium Scholarship Foundation. It has been designed to answer the following four questions:

- After graduating from high school, teenagers coming from low-income backgrounds face a choice as to attend college or university, or not. For those who did attend, how do they compare to those who did not?
- Does providing more funding in a student's first few years of further education attract more low-income students to post-secondary education?
- Does providing more funding in a student's first few years of further education make it more likely for low-income students to stay in and graduate?
- Are low-income students different across Canada?

This paper is part of a series of research papers solicited from some of the leading Canadian researchers in the field of post-secondary education; the researchers were asked to write about issues of access and persistence in post-secondary education in Canada. The requirements for the papers were that the researchers use one of several currently-existing Statistics Canada databases or another source of Canadian data. Each of the papers commissioned during this project is available for downloading from the MESA Project website at www.mesa-project.org.

The findings and conclusions expressed in this paper are those of the authors and do not necessarily represent those of the MESA Project or its partners.

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The **Canada Millennium Scholarship Foundation** is a private, independent organization created by an act of Parliament in 1998. It encourages Canadian students to strive for excellence and pursue their post-secondary studies. The Foundation distributes \$325 million in the form of bursaries and scholarships each year throughout Canada. Its objectives are to improve access to post-secondary education for all Canadians, especially those facing economic or social barriers;

to encourage a high level of student achievement and engagement in Canadian society; and to build a national alliance of organizations and individuals around a shared post-secondary agenda. The Foundation is funding the MESA Project overall, and has negotiated access to its student administrative lists with each of the provinces on the project's behalf.

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Abstract

This paper addresses fundamental questions about the impact of student financial aid on 1) participation in and 2) graduation from post-secondary education. To isolate the causal impact of grants on post-secondary outcomes, this paper looks at a 2001 Quebec reform that significantly altered the calculation of student financial aid. Although students in Quebec received more grants and increased their participation in post-secondary education following the reform, four years after the reform, no impacts on Quebec graduation rates were found.

Matthieu Chemin is a Professor of Economics at Université du Québec à Montréal (chemin.matthieu@uqam.ca)

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Introduction

This paper evaluates the impact of student financial aid (based on need rather than merit) on access to, persistence in and graduation from post-secondary education (PSE). Evaluating the impact of student financial aid on these outcomes can be difficult due to endogeneity issues. With few exceptions, discussed below, the vast body of empirical literature on student financial aid has primarily cited correlational findings, thus precluding the establishment of causal relationships between these variables. This correlational approach is not only spurious on econometric grounds, but it is also not very informative for policy purposes. Regression analyses relating financial aid to student outcomes have been marred by an important econometric issue: unobserved heterogeneity. That is, grant recipients are not comparable to students who do not receive grants and, even among grant recipients, students with differing levels of financial aid differ for unobserved reasons.

This paper addresses the issue at hand by looking at a large reform in student financial aid policy that occurred in the province of Quebec in 2001. More specifically, when Quebec substantially changed its formula for determining the amount of grants awarded for the 2001-2002 school year, students and parents alike were expected to contribute less towards the costs of education. This reform had an effect at the intensive and extensive margins: after the reform in Quebec, more students became eligible to receive

grants and the average grant size increased by \$1,965. One might wonder about the effect of such a dramatic change on access, persistence, time to complete studies, and graduation rates. The analysis presented in this paper used data from the Youth In Transition Survey – Cohort B (YITS-B), comprising four waves of biannual longitudinal data collected from a representative sample of 23,000 individuals aged 18 in cycle one¹, to compare the behavioural changes of Quebec students before and after the reform to the behaviour of students in British Columbia (a province in which no changes occurred in the grant formula, but where, as in Quebec, tuition fees were frozen) and, more generally, in the rest of Canada over the same period. Given the pre-existence of systematic differences between the provinces, a simple post-reform comparison of the behaviour of Quebec students to that of British Columbia students could not have been used to show the effects of the reform. Similarly, because the longitudinal data set followed the same individuals who, over time, were more likely to graduate, a phenomenon that caused graduation rates to increase mechanically in cycle three (as compared to cycle two), simply comparing the data from Quebec students before and after the reform would have been equally unsound. Therefore, to resolve these issues, Quebec students before and after the reform were compared to British Columbia students during this same time-frame².

¹ Cycle one data was collected in 2000 but based on information from 1999.

