Student Aid and the Distribution of Educational Attainment*

Job Market Paper

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Abstract

This paper uses cutbacks to a post-secondary funding program for Indigenous peoples in Canada to understand how increases in the costs of higher education affect the educational attainment and labour market outcomes of marginalized groups. I exploit variation in exposure to student aid across cohorts and ethnicities to show that increasing the costs of post-secondary education not only affects post-secondary attainment but also leads to a sizeable decrease in high school graduation rates. This result is in line with a theoretical model that embeds the expected costs of higher education in the high school decision. The model predicts that high school graduation is affected by the cost of higher education in environments where students face low labour market returns to completing high school, and thus where it may only be optimal to complete high school if there is an option to attend a post-secondary institution. I show that after reductions in targeted student aid in the late 1980s, high school graduation rates declined by four percentage points on Indian reserves, where the return to a high school degree is low. Post-secondary attainment also responded to changes in the availability of student aid, although the exact magnitudes and levels of post-secondary education affected vary across genders. In the long-run, the cutbacks to student aid explain approximately ten percent of the contemporary difference in hours worked between Indigenous and non-Indigenous people in Canada.

JEL Codes: I22, I24, I28, J15
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Between 1980 and 2016 tuition at colleges in the United States and Canada increased by over 200% (College Board, 2017b; Statistics Canada, 2016, 2017b), leading some scholars to contend that, despite a growing return to post-secondary education, limited access to colleges for some marginalized groups is contributing to rising inequality within countries (Carnevale and Strohl, 2013; Chetty, Friedman, Saez, Turner, and Yagan, 2017).[1] In light of this, billions of dollars of student aid are distributed each year in the form of tax credits, need-based scholarships, tuition vouchers, and merit awards.[2] One strategy used to evaluate how changes in the cost of college affect educational attainment is to exploit variation in exposure to these student aid programs. The existing literature has found college enrolment and completion to be responsive to price changes, although there is substantial heterogeneity in the policy response across aid programs and demographic groups (see, e.g., Dynarski (2004), Deming and Dynarski (2009), and Dynarski and Scott-Clayton (2013) for an overview).

This paper contributes to our understanding of how marginalized groups are affected by increases in the costs of higher education by exploiting cutbacks to post-secondary funding for Indigenous students in Canada. Other studies have looked at the effects of student aid on the educational outcomes of Blacks and Hispanics (Turner and Bound, 2003; Abraham and Clark, 2006; Angrist, Autor, Hudson, and Pallais, 2014, 2016; Denning, 2017); however, little is known about how Indigenous peoples respond to increases in the costs of college, despite the fact that in both the United States and Canada their educational attainment is lower than all other groups (Wilson and Macdonald, 2010; National Center for Education Statistics, 2017; Statistics Canada, 2017a).[3] I show that reductions to student aid in the late 1980s not only decreased post-secondary attainment among eligible Indigenous students, but also led to a sizeable decline in high school graduation rates.

Since theory suggests that economic agents are forward-looking and should factor the costs and benefits of future decisions into current choices, the second contribution of this paper is to provide

[1] The increasing return to post-secondary education is well documented in both countries. See, e.g., Acemoglu (2002); Boudarbat, Lemieux, and Riddell (2010); Acemoglu and Autor (2011); Oreopoulos and Petronijevic (2013).

[2] In 2015-2016 federal and state governments, and private institutions spent $125.9 billion USD on education grants (College Board, 2017a). In Canada, tax credits alone accounted for $1.7 billion CAD in 2008 (Collin and Thompson, 2010).

[3] Indigenous peoples represent a small fraction of the overall population in the United States, so it is unlikely that American studies evaluating heterogeneity in the effectiveness of student aid have large enough samples of Indigenous students to obtain reliable parameter estimates.

a theoretical mechanism to explain when variation in the cost of college will induce students to drop out of high school. There is a limited body of empirical work that has examined this indirect effect, and with mixed results. Angrist and Chen (2011) document an increase in high school graduation in response to the Vietnam-era GI bills, while Denning (2017) does not find a change in graduation after reductions in tuition at community colleges in Texas. The key insight generated by my framework is that high school graduation rates will be affected by changes in the cost of higher education in regions where the return to a high school degree is low and therefore where it only makes sense to complete high school if there is an option to attend a post-secondary institution. Consistent with this human capital model, I show that the entire high school effect is driven by students living on Indian reserves, where the return to a high school degree was low during this time period.[4] Given the positive non-market returns to high school,[5] this result suggests that focussing solely on post-secondary outcomes will understate the full impact of variation in the cost of higher education.

In the long-run, the program cutbacks led to an increase in the likelihood of relying on government transfers, and a decline in the likelihood of being employed, the number of weeks worked, and the number of hours worked. I estimate that the reduction in post-secondary funding can explain roughly 10 percent of the contemporary difference in hours worked between Indigenous and non-Indigenous people in Canada. Thus, the final contribution of this paper is to provide empirical support for the claim that unequal access to college is perpetuating inequality along this dimension.

The student aid program I evaluate was implemented by the Canadian government in 1977.[6] Initially it covered all costs of schooling for First Nations and Inuit students–two of the three Indigenous groups in the country.[7] By 1989, the costs of the program were unsustainable, and

[4]In contrast to the human capital model, the educational sorting hypothesis predicts that increases in the cost of higher education can lead to an increase in the high school graduation rate if low ability high school graduates are able to pool with high ability high school graduates who would have attended university in the absence of price changes. Bedard (2001) shows that, consistent with the sorting hypothesis, labour markets that contain universities have higher high school dropout rates.

[5]Non-market returns to high school graduation include reduced criminal behaviour (Lochner and Moretti, 2004), improved health (Grossman, 2006; Heckman et al., 2017a,b), and greater civic participation (Dee, 2004; Campbell, 2009), with many studies finding this link to be causal.

[6]The program was implemented as a response to rising demand for post-secondary education from Indigenous students and is therefore not exogenous to pre-existing trends in educational attainment.

[7]Funding was provided for tuition, all living expenses, travel costs from the student's home community to the closest institution offering the program of their choice, books, supplies, and other education-related costs.

the federal government cut back aspects of the program, effectively increasing the expected cost of schooling in two ways. First, it imposed a cap on the total amount of funding. As a result, per-student funding which, before 1989, had been increasing in tandem with tuition, levelled off at just over $14,000 per year. At the same time, average tuition in Canada increased in real terms from $2,160 in 1989 to $3,760 in 1996. Therefore, after paying the cost of tuition, students had less funding to pay for other living expenses. Second, if there were more eligible students than funding available, students were placed on a deferment list, which decreased the probability that an eligible individual received funding.

I begin the empirical analysis by evaluating the effects of the cutbacks on the distribution of educational attainment. I consider the share of the population whose *highest level of education* is either no school, a high school degree, trade school, community college, or a bachelor's degree. I use the term "community college" to refer to two- or three-year degrees below the bachelor level, whereas "bachelor's programs" are four-year degree-granting institutions, referred to as universities in Canada.[8] Using confidential micro data from the 2006 Census of Population, I implement a difference-in-differences specification that exploits variation in exposure to student aid across cohorts and ethnicities to uncover the causal effects of the program on the distribution of educational attainment.

I find that reductions in student aid decreased community college completion by 2.5 percentage points for men and 3.4 percentage points for women relative to the non-eligible group. Trade attainment also declined among men, who had been completing trades programs at a higher rate than women prior to the cutbacks, and bachelor's attainment declined among women, who had been completing bachelor's programs at a higher rate than men.[9] Mechanically, the decline in post-secondary attainment must either be offset by an increase in the share of the population whose highest level of education is a high school diploma or the share without any formal education. The

[8]Some bachelor's programs in Canada take three years to complete. In the current classification, they are coded as "community college". In practice, changing the way these variables are coded makes little difference to the results.

[9]In the full sample, community college attainment declined by an average of 3 percentage points relative to the control group, implying a 9% decline in community college completion. This result is not directly comparable to other studies of historical student aid programs, e.g., to study the G.I. bills, since the programs differed in scope and there is no dollar amount associated with the reduction in the post-secondary funding program. The consensus of the work studying the G.I. bills is that they increased average educational attainment (Angrist, 1993; Lemieux and Card, 2001; Bound and Turner, 2002; Stanley, 2003; Angrist and Chen, 2011), though the effects were primarily concentrated among white men (Turner and Bound, 2003) and people of higher socioeconomic status (Stanley, 2003).

theoretical model predicts that when the return to high school is low, increasing the cost of college will induce some students to drop out of high school. Whereas when the return to high school is high, increasing the cost of college can result in a lower level of post-secondary attainment, without changing the decision to graduate high school.

Given that the high school dropout rate is the inverse of the high school graduation rate, I build on the theoretical predictions to investigate how the program cutbacks affected high school graduation among eligible students. I show that high school completion declined by an average of 1.7 percentage points after the program was cut back. Taking advantage of the unique labour market structures on Indian reserves during this time period, I identify students facing a low return to high school as those living on reserves (George and Kuhn, 1994; Feir, 2013), and students facing a high return to high school as those living off reserves. This exercise reveals that the entire high school effect is driven by students living on reserves, indicating that the post-secondary funding program had been pulling some students out of high school. Without the certainty of the program, it was no longer optimal for these students to complete high school.