² This estimation technique is called difference-in-differences, or double differences, in the econometrics literature.

This paper shows that the 2001 Quebec reform not only significantly increased the probability of students' receiving grants, but also the amount of these grants. This impact at the extensive and intensive margins significantly increased access to post-secondary education³ along the same lines as previous estimates in the existing literature. However, although persistence rates increased with the implementation of the reform, no such effects were found on graduation rates, even four years after the reform. It is possible that these students graduated (or will graduate) at a later stage, in which case the effect on graduation will show up in later waves of the YITS. Alternatively, it is possible that the 2001 Quebec reform simply had a limited impact on post-secondary students' graduation rates.

Related Literature

As emphasized above, identifying the effects of student financial aid has been empirically challenging because of the correlations between eligibility for federal loans and observed and unobserved determinants of schooling. To solve this problem, a growing number of studies have used a natural experiment approach to estimate the causal effect of schooling costs on participation in PSE.

Dynarski (2002) studied a dramatic policy change called the Georgia Hope Scholarship, enacted in Georgia in 1993. The program allowed free attendance at Georgia's public colleges for state residents with at least a B average in high school. Dynarski's straight-

forward empirical approach measured the effects of the Hope Scholarship by comparing relative changes in college attendance rates before and after 1993 in Georgia to those in the rest of the south-eastern United States. The results suggest that for each additional \$1,000 of subsidy offered, college attendance rates rose by 4 to 6 percentage points.

Applying a regression discontinuity framework, Van der Klaauw (2002) used financial aid discontinuities at a particular university to estimate the impact of financial aid on PSE participation. He found that a 10 percent increase in financial aid increased enrolment by 8.6 percent for students seeking financial aid.

The Higher Education Amendments of 1992, which removed home equity from the set of assets taxed by the federal financial aid formula⁴; the GI Bills; the introduction of the Pell Grant (the largest source of federal grants for college); and within-state tuition changes all represent other examples of such natural experiments.

This paper differs from the existing literature in two important ways. First, in contrast to the mostly American literature, it looks at a provincial reform in Canada. Second, it looks not only at access, but also at other post-secondary outcomes, such as exit, persistence, and graduation.

³ The present analysis was restricted to bachelor's degrees at the university level, and therefore excluded CEGEPs in Quebec.

⁴ Those with the highest home values saw the greatest boost to their aid eligibility.

Student Financial Aid in Canada

The different provinces have tended to use similar algorithms to calculate student financial aid. The amount of loans or grants received by students has generally depended on their financial need, calculated by subtracting their educational costs from their available resources.⁵ Educational costs have typically been estimated to include tuition, fees, books and school supplies; a moderate standard of living allowance for shelter, food, transportation and miscellaneous costs; child/dependant living expenses; and day-care expenses. Calculations of student resources have typically included student contributions, parental contributions, and spousal contributions. Student contributions have included students' total savings, income earned, and other financial resources. No parental contributions have been expected when students were married, had dependent children, had been out of high school for 48 months, or had been in the labour force for two periods of 12 consecutive months. Otherwise, a parental contribution – estimated based on family size, income, and allowable deductions (such as income taxes payable, Canada Pension Plan contributions, and employment insurance contributions) – has been expected. Parents' financial assets⁶ have also been considered in the assessment. Spousal contributions, estimated based on spousal income, have been expected for married students or those living common-law.

Although the student financial aid algorithm has been quite similar across provinces, there have still been some differences.

The next section focuses on Quebec, which experienced a dramatic change in this algorithm in 2001, in contrast to the other Canadian provinces. For example, this paper describes the student financial aid situation in 2001 in British Columbia, where the lack of such changes made this province an ideal control group for Quebec.

The 2001 Quebec reform

Quebec experienced two dramatic changes in its algorithm for calculating student financial aid in 2001-2002, described in detail in Bouchard (2008), as well as in Table 1.⁷

First, the student contribution beyond the minimum amount of \$1280 was decreased, as illustrated in the following example:

Before 2001, if a student were to earn an income of \$4,000, their additional student contribution would equal 60 percent of this income, amounting, in this case, to a total student contribution of \$3,680. After 2001, their additional student contribution would have been decreased from 60 percent to 50 percent of the difference between their income and the minimum contribution. In this example, the additional student contribution would have been reduced to \$1,360 ($50\% * (\$4000 - \$1280)$), adding up to a total contribution of \$2,640, with the overall reduction in the required contribution totalling \$1,040 for this particular student. As student contributions are subtracted in calculations

⁵ For example, see the BC student financial aid website: <http://www.aved.gov.bc.ca/studentaidbc/apply/eligibility/financialneed.htm>

⁶ Assets include term deposits, stocks, bonds, GICs, bank accounts and rental properties.

⁷ <http://www.afe.gouv.qc.ca/fr/organisation/historique5.asp>

of financial need, a decrease in a particular student's contribution amount would translate directly to a one-to-one increase in the financial aid for which they would be eligible.

Second, parental contribution amounts were also reduced because of a decrease in the marginal rates for each income bracket (see Table 1 for the exact changes). For example, if a student were to live in a household of three individuals with a total household gross income of \$31,126 (the 2007 poverty line in Canada for a family of three⁸), the parental contribution would have been decreased by \$925, translating to a one-to-one increase in student financial aid.

Note that in Quebec in 2008 the maximum student loan amount was limited to \$2,440, with the rest given out as grants. Low-income students would therefore have been likely to benefit from these policy changes with an increase in grants rather than loans.

The issue of timing is critical in the present analysis. The reform in Quebec occurred in 2001-2002, at the end of cycle two of the YITS-B. Cycle two data were collected in early 2002, by which time the students responding to the survey might already have benefited from the reform. However, this paper compares data from cycles three and four (collected after the reform) to data from cycles one and two (collected before the reform and at its outset) for two reasons. First,

the YITS data set measured total amounts of student financial aid allotted over the 2 years between cycles. Therefore, the effect of the reform in cycle two would have been dampened by the unaffected amount of student financial assistance received in 2000-2001. Second, one might expect any effects on persistence, exit, and graduation to appear later than at the initiation of the grant increases.

The 2001 British Columbia absence of reform

The student financial aid system in British Columbia has been set up somewhat differently than that in Quebec. In contrast to Quebec, a much more sizeable fraction of the student financial aid in British Columbia takes the form of loans rather than grants. These loans come from both federal sources (the Canada Student Loans Program or CSLP)⁹ and provincial ones (BC Student Loans or BCSL). These remained more or less unchanged for most of the period in consideration. From 2000 to 2004, students were eligible for a maximum of \$260 in loans per week. In 2004-5 a change to the provincial aid system increased the maximum to \$275/week and in 2005-6 a change to the federal system increased the maximum to \$320/week. In 2005-6, changes were also made to the treatment of parental income for dependent students, similar to the one made earlier in Quebec. The increases in maximum aid might have had a small effect on students in this cohort; the changes to the need assessment would not have affected the cohort as very few of them would have been depend-

⁸ Poverty line from Canadian Council on Social Development: http://www.ccsd.ca/factsheets/fs_lico04_bt.htm

⁹ Quebec, the Northwest Territories, and Nunavut choose not to participate in the Canada Student Loans Program. Instead, under the Canada Student Financial Assistance Act, these jurisdictions have received transfer payments from the federal government (totalling about \$160 million for 2005-06) to operate their own student assistance plans.

ent students (defined as being less than four years out of secondary school) at the time of the reform.

Students in BC also receive non-repayable aid in a variety of forms. Since 1994, they have been eligible for a number of federal grants known as “Canada Study Grants” (formerly “Special Opportunity Grants”). In 1999-2000, the Canada Millennium Scholarship Foundation (CMSF) established a bursary program in the province worth \$36 million per year, which is administered by the provincial government. In 2005, a new Canada Access Grant was introduced for students from low-income families; however, since it was only available to students in first year, this program would not have affected the YITS cohort we are considering, nearly all of whom were well past first year.

From the 1990s until 2003-04, students in BC received grants from BC Grants (BCG) program; In 2004-2005, the BCG was replaced by the BC Loan Reduction Program (BCLR) which absorbed and matched the CMSF funding and repaid students’ loans above a threshold amount at the end of each year of study.¹⁰ As a back-end grant, it differed from the BCG, which was awarded at the commencement of each year of studies.