In the last section of the paper, I evaluate the impact of the cutbacks on labour market outcomes. Since the policy affected different levels of education simultaneously, this exercise evaluates the effect of the policy, rather than that of a specific degree, on outcomes. Relative to those who were ineligible for funding, the cutbacks increased the likelihood of relying on government transfers, and reduced labour supply. To assess the heterogeneity of the policy response on the intensive margin of labour supply, I employ the changes-in-changes (CIC) model of Athey and Imbens (2006), which estimates a treatment effect for each quantile of the distribution of hours worked. In contrast to the difference-in-differences framework, which estimates that average hours worked declined by 1.03, the CIC model reveals that, in the 45-60th quantiles, hours worked declined by up to 12 hours per week, a result that is primarily due to a reduction in the labour supply of women, and individuals living on-reserve. Simultaneous increases in the number of hours worked just below the median and in the lowest quantiles of the distribution imply that the difference-in-differences estimate conceals the full extent of the policy response.

Throughout this paper I make reference to Aboriginal peoples–a term that is used in the census to refer to Indigenous peoples in Canada. I also discuss legislation referring to Indians, which is the term used in official government documentation referring to Indigenous peoples. For this paper, the terms Aboriginal, Indigenous, and Indian are used in the context in which they arise.

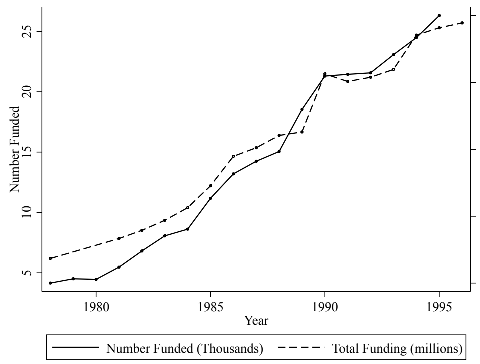
2 Background on Post-Secondary Funding for Indigenous Students

This section outlines the evolution of post-secondary funding to First Nations and Inuit students as described in Paquette and Fallon (2010) and Stonechild (2006). Canada's Indigenous population is comprised of three broad groups–First Nations (also known as North American Indians), Inuit, and Métis. Currently, the federal government has legal jurisdiction over First Nations and Inuit populations.[10] Prior to 1970 few First Nations or Inuit students attended post-secondary institutions and it was not until the late 1970s that the federal government implemented a formal post-secondary funding program for this demographic in response to increasing demand for post-secondary education from Indigenous groups. The Post-Secondary Educational Assistance Program (PSEAP) was established in 1977 to,

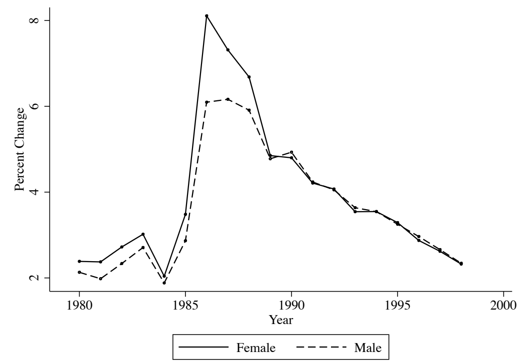
> *"Encourage Registered Canadian Indians and Inuit to acquire university and professional qualifications so that they may become economically self-sufficient and may realize their individual potentials for contributions to the Indian community and Canadian society."* (Program Circular, E.12, page 2)

To qualify, students had to be registered with the federal government as Status Indians or Inuit and they must have been accepted into a program at a valid post-secondary institution (Program Circular, E.12, page 3). Funding under the program was comprehensive and included tuition, training, shelter, travel, equipment, books, supplies, and other living expenses. Table A2 summarizes these allowances as they are described in official government documentation. At the onset of the program, Status Indians and Inuit who had been accepted into programs at recognized post-secondary institutions applied for funding through the Education Counsellor at the nearest Band Council Office or office of the Department of Indian Affairs and Northern Development, and then received compensation for the full cost of the post-secondary education of their choice.

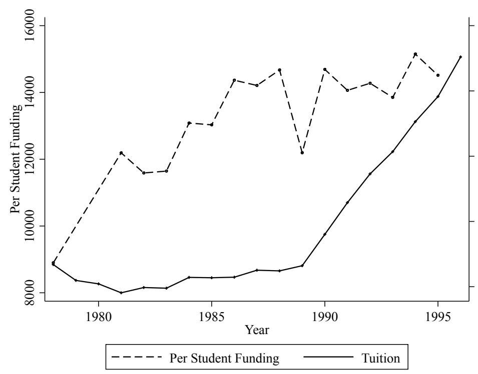
[10] In April, 2016, the Supreme Court of Canada passed a ruling that determined Métis are considered "Indian" within the meaning of the constitution. During the time period under study in this paper, the Métis population was not included in the legal definition of "Indian" used by the federal government.



(a) Total Funding and Number Funded



(b) Growth in the Registered Status Population



(c) Funding Per Student and Tuition

Figure 1: Number of students funded under the PSEAP and the PSSSP, the average amount of funding per student (in 2016 CAD), and the growth in the Registered Status population. Data for the number of students funded from *DIAND: Basic Departmental Data, 2004,* and data for the total and per student funding from Stonechild (2006) (1977, 1978, 1981-1989), Annual Indian Affairs Reports (1990), Indian and Northern Affairs Canada 1996 Performance Report (1991-1995). Data for Registered Status Population from *Basic Departmental Data, 2004, DIAND.*

Figure 1(a) shows that after the PSEAP was implemented the number of Indigenous students who were provided funding for post-secondary education under this program increased from 3,599 in the first year to 14,242 in 1987 (Stonechild, 2006). A contributing factor to the large increase in the number of students funded was the passage of Bill C-31, *A Bill to Amend the Indian Act*, in 1985, which sought to eliminate gender-discrimination from the Indian Act, and reinstated Status for women and their children who had previously been denied it under the discriminatory sections.[11] Figure 1(b) demonstrates the staggering increase in the total number of Registered

[11] Prior to 1985, Indian Status was inherited paternalistically. An Indigenous woman and her children were disenfranchised if the woman married a non-Indigenous man, though the same consequences did not hold for an Indigenous man marrying a non-Indigenous woman.

Status Indians after Bill C-31 passed.

The federal government viewed the increasing number of students funded through the PSEAP as financially unsustainable and, concerned about the potential extra demand for funding created by Bill C-31, met with Indigenous leaders in May of 1987 to discuss the most cost effective way to allocate funding for Indigenous students. It was decided that a new funding program would replace the PSEAP in the spring of 1989. This program was renamed the Post-Secondary Student Support Program (PSSSP) to reflect the differences from the PSEAP.

In general, the type of allowances available under the PSSSP did not change from the PSEAP, rather the PSSSP changed the expected costs of schooling in two fundamental ways. First, it imposed a cap on the total amount of funding available to students. Figure 1(c) displays the per-student funding and the average university tuition in Canada in 2016 CAD. This initial cap led to a substantial decline in the per-student funding, which was met with backlash from Indigenous scholars and leaders. The federal government responded by increasing total funding in the following year, allowing per-capita funding to return to it's 1988 level, after which point a 2% annual cap was imposed on spending increases. The 2% growth was not sufficient to cover rising demand for the program, leading per-student funding to level-off at around the same time that tuition rates began soaring. Thus, with rising tuition, it became increasingly challenging for Indigenous students to cover their entire schooling expenses with the funding they were allotted.[12]

Second, the new funding program lowered the likelihood that an eligible student received funding. Under the PSSSP the guidelines governing the application process were modified, so that the federal government allocated funding directly to each band and students applied to their band for funding, rather than to the federal government directly. In the event that there were more students eligible than funds available, applications could be deferred.[13] Although the Department of Indian Affairs asked regional administration offices to keep deferred files, they did not require offices to

[12]Figure A1 provides additional evidence that the cutbacks to funding were accompanied by notable declines in the portion of people receiving funding through the post-secondary student support program (labeled INAC). Figure A2 further shows the breakdown of total student assistance over this time period–e.g. INAC funding, loans, and other means of support. These figures are constructed from data from the 2006 Aboriginal People's Survey which does not include the on-reserve population.

[13]For example, on page 8 of the Post-Secondary Student Support Program Administrative Handbook states: *"Support will be provided within the limits of funds voted by Parliament. If support for the number of eligible applicants exceeds the budget, applications will be deferred according to the rules set out in each of the administering organization's guidelines."*

submit any type of record regarding the number of eligible students denied funding. Anecdotal evidence suggests that the number of students who were denied funding or had their application deferred due to unavailable funds may have been quite large. For example, the Eskasoni band's Director of Education reported that,

> *"[Eskasoni] has funding for approximately eighty students per year. Routinely, they get applications of 120 to 150. They have to turn away forty to seventy students per year."*
> (No Higher Priority, 1995)

In the following section I outline a simple theoretical framework that formalizes how the change in funding might affect educational choices. I then combine this insight with confidential micro data from Statistics Canada to examine how the decline in student aid has affected educational attainment and labour market outcomes among the First Nations and Inuit population in Canada.

3 A Model of the Acquisition of Schooling

In this section, I present a simple human capital model of the acquisition of schooling. The model is grounded in Becker (1964) and extends the framework of Charles, Hurst, and Notowidigdo (2016) by modelling the schooling decision in two stages: students first decide whether or not to complete high school and then which, if any, level of post-secondary education to obtain.

Consider a student residing in province p at time t who ultimately chooses the level of schooling r. This may be either no school (o), a high school diploma (h), a trade or apprenticeship (a), community college (c), or a bachelor's degree (u). Table A1 defines these schooling levels as they pertain to educational attainment in Canada. Students must graduate high school before pursuing a trade, college or bachelor's, so that their end level of schooling is the result of a two-stage decision process.

Students differ based on their ability α_i, which is known to the student but not the econometrician, and is distributed according to some underlying distribution with p.d.f. $\psi(x)$ and c.d.f. $\Psi(x)$ along support $(\underline{\alpha}, \bar{\alpha})$. This distribution is time invariant, so that changes in educational attainment arise from changes in the costs and benefits of schooling and not changes in the underlying distribution of ability.

Each level of education is associated with three types of costs: fixed costs, psychic costs, and opportunity costs. The fixed costs of school include the tuition of education level r in province p at time t (T^r_{pt}), and the cost of travelling to school (D^r_{pt}).[14] The fixed costs are 0 for the no school and high school options. If students choose to attend a post-secondary institution then with some probability μ_t they do not have to pay the fixed cost of schooling because they will receive adequate financial aid to cover the cost of their education.

Psychic costs, $\kappa^r(\alpha_i)$ are decreasing linearly in ability, $\kappa^r(1-\alpha_i)$, and reflect the idea that effort is costly and increasingly so for students of lower ability. I assume that $\kappa^o = 0$ and that $0 < \kappa^h < \kappa^a < \kappa^c < \kappa^u$ so that more effort is required for a bachelor's degree than for community college, trade school or high school, regardless of ability. I assume that the psychic costs of post-secondary education embed the psychic costs of high school, so that κ^a includes κ^h, and so on. Psychic costs are both time and location invariant.[15]

Students in province p at time t face an outside option of wages $w^o_{pt} = 0$ if they do not graduate high school. Assuming students live for T periods and have a time t information set of Ω_t,[16] then this structure ensures that the indirect utility of student i in province p in time t is:

$$U^o_{ipt}(\alpha_i) = \sum_{t=0}^{T} \mathbb{E}\left[w^o_{pt}|\Omega_t\right] = 0 \tag{1}$$

If students complete high school they can start working directly afterwards for a wage of w^h_{pt}, which is either high H or low L.[17] Then the indirect utility of student i in province p in year t is:

$$U^h_{ipt}(\alpha_i) = \sum_{t=l^h}^{T} \mathbb{E}\left[w^h_{pt}|\Omega_t\right] - \kappa^h(1-\alpha_i) \tag{2}$$

[14] I assume that the disutility associated with travelling to school is the same for each level of education.

[15] One could also imagine that psychic costs affect post-secondary attainment through a social cost parameter that captures between group differences in the propensity for social factors to affect school attendance. These pressures could be through peers, e.g., the "acting white" phenomenon where students are penalized by their peers for engaging in behaviour that is outside the group norm (Fryer, 2005; Fryer Jr. and Torelli, 2010); or other social factors that make completing high school difficult, like higher rates of teen pregnancies or family alcoholism in some communities (Garner, Guimond, and Senécal, 2013; Kelly-Scott and Smith, 2015). I abstract from this notion of psychic costs here.

[16] Ω_t captures all information a student may have accumulated that assists them in forecasting their future wages. I do not allow Ω_t to depend on ability, so in this sense wages are entirely determined by education, and higher ability students are not better at forecasting wages.

[17] Since the outside option yields a wage of 0, the wage of high school and higher levels of education can be thought of as the return to this level of education. Further, one could imagine a situation with a continuum of returns to high school, but for the purpose of illustrating how the returns to high school interact with the cost of post-secondary education only requires two wages.

where l^h is the length (in years) of high school.[18] If students complete high school, then they may choose to pursue a trade, community college, or a bachelor's degree. For each of these levels of schooling, $r \in \{a, c, u\}$, the costs of completing high school are embedded in the indirect utility function:

$$U^r_{ipt}(\alpha_i) = \sum_{t=l^r}^{T} \mathbb{E}\left[w^r_{pt}|\Omega_t\right] - (1-\mu_t)\left[T^r_{pt} + D^r_{pt}\right] - l^r \cdot w^h_{pt} - \kappa^r(1-\alpha_i) \tag{3}$$

Through backwards induction, students will choose the level of schooling $r \in \{o, h, a, c, u\}$ that yields the highest conditional indirect utility:[19]

$$\max\{U^o_{ipt}(\alpha_i), U^h_{ipt}(\alpha_i), U^a_{ipt}(\alpha_i), U^c_{ipt}(\alpha_i), U^u_{ipt}(\alpha_i)\}$$

For simplicity we can rewrite equation 3 in terms of the benefits less the costs:

$$U^r_{ipt}(\alpha_i) = \Pi^r_{pt} + \kappa^r \alpha_i \tag{4}$$

where,

$$\begin{aligned}
\Pi^r_{pt} &= B^r_{pt} - F^r_{pt} - \kappa^r \\
B^r_{pt} &= \sum_{t=l^r}^{T} \mathbb{E}\left[w^r_{pt}|\Omega_t\right] \\
F^r_{pt} &= (1-\mu_t)\left[T^r_{pt} + D^r_{pt}\right] + l^r \cdot w^h_{pt}
\end{aligned}$$

For students who face a high return to high school, $w^h_{pt} = H$, the conditions:

$$\begin{aligned}
0 > U^h_{ipt}(\underline{\alpha}) > U^a_{ipt}(\underline{\alpha}) > U^c_{ipt}(\underline{\alpha}) > U^u_{ipt}(\underline{\alpha}) \\
0 < U^h_{ipt}(\bar{\alpha}) < U^a_{ipt}(\bar{\alpha}) < U^c_{ipt}(\bar{\alpha}) < U^u_{ipt}(\bar{\alpha})
\end{aligned}$$

ensure that there is a range of ability levels for which each action is the optimal decision. Since the indirect utility is increasing in ability, these conditions also guarantee that all indirect utility functions cross. If students face a low return to high school ($w^h_{pt} = L$), then it is possible that

[18] If the student obtains high school, they forgo the wage of the outside option for the length of the time spent in high school, $l^h \cdot w^o_{pt}$; however, since $w^o_{pt} = 0$, this term does not need to be included in the indirect utility function.

[19] Following Charles et al. (2016) I abstract from imposing more complicated assumptions on the model. In particular, I ignore discounting, assume students are risk neutral, and I assume that students who choose to pursue degree r receive a degree. In addition, students do not work and attend school simultaneously and there is no borrowing cost.

the indirect utility they obtain as a high school graduate is lower than the indirect utility from no school. In this case, the following conditions characterize an optimal allocation of schooling under the assumption that students face a low return to school:

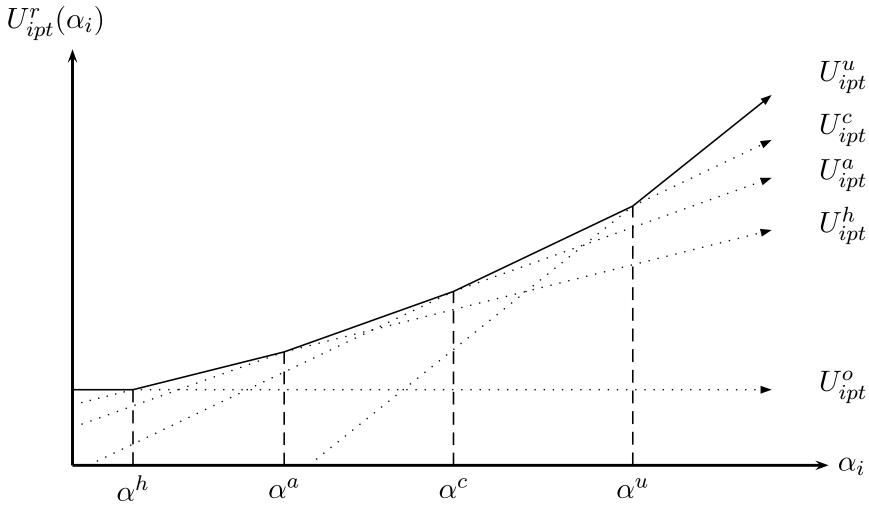
$$U^h_{ipt}(\underline{\alpha}) < U^a_{ipt}(\underline{\alpha})$$
$$0 > U^a_{ipt}(\underline{\alpha}) > U^c_{ipt}(\underline{\alpha}) > U^u_{ipt}(\underline{\alpha})$$
$$0 < U^h_{ipt}(\bar{\alpha}) < U^a_{ipt}(\bar{\alpha}) < U^c_{ipt}(\bar{\alpha}) < U^u_{ipt}(\bar{\alpha}).$$

Figure 2 plots equation 4 for each level of education. Figure 2(a) displays an equilibrium when $w^h_{pt} = H$. For all levels of ability lower than α^h, the student chooses to drop out of high school. At α^h the student is indifferent between graduating high school and not, whereas for $\alpha_i \in (\alpha^h, \alpha^a)$ the student will prefer to complete high school. Between $\alpha_i \in (\alpha^a, \alpha^c)$ the student will obtain a trade, between $\alpha_i \in (\alpha^c, \alpha^u)$ the student will go to community college, and for $\alpha_i > \alpha^u$ students will obtain a bachelor's degree.