Since BCLR matched the exact amount of the BCG grants, there was no decrease in the amount of grants awarded in British Columbia in 2004-2005; the only relevant change was in the timing of grant receipt. Therefore,

the measurement of 2004-2005 grants in cycle four remained unaffected, as students would have received the loan reductions for 2004-2005 in early 2006. On the other hand, the measurement of 2005-2006 grants in cycle four might have been affected, as students in early 2006 would not yet have received their loan reduction grants for 2005-2006. Regardless, cycle four was included in the analysis in consideration of the low percentage of YITS-B respondents still enrolled in a bachelor’s degree program at this stage, and consequently the low number of respondents not accurately reporting their pending loan reduction grant.

To summarize, no reform was implemented in British Columbia in 2001.¹¹ Moreover, tuition fees remained frozen over the first two cycles in both British Columbia and in Quebec. Further, while tuition fees increased somewhat in cycles three and four, variations in tuition fees were accounted for and controlled in the empirical analysis. An additional advantage of restricting the principal analysis presented in this paper to Quebec and British Columbia was the low likelihood of inter-provincial migration, considering the distance between the two provinces. Nonetheless, inter-province migration was also controlled for in the analysis.

Although, for the reasons outlined above, British Columbia was deemed an ideal control group, the results presented here do not depend on the choice of British Columbia as the control group. To illustrate this point, this

¹⁰ This threshold amount was based on the total funding available and the number of students successfully completing the school year and meeting other BCLR criteria. The calculation of this threshold amount may have affected the measurement of grants in cycle four.

¹¹ Only minor changes, such as credit screening and the BCSAP online application process, which was piloted with B.C. public schools starting in January 2002, were introduced for B.C. students. Source: personal communications with StudentAidBC, the Ministry of Advanced Education and Labour Market Development.

paper also presents results comparing Quebec to the rest of Canada, in addition to showing within-Quebec results comparing low-income students to those whose higher incomes made them ineligible to receive grants.

Data

The Youth in Transition Survey (YITS) is a Canadian longitudinal survey that collected information from young people about major transitions in their lives, including transitions to post-secondary education and to the labour market. Two different age groups participated in the YITS from 1999 through 2005, a 15-year-old cohort and an 18-to-20-year-old cohort. This paper focuses on the latter cohort (Cohort B), who were more likely to access post-secondary education throughout the four waves of data collection. More than 23,000 youth aged 18 to 20 were included in this sample.

Data were collected every two years for a total of four cycles. Cycle one data were collected in December 1999, cycle two data in December 2001, cycle three data in December 2003, and cycle four data in December 2005. The survey collected a wealth of information on participation in PSE (e.g., program, level, months registered), access to loans and grants, student and partner incomes, and parental contributions.

Results

Figure 1 presents the percentage of individuals who received grants in Quebec, British Columbia, and the rest of Canada (i.e. not including British Columbia or Quebec) before

and after the Quebec reform. With the exception of the Quebec control group, the sample was restricted to individuals with incomes totalling less than \$20,000 from all sources (including their own work income and parental and spousal contributions). 5 percent of individuals in Quebec earning less than \$20,000 had access to grants in cycles one and two, before the reform. As a result of changes in the calculation of student and parental contributions, more individuals in Quebec became eligible to receive grants after 2001-2002. Indeed, the percentage of individuals accessing grants in Quebec in cycles three and four went up to 14 percent. However, this increase in grant access might have been attributable to factors other than just the reform. For example, over time, more individuals might have attempted to access post-secondary education and, correspondingly, have sought out more grants. Therefore, this increase in grant access in Quebec had to be compared to the evolution of grant access in a control group.

Among individuals in British Columbia earning less than \$20,000, 14 percent had access to grants in cycles one and two, and 18 percent in cycles three and four. Given that, presumably, individuals age at the same rate in British Columbia and Quebec, it might be safe to assume that any observed differences in the evolution of grant access in Quebec as compared to British Columbia would not be attributable to the natural aging of the cohorts. One might therefore conclude that the 5 percent difference observed between the 9 percent increase in grant access in Quebec, as compared to the corresponding 4 percent increase in British Columbia, represents the impact of the reform,

independent of any aging effect. According to the logic of the difference-in-differences analysis, Quebec and British Columbia could not be compared directly to one another, as they were systematically different places; moreover, the same individuals in Quebec before and after the reform could not be compared over time, as they naturally aged between observations. However, the difference-in-differences approach employed in the present analysis controlled for these factors. In other words, it could be concluded that the proportion of students who received grants increased proportionately more¹² in Quebec than in British Columbia following the 2001 Quebec reform.