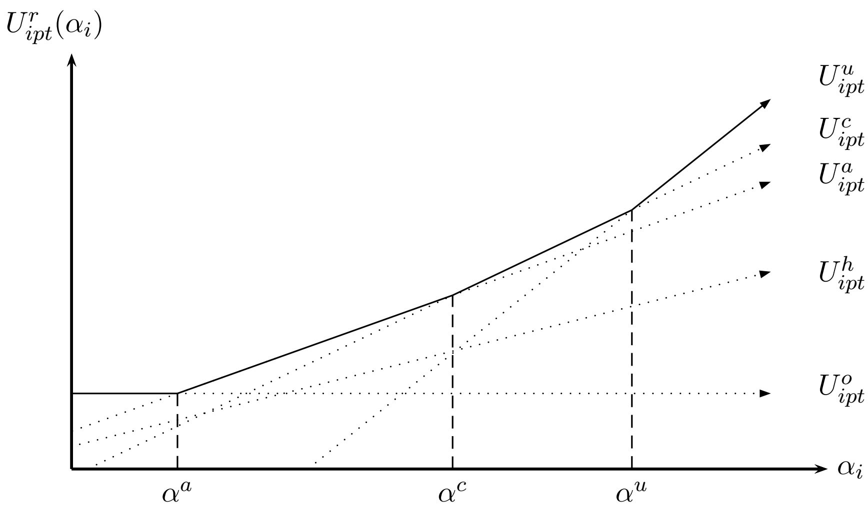
Figure 2(b) displays an equilibrium when $w^h_{pt} = L$. In this circumstance, it is never optimal for a student to choose high school as their highest level of education, since the return to a high school degree is so low that it is not worth paying the psychic cost of schooling. Here, for all levels of ability lower than α^a, the student chooses to drop out of high school, and at α^a the student will be indifferent between no school and trade school. Despite the fact that the indirect utility functions in Figures 2(a) and 2(b) contain the same costs and benefits of post-secondary schooling, the environment in which the return to high school is low will always have a lower high school graduation rate.

If we consider the policy environment in Canada in the late 1980s, the expected cost of schooling changed in two ways: (i) a student who received funding was not given enough funding to keep up with the rising costs of tuition; (ii) it became less likely that a student who was eligible for funding actually received funding. Both of these situations lead to a decrease in the expected cost of higher education. Since both the cost of tuition (T^r_{pt}) was increasing over time and the probability that an eligible student obtained funding (μ_t) was decreasing over time, we can interpret the effects as a gradual decline in the expected cost of higher education after the 1989 policy change.

Figure 3 demonstrates the effects of increasing the expected cost of post-secondary education



(a) Optimal schooling choices when $w^h_{pt} = H$

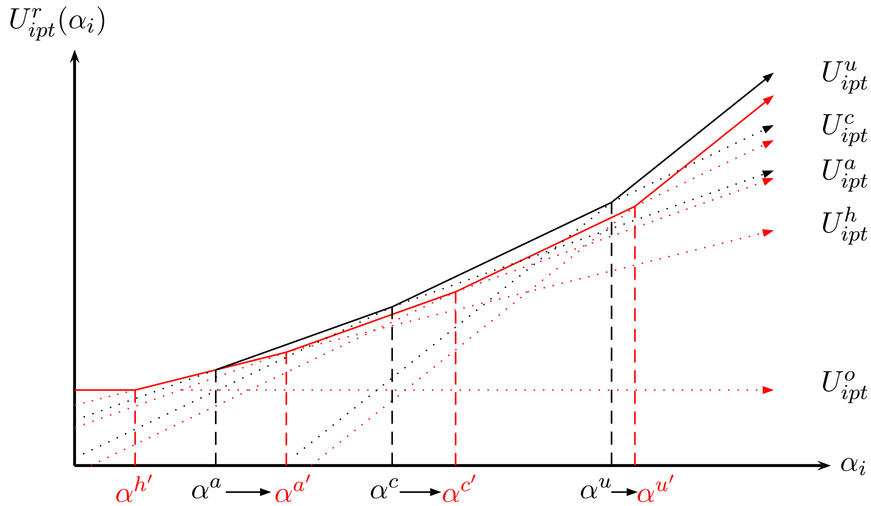


(b) Optimal schooling choices when $w^h_{pt} = L$

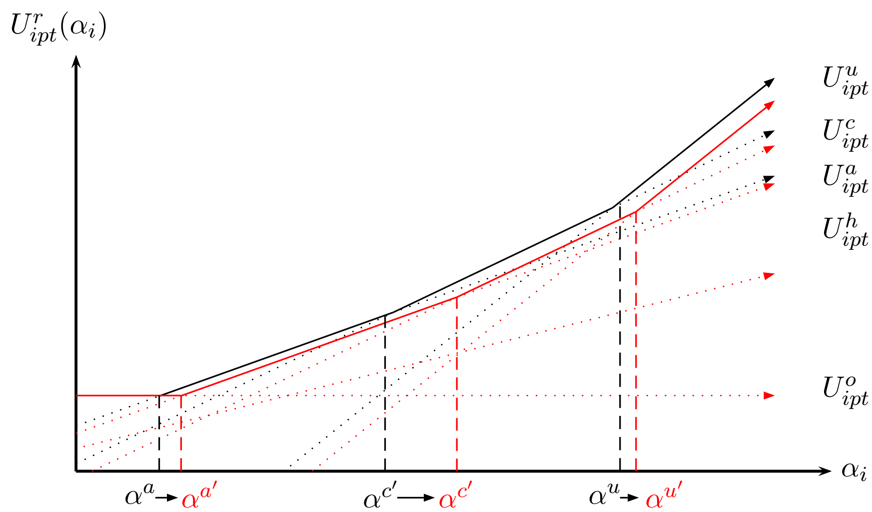
Figure 2: This figure displays the optimal allocation of schooling (conditional on ability) when $w^h_{pt} = H$ versus $w^h_{pt} = L$

on the cutoff values of α_i for a situation where the fixed costs of attending post-secondary school are increasing in their level of difficulty ($F^a < F^c < F^u$).[20] In this situation, a decrease in student aid causes U^u_{ipt} to shift downwards by more than U^c_{ipt}, and similarly the change in U^c_{ipt} will be more than the change in U^a_{ipt}. This results in an increase in the ability cutoff for trades, community college and bachelor's degrees. In regions where the return to high school is high, the change in

[20]While the costs of bachelor's programs were greater than the costs of community college and trade school during this time period, in the empirical section I explore the possibility that bachelor's degrees were funded at a higher rate after the cutbacks were imposed, in which case, the expected cost of bachelor's programs would not be higher than community college.



(a) Decreasing student aid if $F^a < F^c < F^u$ and $w^h_{pt} = H$



(b) Decreasing student aid if $F^a < F^c < F^u$ and $w^h_{pt} = L$

Figure 3: This figure displays the effects of increasing student aid when $w^h_{pt} = H$ and $w^h_{pt} = L$.

post-secondary funding should not affect the high school graduation rate (Figure 2(a)), but for areas with a low return to high school, the decrease in student aid can lead to a decrease in the high school graduation rate (Figure 2(b)). For the remainder of the education levels, the change in the share of the population whose highest degrees are trade school, community college and a bachelor's degree depend on the relative costs and benefits associated with each type of educational program, the differences between the psychic costs of attending each type of post-secondary program, and the degree to which post-secondary funding programs reduce each of the expected costs of schooling.[21]

[21] Appendix B illustrates that the model generates several intuitive comparative statics. Specifically, more people

In the sections that follow, I explore the predictions of the theoretical model empirically. Specifically, I use differences in the characteristics of individual's surrounding environments as variation in the costs and benefits associated with post-secondary education. I consider how differences in the returns to high school, cost of tuition, and distance to community colleges and universities interact with the changes to student aid for Indigenous students. In some circumstances, I rely heavily on the theoretical model to guide my interpretations of the results, while in others I consider the data independently from the model. In the final section, I abstract from the model to examine how the changes to student aid have contributed to contemporary labour market inequalities between Indigenous and non-Indigenous people in Canada.