To extend these findings, Figure 1 presents the results for the rest of Canada, with the overall conclusion remaining that after the Quebec reform, the proportion of students in Quebec receiving grants increased disproportionately and significantly compared to that in British Columbia and other Canadian provinces.

However, these results might have been driven by the longitudinal nature of the data and the institutional differences between Quebec and the other provinces in Canada. For instance, the education system is slightly different in Quebec in that Quebec students graduate from high school a year earlier than in the rest of Canada but have to spend two additional years attending a CEGEP, a pre-university training college; Quebec students therefore start university a year later than

other Canadian students. Hence, it is possible that only a low proportion of individuals in Quebec in cycle one had enrolled in PSE and had access to grants. As individuals age naturally in a longitudinal data set, the YITS respondents might have been expected to participate more in post-secondary education, and consequently to receive more grants, in subsequent cycles. Therefore, these results could just be evidence of mean reversion in Quebec as compared to the rest of Canada.

To test this hypothesis, a control group was isolated within Quebec: individuals with incomes greater than \$20,000¹³ who were therefore ineligible for grants in Quebec, both before and after the reform. Figure 1 shows that, even if ineligible, 3 percent of these individuals still managed to obtain a grant before the reform. This figure went up to 4 percent after the reform. Therefore, compared to these higher-income individuals, individuals earning less than \$20,000 had significantly more access to grants after the reform in Quebec. This test provided evidence that the current results were not driven by the institutional differences between Quebec and the rest of Canada, as the conclusions remained valid when a within-Quebec control group was used.

Figure 2 shows the impact of the reform on PSE outcomes. Post-reform participation rates increased in both Quebec and British Columbia, but by less in the latter than the former. When comparing individuals earning

¹² The difference-in-differences was precisely estimated in Chemin (2009). The coefficient was significantly different from zero at the five percent level. The significance was estimated through a bootstrap method.

¹³ We did not define low-income students as students earning under \$20,000. We just used this threshold to perform a falsification exercise on a group of students that by nature was excluded from student financial aid. We replicated all the results with a \$15,000 threshold with no differences in the results.

less than \$20,000 in Quebec to similar individuals in British Columbia, the probability of accessing PSE was estimated to have increased by 5 percentage points due to the reform. Similar results were obtained when comparing Quebec to the rest of Canada. However, as mentioned above, this observed difference might have been due to the institutional difference inherent to the CEGEP system.

To test this hypothesis, the participation rates of individuals in Quebec earning more than \$20,000, and therefore ineligible for grants, were examined both before and after the reform. The participation rate increased significantly over time for individuals in Quebec earning more than \$20,000, but by a lesser margin (4 percentage points, to be precise) than it did for individuals earning less than \$20,000.

Although access to post-secondary education is important, it is PSE completion, rather than attendance, that is rewarded on the labour market. It is therefore important to look at drop-out rates, persistence rates, and graduation rates. Exit rates in Quebec dropped after of the reform by 3 percentage points¹⁴ more than in British Columbia. This finding represents another piece of evidence in favour of the reform, showing that increased student financial aid made students more willing to stay in PSE. As expected, persistence rates increased by 6 percentage points, again indicating that Quebec students stayed enrolled longer in PSE.

Another important outcome to consider is graduation rates. While it is theoretically clear that subsidizing the cost of education increases access to PSE, effects on graduation are much less clear. On the one hand, if credit markets were perfect, individuals would already attend their optimal level of schooling. Subsidizing the costs of PSE based on need might attract individuals who would have otherwise chosen another earnings-maximizing path more adapted to their comparative advantage (Willis, Rosen, 1978). On the other hand, if reducing the costs of schooling were to attract individuals constrained by imperfect credit markets, one might expect a positive effect of student financial aid on graduation. Figure 3 shows that the evolution of Quebec graduation rates did not outperform the evolution of graduation rates in British Columbia or the rest of Canada. These results therefore cast doubt on the efficacy of this reform in particular, and of needs-based grants in general, to improve graduation rates.

Robustness Checks

As presented in a companion technical paper (Chemin, 2009), three additional test were performed to check the robustness of the results.