4 Data Sources, Sample Restrictions, and Descriptive Statistics

The primary empirical strategy applies a difference-in-differences approach to exploit cross-cohort and cross-ethnicity variation in program eligibility to study the effect of student aid on educational attainment and labour market outcomes. This section describes the data sources and sample restrictions used to evaluate each outcome.

4.1 Data Sources and Sample Restrictions

The 2006 Census of Population is the principal data source used in the empirical analysis. Although the funding cutbacks occurred in 1989, I use date of birth combined with provincial school attendance rules at each point in time to group students into cohorts based on the year in which they should have graduated high school. A summary of these entry and exit rules is located in Table A3. To ensure that I am making comparisons between individuals who faced similar educational institutions in their youth, I exclude individuals who immigrated after they turned 10. I focus on cohorts who should have graduated high school between 1982 and 1995.[22]

The program was available to all Registered Status Indians or Inuit who had been accepted

will choose education level r if the benefits associated with r increase. This would be the case if there was an increase in the wage premium for graduates from program r, for instance. Likewise, more people choose education level r if the costs associated with the next highest education level increase. For example, if university tuition suddenly increases relative to community college tuition, then we expect to see a switch from bachelor's programs to community college programs. Similarly, if the cost of the education level just below r increases, we should see more students choosing r in subsequent periods. On the other hand, we should observe a decrease in the share of the population choosing education r if the cost of r increases, or if the benefits associated with the next highest or lowest education levels increase.

[22] I show in the robustness section that the results are unchanged if I choose a shorter window surrounding each of the policy changes.

into a recognized post-secondary institution. Since only First Nations are able to apply to become Registered Status Indians, I group students as eligible for the program (treatment) if they report having First Nations or Inuit ethnicity, and not eligible for the program (control) if they do not identify as First Nations or Inuit. Individuals can report multiple ethnicities on the census, and having multiple ethnicities does not necessarily preclude them from participating in the post-secondary funding program, so the eligible group consists of any combination of ethnicities that also contains First Nation or Inuit. That is, the eligible group is First Nation only, Inuit only, First Nation and Inuit, First Nation and Métis, First Nation and non-Aboriginal, Inuit and Métis, and Inuit and non-Aboriginal, while the non-eligible group is Métis only, and non-Aboriginal only.

Other studies that use current data to examine historical trends pool multiple waves of data, controlling for differences between surveys using dummy variables (Goldin and Katz, 2008; Charles, Hurst, and Notowidigdo, 2016). I choose to focus only on the 2006 census for three reasons. First, out of the 1991, 1996, 2001, 2006, and 2011 censuses, the 2006 census has the highest number of completely enumerated Indian reserves, which directly affects the composition of the treatment group in my analysis.[23] Second, the likelihood that an individual with Indigenous ethnic origins self-identifies on the census has also increased over time. This phenomenon, known as ethnic mobility, has been well documented for the Canadian Aboriginal population (Guimond, 1999, 2009; Caron-Malenfant, Coulombe, Guimond, Grondin, and Lebel, 2014).The prevalence of ethnic mobility would be particularly problematic for this analysis if willingness to self-report is in some way correlated with the likelihood of being affected by the policy. A final concern with pooling multiple waves of data is that the nature of the census questions on ethnic identity have changed over time in a way that directly affects the Aboriginal population (Saku, 1999).[24]

To construct the outcome variables relating to educational attainment I refer to the "highest certificate, diploma, or degree" attained by the respondent. From this variable, I can construct

[23]In 2006, 22 reserves were incompletely enumerated, down from 30 in 2001 and 77 in 1996: `https://www.aadnc-aandc.gc.ca/eng/1100100020284/1100100020288`. In 2011, there were 31 incompletely enumerated reserves: `http://www12.statcan.gc.ca/census-recensement/2011/ref/irr-app-ann-1-eng.cfm`. In addition to the high number of incompletely enumerated reserves, I do not consider the 2011 National Household Survey (replacement for the long-form census) since it was not mandatory to complete.

[24]The 2001 question was phrased as *"To which ethnic or cultural group(s) did this persons ancestors belong?"* and the 2006 question was *"What were the ethnic or cultural origins of this persons ancestors?"*. The 2006 census did, however, contain additional changes to the preamble to the ethnic origin question and it contained a definition of "ancestor" directly on the questionnaire, to minimize any confusion.

indicators for whether an individual's highest level of education is no school, high school, trade school, community college, or a bachelor's degree. Although there is an implied hierarchy in the classification of the "highest certificate, diploma, or degree" variable, there are some cases where a tradesperson may not have graduated high school. Since this likely represents a small fraction of those obtaining trades, I code an individual as having graduated high school if they indicate that their highest level of education is a high school degree or above.

In the theoretical model, students' utility from education level r depends on fixed costs (tuition and distance), psychic costs (effort and social pressures), and opportunity costs (forgone wages). To account for differences in the cost of tuition faced by students across provinces and across levels of education, I construct education-level estimates of the cost of tuition in each province and year of the analysis. I begin by setting the cost of tuition to be equal to 0 for the outside option (no school) and for high school in all provinces and time periods. I obtain the average cost of tuition in bachelor's programs for each province for the duration of my analysis from the Tuition and Living Accommodations Cost (TLAC) Survey implemented by Statistics Canada. This survey does not include the average cost of community colleges, nor the price of trade school and apprenticeships, and to the best of my knowledge this information is not available through other sources. I therefore construct an estimate of the cost of community college tuition by dividing total government expenditures on community colleges financed from student fees by total community college enrolment.[25] For provinces and territories that do not have community college expenditure and enrolment data, I replace their tuition costs by the national average in that year.[26] I construct the same estimate for university tuition and verify the estimates against the true values of university tuition from the TLAC survey. The results of this verification exercise are found in Figure A3 and show a remarkably close match. I am not able to locate the same expenditure and enrolment data for trade school and apprenticeship programs so I assume that the cost of these programs is equal to a fixed fraction of the cost of university.[27] The bachelor's, community college, and trade school

[25]Total expenditures on education is obtained from Statistics Canada CANSM table 478-0001 and total enrolment figures are from CANSIM table 477-0006 for 1982-1996.

[26]This data is predominantly unavailable for the territories, due to the fact that in some years they did not have any post-secondary institutions, so students had to travel to one of the provinces if they wanted to pursue a post-secondary degree.

[27]The exact value of the fixed fraction does not make a difference for the empirical analysis. In specifications where I examine the high school graduation decision, I include tuition costs for all levels of post-secondary education. This results in the tuition of trades being excluded from the regression model due to collinearity. In the regressions where

cost estimates can be found in Figure A4.

I address differences in travel costs by computing the geodetic distance between each census subdivision and the closest census metropolitan area using Statistics Canada geographic boundary files. I also calculate the latitude and longitude of the centroid of each census subdivision and include these variables as controls to proxy for isolation, or geographic characteristics that may affect educational attainment. To the extent that psychic costs may differ across provinces, time periods, or along other dimensions, I do not directly control for this in the econometric specification.

As a rough approximation for variation in opportunity costs, I include census metropolitan area (CMA) fixed effects. If an individual does not live in a CMA, the census assigns them one of four degrees of rurality. For individuals living outside of CMAs I could include the rurality code as their CMA fixed effect; however, it would mean that someone living in a rural area of the Northwest Territories would have the same fixed effect as someone living in a rural area of Newfoundland and Labrador. Because there are many reasons to believe that these people and their environments would differ, I replace CMA fixed effects with a CMA-province fixed effect. This does not change the grouping of people who actually live in a CMA, but adds a more reliable grouping for those living in rural areas.

One potential problem with using any of the geographic variables included in the 2006 census–CMA fixed effects, distance to a CMA, latitude and longitude of CSD, even the classification of year of graduation based on provincial school attendance rules–is that they assume that individuals are living in the same area in 2006 as when they went to high school. In the robustness section I show that this problem is likely not of large concern by restricting the sample to those who live in the same province they were born and re-estimating the main results. In addition, the inclusion of these controls could also be viewed as a useful proxy for regional differences in educational attainment or labour market conditions, rather than opportunity or travel costs.

All regression results are weighted by the composite sample weights included in the census files. Throughout the analysis, I employ a number of additional data sources that will be discussed as they appear in the results sections.

I examine the decision to complete each level of post-secondary education, I control for the tuition of the level that I am examining. For this exercise, changing the value of the fixed fraction simply changes the magnitude on the coefficient that corresponds to tuition, without changing the value of the coefficients on the other regressors.

4.2 Discussion of Data

Table 1 displays summary statistics for the outcome variables of the eligible and non-eligible populations in the time periods before and after the funding cutbacks.[28] Difference in means tests are also reported. Educational differences between the two groups are large. In both time periods a greater portion of the eligible group do not have a high school degree, in comparison to the non-eligible group. Community college and bachelor's degree completion is also higher for the non-eligible group; however, there are only small differences in trade completion between groups.