First, the YITS data set was used to follow the same students over time. It is important to note the longitudinal nature of the data set because of the possibility for individuals to respond strategically to changes in government policy. If both the distribution of generous post-secondary student grants and access to PSE significantly increased in Que-

¹⁴ Exit was defined as a student's accessing, but dropping out of, university. Results not shown in this paper are available on request.

bec after 2001, relative to the evolution of these factors in other provinces at the same time, would student financial aid have caused the observed increase in participation? Or, alternately, could these findings be attributed to students who would have otherwise left Quebec but opted to stay, or those who would have stayed out-of-province but migrated to Quebec, or those who would have otherwise accessed post-secondary education earlier but delayed matriculation by a year? It is imperative to differentiate between the available possibilities, as policy makers would like to know whether these costly policies affect individuals' choices regarding whether, rather than where and when, to attend college. In other words, these potential spatial and temporal displacement effects might have improved the situation of Quebec after 2001, but cast doubt on the efficacy of the reform to increase overall participation rates in Canada.

Chemin (2009) explicitly addressed this self-selection issue by using the longitudinal nature of the data set. In essence, this paper compared the behavioural change of a student (as opposed to a group of students, as in Dynarski, 2002, 2003, Stanley, 2003, Bound and Turner, 2002, and Angrist, 1993) exposed to the reform to the change in behaviour of a similar student not exposed to the reform. After using panel data estimation techniques with individual fixed-effects, results remained similar when comparing Quebec students to British Columbia students, Canadian students, or other Quebec students with annual incomes greater than \$20,000. It is therefore possible to interpret these results with regard to the impact of the reform on a particular student, net of spatial or temporal displac-

ement effects. These results are highly relevant to policy decisions.

Second, because cohorts age naturally in a longitudinal data set, participation and graduation rates should both increase mechanically over time. Although a difference-in-differences framework addressed this issue here (by comparing students who age at the same rate in different provinces), Chemin (2009) more directly addressed the concern of aging by comparing 22-year-olds in cycle two to 22-year-olds in cycle three. Individuals aged 22 years in cycle two (in 2001) made the choice to participate in post-secondary education at approximately 20 years of age, without having been exposed to the reform. On the other hand, when individuals aged 22 years in cycle three (in 2003) made the choice to participate in post-secondary education, they had been exposed to the reform (and, hence, bigger grants). It is therefore interesting to compare these two groups in terms of their decisions to participate in post-secondary education. Results on this test were similar to those outlined above and confirm the validity of the conclusions.

Third, a similar test was performed by using an entirely different cohort, followed in a separate YITS data set. The Youth In Transition Survey – Cohort A (YITS-A) comprised approximately 38,000 individuals who were 15 years old in cycle one (December 1999) and who were followed every two years across the four cycles. 21-year-olds from cycle two (1999 to 2001) of the YITS-B were not exposed to the 2001 Quebec reform, while 21-year-olds from cycle four (2003 to 2005) of the YITS-B were. These two same-age groups could therefore be compared to de-

termine whether the reform had any impact on post-secondary outcomes by using the 21-year-olds from cycle four of the YITS-A as the treatment group. Chemin (2009) found results that confirmed the validity of the conclusions presented here.

Conclusions

This paper addressed two fundamental questions about the impact of student financial aid on students' participation in PSE and on their rates of graduation. To isolate the causal impact of grants on post-secondary outcomes, it focused on the 2001 Quebec reform that significantly altered the student financial aid calculation, thus increasing students' likelihood of receiving grants by 5 to 7 percentage points. As a result, students' access to PSE increased by between 4 and 6 percentage points. These estimates are in the same range as estimates found in previously published literature.

Despite findings of increased persistence due to the reform, no corresponding increase in graduation rates was observed. This finding might indicate that some individuals who accessed post-secondary education had not yet graduated by the end of cycle four. It would therefore be interesting to follow the respondents into future YITS cycles to observe their eventual graduation rates. An alternate possibility is that students attracted to PSE by the availability of these grants were less likely to graduate, a hypothesis that raises doubts about the efficacy of this reform.