In general, labour market outcomes are lower among the eligible population in both time periods. The eligible group is more likely to be out of the labour force, and less likely to work full time, though the differences in part time employment are marginal. The eligible population also works fewer hours and weeks, is less likely to make above the median income, and is more likely to rely on government transfers. Qualitatively, these observations are the same across time periods.

Figure 4 shows trends in educational attainment over time. Figure 4(a) shows the share of the eligible population with each level of schooling by cohort. The vertical lines represent the date that the funding program was formally established and the date that funding was cut back. By construct, each individual must have some highest level of educational attainment even if this level is "no school". As a result, each cross section of Figure 4(a) should sum to 1. After 1989, there was a noticeable decrease in post-secondary attainment that was offset by an increase in the share of the population whose highest degree was a high school degree, in addition to an increase in the share with no formal education. Figure 4(b) displays the evolution of high school graduation rates among the eligible and non-eligible groups over time. Following the cutbacks to funding, high school graduation among the eligible population declined, while high school graduation among the non-eligible population remained flat.

Table A4 in the appendix includes additional summary statistics for the control variables. For all groups and time periods there is a higher share of men than women, though the gender ratio is particularly skewed towards women for the eligible population.[29] Due to the fact that the eligible group is defined by Inuit or First Nation identity, the portion of people reporting these ethnicities

[28]The summary statistics are calculated for cohorts graduating ± 6 years from the cutbacks, so that the pre-1989 sample is 1983-1989, and the post-1989 sample is 1990-1996.

[29]This is likely a result of high rates of homelessness and institutionalization among First Nations men in Canada (Feir and Akee, 2017).

Table 1: Summary Statistics Pre- and Post-1989

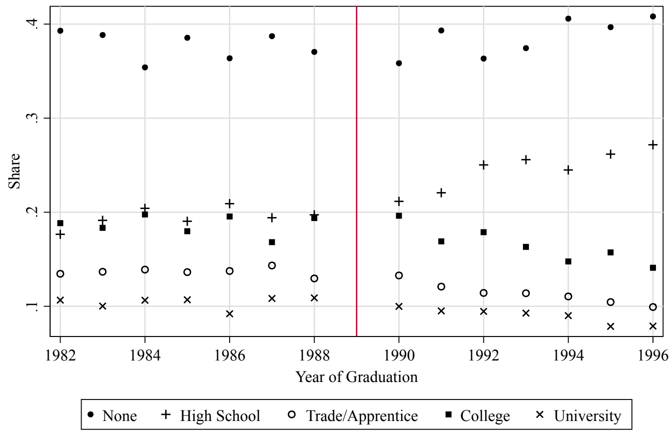
	Pre-1989			Post-1989		
	Eligible (1)	Non-Eligible (2)	Difference (1) - (2)	Eligible (4)	Non-Eligible (5)	Difference (4) - (5)
			Educational Outcomes			
No School	0.360	0.112	0.248	0.375	0.101	0.273
	(0.003)	(0.001)	(0.003)	(0.004)	(0.001)	(0.004)
High School	0.201	0.228	-0.027	0.248	0.224	0.024
	(0.003)	(0.001)	(0.003)	(0.003)	(0.001)	(0.004)
Trade	0.137	0.130	0.008	0.113	0.114	-0.001
	(0.003)	(0.001)	(0.003)	(0.002)	(0.001)	(0.002)
College	0.328	0.374	-0.046	0.283	0.360	-0.078
	(0.004)	(0.001)	(0.004)	(0.001)	(0.004)	(0.004)
University	0.071	0.247	-0.176	0.066	0.276	-0.210
	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.002)
High School Grad	0.640	0.888	-0.248	0.625	0.899	-0.273
	(0.003)	(0.001)	(0.003)	(0.004)	(0.001)	(0.004)
			Labour Market Outcomes			
Not Working	0.255	0.105	0.150	0.281	0.099	0.182
	(0.003)	(0.001)	(0.003)	(0.003)	(0.001)	(0.003)
Part Time	0.123	0.121	0.002	0.130	0.121	0.009
	(0.002)	(0.001)	(0.003)	(0.003)	(0.001)	(0.003)
Full Time	0.623	0.774	-0.152	0.588	0.780	-0.192
	(0.004)	(0.001)	(0.004)	(0.004)	(0.001)	(0.004)
Weeks	30.060	41.294	-11.234	27.267	40.214	-12.946
	(0.164)	(0.029)	(0.166)	(0.167)	(0.030)	(0.170)
Hours	23.654	33.137	-9.482	21.408	32.041	-10.633
	(0.174)	(0.034)	(0.177)	(0.174)	(0.035)	(0.178)
Above Med Inc	0.151	0.319	-0.168	0.090	0.206	-0.116
	(0.003)	(0.001)	(0.003)	(0.002)	(0.001)	(0.002)
Govt Transfers	0.822	0.583	0.238	0.853	0.598	0.255
	(0.003)	(0.001)	(0.003)	(0.003)	(0.001)	(0.003)

Notes: Sample means for eligible and non-eligible groups in the pre- and post-cutback time periods. Standard deviations are displayed in parentheses and difference-in-means tests are also computed. All statistics are weighted by the same weights provided in the census of population.

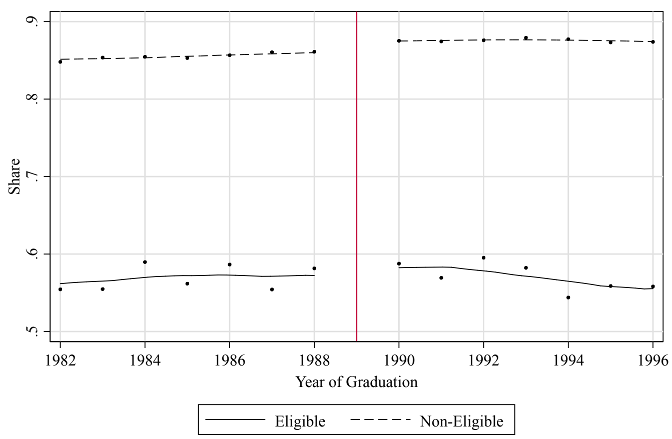
in the non-eligible group is 0. The portion who identify as Métis is roughly stable in the pre-1989 and post-1989 time periods. Finally, geographic isolation is more pronounced among the eligible group, who are more likely to live on a reserve or in a northern community and are located farther from a census metropolitan area.

5 Empirical Methodology

The primary empirical strategy is a difference-in-differences framework that compares educational attainment across cohorts and across students who, based on their ethnicity, are eligible for funding



(a) Trends in education of eligible population



(b) Trends in high school graduation rates

Figure 4: Distribution of educational attainment for the eligible population by expected high school graduation year. Lines of fit are from local polynomial regressions of degree 1. Data from 2006 Census of Population.

through the post-secondary funding program and those who are not. To formalize this comparison, consider the level of schooling r which, consistent with the theoretical model, may be either "no school", "high school", "trade school", "college", or "university". Let $r_{i,g,t} = 1$ if r is the highest level of schooling of individual i from eligibility group g belonging to graduation cohort t, and consider the following equation that relates r to student aid eligibility:

$$\mathrm{r}_{i,g,t} = \gamma_0 + \gamma_1 \mathrm{after}_t \times \mathrm{eligible}_g + \gamma_2 \mathrm{after}_t + \gamma_3 \mathrm{eligible}_g + \epsilon_{i,g,t}, \quad (5)$$

where, the indicator after_t is equal to 1 if individual i from cohort t should have graduated high school in any year after 1989, and eligible_g is an indicator equal to 1 if individual i belongs to an ethnic group that is eligible for the program.[30] The coefficient of interest, γ_1, measures the differential change in the share of the population whose highest level of education is r between eligible and non-eligible students after the policy change. Since I do not observe whether students actually obtained post-secondary funding, γ_1 can be interpreted as an estimate of the *intent-to-treat* (ITT). The differential change in expected outcomes between the eligible and non-eligible population, where A stands for "after", E for "eligible", B for "before" and NE for "non-eligible" can be expressed non-parametrically as:

$$\Big(\mathbb{E}\left[\mathrm{r}_{i,g,t}|A,E\right]-\mathbb{E}\left[\mathrm{r}_{i,g,t}|B,E\right]\Big)-\Big(\mathbb{E}\left[\mathrm{r}_{i,g,t}|A,NE\right]-\mathbb{E}\left[\mathrm{r}_{i,g,t}|B,NE\right]\Big)= \gamma_1+\left[\Big(\mathbb{E}\left[\epsilon_{i,g,t}|A,E\right]-\mathbb{E}\left[\epsilon_{i,g,t}|B,E\right]\Big)-\Big(\mathbb{E}\left[\epsilon_{i,g,t}|A,NE\right]-\mathbb{E}\left[\epsilon_{i,g,t}|B,NE\right]\Big)\right], \quad (6)$$

where the last term in equation 6 quantifies the differential change in unobservable characteristics between the eligible and non-eligible populations after the policy change. In order to interpret γ_1 as the causal effect of the funding cutbacks on education level r, this term must equal 0. Although we can never prove this, we can assess whether it is likely to be true based on a set of key identifying assumptions.