Extensive robustness checks were undertaken to test these findings. Students in

Quebec were compared to those in British Columbia, a province where: (a) inter-provincial migration rates with Quebec were assumed to be low; (b) there were no changes to the formula used to calculate student financial aid analogous to those that occurred in Quebec; and (c) like in Quebec, tuition fees were frozen. To show that the observed results were not dependent on the choice of this particular control group, results were also calculated using the rest of Canada as a control group. Moreover, an additional within-Quebec test was presented to compare Quebec students who earned less than \$20,000 (and were therefore eligible for grants and, by extension, were therefore affected by the reform) to Quebec students who earned more than \$20,000 (and were therefore ineligible for grants and, by extension, were therefore not affected by the reform). Other robustness tests can be found in Chemin (2009).

To ensure that the causal impacts were not driven by spatial or temporal displacement effects (i.e., students attracted to or retained by Quebec because of the reform, students delaying matriculation to take advantage of the reform, etc.), the longitudinal nature of the data set was used to control for individual unobserved time-constant heterogeneity. The use of panel data estimation techniques with individual fixed effects led to similar results.

To ensure that results were not driven by the natural aging of cohorts, individuals aged 22 years in cycle three (i.e., 22-year-olds exposed to the 2001 Quebec reform) were compared to individuals aged 22 years in cycle two (i.e., 22-year-olds not exposed to the

2001 Quebec reform) in both Quebec and the rest of Canada. Finally, individuals aged 21 years in cycle four (2005) of the YITS-A (exposed to the 2001 Quebec reform) were compared to individuals aged 21 years in cycle two (2001) of the YITS-B (not exposed to the reform). The remarkable stability of the results across these robustness checks confirms the validity of the conclusions presented here.

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Tables and Figures

Table 1. Mean and standard deviations of average URC satisfaction scores for males and females where the unit of observation is the university or campus

	Contribution Before 2001	Contribution After 2001	Net Difference
Student Contribution (ex: 4000\$ student income)			
Minimum student contribution	\$1280	\$1280	
Amount used to calculate the marginal contribution	\$4000	\$2,720 (\$4,000-\$1,280)	
Rate	60%	50%	
Additional student contribution	\$2,400 (60%*4,000)	\$1,360 (50%*2 720)	
Total student contribution	\$3680	\$2640	\$1040
Parental Gross Income (\$)			
<\$8,000	0	0	
\$8,000 to \$44,000	0% of the first \$8,000 and 23% of the rest.	0% of the first \$8,000 and 19% of the rest.	
\$44,000 to \$54,000	\$8,280 and 33% of (income-\$44,000)	\$6,840 and 29% of (income-\$44,000)	
\$54,000 to \$64,000	\$11,580 and 53% of (income-\$54,000)	\$9,740 and 39% of (income-\$54,000)	
\$64,000 and more	\$15,880 and 53% of (income-\$64,000)	\$13,640 and 49% of (income-\$64,000)	
Net difference if parental income=\$31,126 (=poverty line in Canada in 2007 for a family of 3)			\$925

Figure 1. Percentage of individuals in Quebec, British Columbia, and Canada with income levels <\$20,000, as well as individuals in Quebec with incomes >\$20,000, receiving grants before and after the reform.