First is the common support condition, which relies on the legitimacy of the non-Indigenous and Métis population as a control group. While there are certainly demographic differences between the treatment and control groups, we can mitigate this concern by controlling for these differences in the regression framework. Therefore, the preferred specification generalizes the standard difference-in-differences model by adding a matrix of control variables:

$$\mathrm{r}_{i,g,t}=\gamma_0+\gamma_1\text{after}_t\times\text{eligible}_g+\mathbf{X}_{i,g,t}\mathbf{\Theta}+\psi_g+\zeta_t+\epsilon_{i,g,t}, \quad (7)$$

which includes gender, whether someone is registered with the federal government as a Status Indian, tuition of education level r in province p at time t, the distance between an individual's census subdivision and the closest census metropolitan area, and the latitude and longitude of the

[30] In each specification $t \in \{0, \pm 6\}$ years from the policy change so that all regressions consider cohorts spanning a 13 year period surrounding the policy change. Using a wider or narrower time frame does not change the results qualitatively.

centroid of individual i's census subdivision. In this framework, the indicator "eligible" is replaced by ethnic group dummies, ψ_g, to control for variation in educational attainment across groups that is constant over time. The indicator "after" is replaced by year of graduation dummies, ζ_t, to account for secular changes in educational attainment across time that are common across groups.[31] I also include CMA-province, tribe, and birth quarter fixed effects.

The second assumption required to interpret γ_1 as the causal effect of the policy change is that of a common trend, which states simply that in the absence of treatment, educational attainment among the treatment and control groups would have followed parallel trends. To formally test this assumption would be impossible, as it refers to a hypothetical situation. Nevertheless, I can test whether there are differential pre-treatment trends between the eligible and non-eligible groups to lend support to my identification strategy. To do this, I present specifications that interact eligibility with each year before and after the policy change:

$$\mathrm{r}_{i,g,t} = \gamma_0 + \sum_{t=-6, t\neq -1}^{6} \delta_t \mathrm{eligible}_g \times \mathrm{cohort}_t + \mathbf{X}_{i,g,t}\mathbf{\Theta} + \psi_g + \zeta_t + \epsilon_{i,g,t}, \tag{8}$$

where the set of dummies, $\{\mathrm{eligible}_g \times \mathrm{cohort}_t\}_{t=\{-6,\ldots,-2,0,\ldots,6\}}$, are the interaction of eligibility with cohort dummies. They control for the change in educational attainment between eligible and non-eligible groups for cohorts who are born ± 6 years from the policy change, excluding $t = -1$, so that the coefficient estimates are measured with respect to one graduation cohort prior to the policy change. Testing whether the pre-treatment trends are different amounts to checking whether each of δ_t, $t = \{-6, \ldots, -2\}$ are statistically different from 0. I confirm this check in the results section.

Third, there cannot have been any anticipation effects prior to the policy change. The historical accounts suggest that the cutbacks were discussed as early as 1987. If anticipation effects were present, in the sense that high school students began dropping out of school early in anticipation of the fact that they would not have post-secondary funding available to them, then the treatment effects will be larger in magnitude than those presented in the results section. However, if more students in the 1988 cohort applied for the program to secure funding in anticipation of a lack of future funds, then it is possible the results will overstate the true effect on educational attainment.

[31] Ethnic group dummies control for whether an individual identifies as either Inuit, First Nation, Métis or non-Indigenous. As described in the data section, an individual may identify with more than one of these ethnicities.

The event study framework in equation 8 assists in ruling out anticipation effects of this type.

Finally, there cannot have been any anticipation effects on the part of the federal government. That is, the funding cutbacks cannot have been a response by the federal government to an anticipation that there would be a reduced demand for the post-secondary funding program. This assumption rules out the potential for reverse causality, wherein the federal government's cutbacks were actually a response to declining demand. If anything, the historical accounts suggest the opposite is true; the federal government felt costs were unsustainable and cut back funding accordingly.

In the theoretical specification, students choose the level of education that yields the highest indirect utility conditional on their individual level of ability. This type of utility maximization behaviour typically implies the use of a logit or probit model in estimating the share equations, depending on the structure of the error terms. Moreover, the ordered nature of the education choice, would suggest the use of an ordinal regression model, like an ordered probit or logit. However, the majority of the right hand side variables in equation 8, in addition to the CMA-province and tribe fixed effects, are binary, which introduces an incidental parameter problem when using non-linear estimation techniques. In addition, to interpret the treatment effects as causal in difference-in-differences specifications, requires a linear specification. To avoid these issues, I treat the share equations as linear probability models and I estimate them jointly in a Seemingly Unrelated Regression (SUR) model to account for the cross-equation correlation of the error terms.[32]

For the analysis of high school graduation and labour market outcomes, I estimate equation 8 using an indicator for high school graduation or the appropriate labour market outcome as the dependent variable. These regressions cluster standard errors at the province level, which is the jurisdictional level of education-related policy in Canada.

[32]I include ordered logit results in the appendix, which yield very similar results as the SUR model. I also estimate each equation individually using OLS, logit and probit, which all yield similar marginal effects. These results are unreported, but available upon request.

6 Results

6.1 The Distribution of Educational Attainment

This section presents the results examining how the program cutbacks affected the distribution of educational attainment. Table 2 displays the coefficient estimates from equation 8. The coefficients measure the differential change in the share of the population with education level r between eligible and non-eligible groups relative to one year prior to the cutbacks. Each column represents a different level of educational attainment, so the results should be considered as a whole and not equation by equation. All columns include the full set of controls and fixed effects.

After the new guidelines of the PSSSP came into effect, there were declines in trades, community college and bachelor's program completion. A striking feature of the treatment effects is that they are changing over time. For instance, relative to the control group, the share of the population with a community college degree declined by 1.1 percentage points in the first cohort affected by the funding cutbacks. For cohorts completing high school six years after the cutbacks, community college completion had declined by 4.8 percentage points, relative to the non-eligible population. Trades completion declined by 0.1 percentage points among the cohort immediately after cutbacks, and 1.7 percentage points six cohorts after cutbacks. Similarly, the share of the population with a bachelor's degree declined by 1.1 and 2.0 percentage points, one and six cohorts after the program cutbacks, although the individual effects are not statistically different from 0.

These trends are consistent with the predictions of the theoretical model when the expected cost of schooling is decreasing over time. Recall that the changes to post-secondary funding occurred in such a way that increased the cost of post-secondary education at the same time that the likelihood of obtaining post-secondary funding that would cover one's entire cost of schooling was decreasing. Essentially, $\frac{\partial \mu_t}{\partial t} < 0$ which implies that the expected cost of schooling is increasing over time. This slow change in μ_t results in a gradual change in the share of the population completing each level of schooling.

Mechanically, the decrease in community college and bachelor's degree completion must be accompanied either by increases in the share of the population whose highest degree is no school or the share whose highest degree is a high school diploma.[33] Indeed, the share of the population

[33] Another way of saying this is that by construction everyone has *some* highest level of education, so that in the

Table 2: Effects of Funding Cutbacks on Education Levels

	(1) None	(2) High School	(3) Trade	(4) College	(5) Bachelor's
$t = -6$	0.01872*	-0.03926***	-0.00903	-0.00810	0.03767***
	(0.00959)	(0.01278)	(0.00994)	(0.01382)	(0.01304)
$t = -5$	-0.00355	-0.02567**	-0.01389	0.00788	0.03522***
	(0.00950)	(0.01267)	(0.00985)	(0.01370)	(0.01292)
$t = -4$	0.00038	-0.02063	0.00211	-0.00275	0.02089
	(0.00963)	(0.01284)	(0.00998)	(0.01389)	(0.01310)
$t = -3$	-0.00110	-0.00286	-0.00643	0.00341	0.00698
	(0.00957)	(0.01276)	(0.00992)	(0.01380)	(0.01302)
$t = -2$	0.01246	-0.00996	0.00665	-0.02084	0.01169
	(0.00953)	(0.01270)	(0.00987)	(0.01373)	(0.01295)
$t = -1$	.	.	.	.	.
	.	.	.	.	.
$t = 0$	0.01929**	0.00557	-0.00187	-0.01131	-0.01168
	(0.00956)	(0.01275)	(0.00991)	(0.01379)	(0.01300)
$t = 1$	-0.00154	0.01757	0.00545	-0.00934	-0.01213
	(0.00969)	(0.01291)	(0.01004)	(0.01396)	(0.01317)
$t = 2$	0.03375***	0.01219	-0.00468	-0.03642***	-0.00484
	(0.00966)	(0.01287)	(0.01001)	(0.01392)	(0.01313)
$t = 3$	0.01535	0.03696***	-0.00983	-0.03224**	-0.01023
	(0.00963)	(0.01283)	(0.00997)	(0.01388)	(0.01309)
$t = 4$	0.01961**	0.04492***	-0.01741*	-0.03783***	-0.00929
	(0.00968)	(0.01291)	(0.01003)	(0.01396)	(0.01316)
$t = 5$	0.04157***	0.03267**	-0.01357	-0.04231***	-0.01836
	(0.00971)	(0.01295)	(0.01007)	(0.01400)	(0.01321)
$t = 6$	0.03844***	0.04799***	-0.01738*	-0.04830***	-0.02076
	(0.00969)	(0.01292)	(0.01005)	(0.01397)	(0.01318)
N Obs	917,590	917,590	917,590	917,590	917,590
R^2	0.04954	0.01693	0.04120	0.01210	0.06049