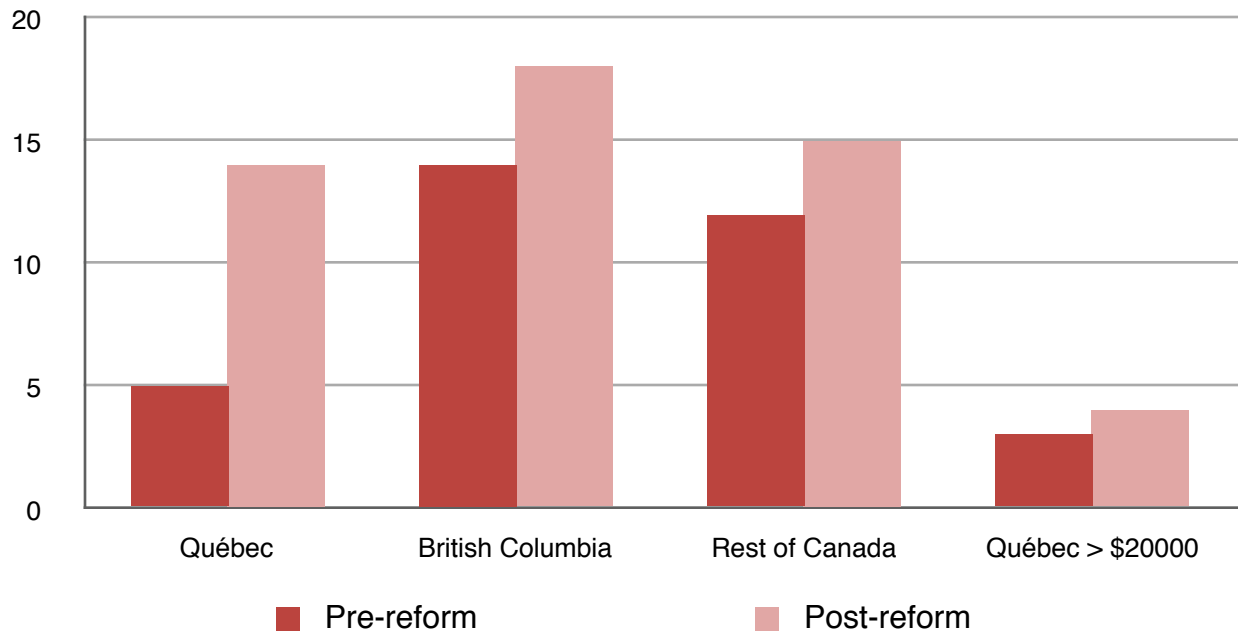


Figure 2. Percentage of individuals in Quebec, British Columbia, and Canada with income levels <\$20,000, as well as individuals in Quebec with incomes >\$20,000, accessing post-secondary education before and after the reform

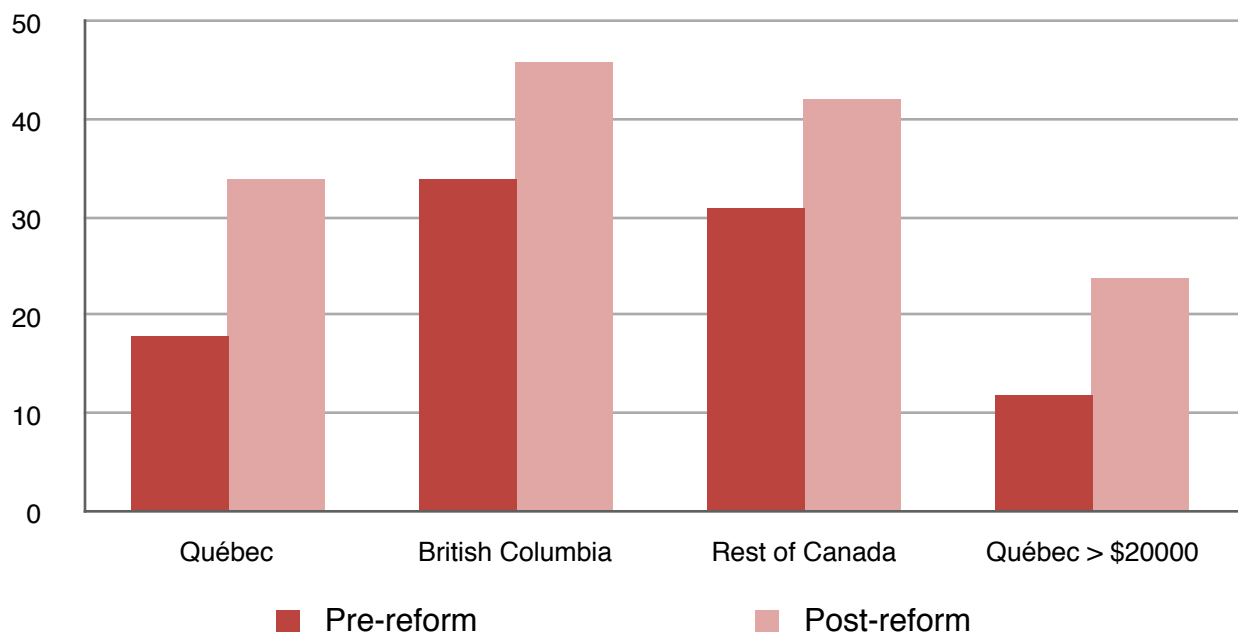


Figure 3. Percentage of individuals in Quebec, British Columbia, and Canada with income levels <\$20,000, as well as individuals in Quebec with incomes >\$20,000, graduating from post-secondary education before and after the reform