Notes: Standard errors in parentheses. The dependent variable in each specification is a dummy variable for whether or not the highest level of education completed is the one being examined in the regression. The 5 equations are estimated jointly in a Seemingly Unrelated Regression model. A Breusch-Pagan test of independence among the error terms strongly rejects the null hypothesis that the errors are independent: $\chi^2(10) = 593,890$. I exclude the dummy variable for $t = -1$ so that all effects are measured relative to one cohort before the policy change occurred. All regressions control for gender, whether an individual lives on a reserve or northern community, whether the individual is a Status Indian, distance to the closest CMA, latitude and longitude of CSD, tuition of education level r in province p at time t, and I include fixed effects for tribe, CMA-province, aboriginal group, and birth quarter.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 3: Effects of Funding Cutbacks on Education Levels by Gender

	(1) None	(2) High School	(3) Trade	(4) College	(5) Bachelor's
			Panel A: Full Sample		
Treatment	0.01787***	0.04527***	-0.00632	-0.02983***	-0.02698***
	(0.00380)	(0.00506)	(0.00393)	(0.00547)	(0.00516)
N Obs	917,590	917,590	917,590	917,590	917,590
Adj. R^2	0.04950	0.01690	0.04118	0.01208	0.06046
			Panel B: Male Sample		
Treatment	0.02066***	0.02600***	-0.01322**	-0.02471***	-0.00873
	(0.00597)	(0.00761)	(0.00636)	(0.00772)	(0.00724)
N Obs	454,860	454,860	454,860	454,860	454,860
Adj. R^2	0.04755	0.01711	0.03630	0.00808	0.05595
			Panel C: Female Sample		
Treatment	0.01496***	0.06529***	-0.00086	-0.03427***	-0.04511***
	(0.00480)	(0.00674)	(0.00478)	(0.00776)	(0.00736)
N Obs	462,740	462,740	462,740	462,740	462,740
Adj. R^2	0.04695	0.01703	0.03249	0.00788	0.05661

Notes: Standard errors in parentheses. The dependent variable in each specification is a dummy variable for whether or not the highest level of education completed is the one being examined in the regression. The 5 equations are estimated jointly in a Seemingly Unrelated Regression model. A Breusch-Pagan test of independence among the error terms strongly rejects the null hypothesis that the errors are independent: $\chi^2(10) = 593,890$ (full), $\chi^2(10) = 289,590$ (men), $\chi^2(10) = 306,260$ (women). All regressions control for gender (Panel A only), whether an individual lives on a reserve or northern community, whether the individual is a Status Indian, distance to the closest CMA, latitude and longitude of CSD, tuition of education level r in province p at time t, and I include fixed effects for tribe, CMA-province, aboriginal group, and birth quarter.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

whose highest degree is a high school diploma increased by up to 4.8 percentage points, and the share of the population with no school increased by up to 4.1 percentage points.

Table 3 presents estimates from equation 7. In this table, the post-treatment cohorts, $t = \{0, \ldots, 6\}$, and the pre-treatment cohorts, $t = \{-6, \ldots, -1\}$, are pooled, so that the treatment indicator tests whether the average change in educational attainment among eligible cohorts is statistically different from the average change in educational attainment among non-eligible cohorts. Panel A presents the full sample, panel B displays the male sample, and panel C examines the female sample. Table A5 displays the marginal effects from an ordered logit estimation for

aggregate, increases in the share of the population with one level of education must be offset by decreases in the share of the population with another level of education.

comparison.

The treatment effect reported in Table 3 for bachelor's programs is 2.7 percentage points. Given that, prior to 1989, the share of the eligible population with a bachelor's degree was 7.1%, this coefficient imples that the funding cutbacks led to a 38% decline in bachelor's completion relative to the non-eligible group. For community colleges, which were attended more frequently than bachelor's programs, the treatment effect implies a 9.1% decline in completion, relative to the non-eligible population. In concordance with Table 2 declines at the community college and bachelor's degree level were offset by increases at the high school and no school level.

To place these results in the context of the theoretical framework, in order to observe a decline in bachelor's completion in addition to college completion, we need the expected cost of community college to increase by more than the expected cost of bachelor's degrees. This would be the case if, for example, bachelor's programs were funded at a higher rate before and after the program cutbacks. In Figure A6 I present supplementary evidence that suggests this may have been the case. Using data from the confidential 2006 Aboriginal People's Survey, panel (a) displays the share of each cohort who attended some community college and the share of each cohort who attended some community college and received funding for their education. Panel (b) displays the analogous shares for bachelor's programs. These figures make it clear that most students in bachelor's programs received some funding for their education, while the reverse was not true for community college.[34]

Focussing on the treatment effects by gender reveals that community college completion declined for both men and women; however, at the margin, trade school completion declined for men, while bachelor's degree completion declined for women. Prior to 1989, men attended trades programs at greater rates than women, and women attended bachelor's programs at greater rates than men, thus we should expect to see these differential effects by gender.

The final point to make regarding Tables 2 and 3 is that both the share of the population with no school and whose highest degree was a high school degree declined. This suggests that some students responded to the cutbacks to post-secondary funding by deciding not to pursue

[34]The 2006 Aboriginal People's Survey (APS) is a volunteer survey administered to individuals who report having Aboriginal identity on the 2006 Census of Population. Unfortunately the 2006 APS did not include the on-reserve population, so these figures are constructed using only those living outside of reserves.

post-secondary education, while others dropped out of high school entirely. The theoretical model predicts that when students face a low return to graduating high school, cutbacks to post-secondary funding can lead to declines in high school graduation because for many students, the only reason to complete high school is for the option to attend a post-secondary institution. In the sections that follow, I investigate this result in more detail by considering the policy response for the high school graduation rate.

6.2 High School Graduation Rates

6.2.1 Main Results

The post-secondary funding program did not change the cost of graduating high school, so in the context of the human capital model presented in Section 3, we should only observe changes in the high school graduation rate if the return to high school so low that it is not a worthwhile education choice unless post-secondary education is a viable option. To shed light on this observation, I begin by presenting the results of estimating equation 8 in Figure 5, where the dependent variable is an indicator for whether or not the individual graduated from high school. Since the share of the population with no school is the inverse of the high school graduation rate, the information in Figure 5 is analogous to the findings in column (1) of Table 2.

Each point on the graph can be interpreted as the difference between graduation rates among the eligible and non-eligible groups relative to the year prior to the policy change. The dashed lines represent 95% confidence intervals constructed using standard errors clustered by province. The fact that the coefficient estimates prior to each of the policy changes are not statistically different from zero suggests that high school graduation rates among the eligible population and the non-eligible population followed parallel trends before the policy change. This result lends support to the assumption that prior to the funding cutbacks, high school graduation rates among the eligible and non-eligible populations followed parallel trends. The main takeaway from the plot is that high school graduation rates declined gradually after the funding program was cut back.

Table 4 presents the results from estimating the difference-in-differences specification with pooled pre-treatment and post-treatment time periods. Standard errors, clustered by province, are reported below coefficient estimates in parentheses, and P-values from the wild cluster boot-

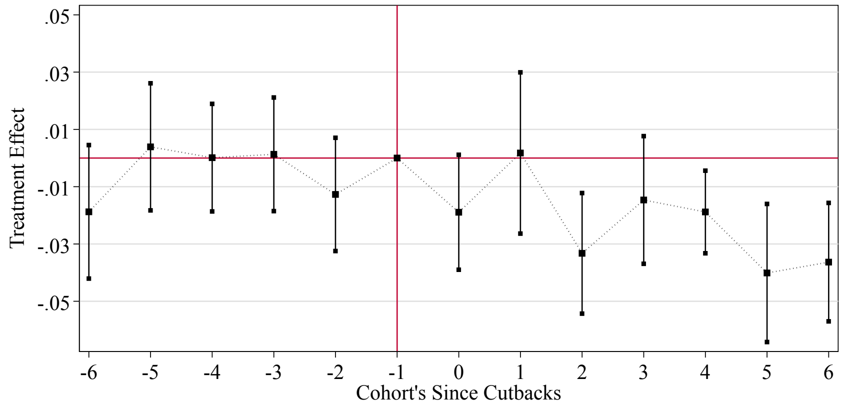


Figure 5: The dependent variable is an indicator for whether an individual graduated from high school. The figure plots estimated coefficients on the interactions between "eligible" and event-time dummies for 6 years before and after the funding was cut back. Time -1 is omitted so that all coefficients are measured with respect to one year prior to the cutbacks. I include controls for gender, whether an individual lives on a reserve or northern community, whether the individual is a Status Indian, distance to the closest CMA, latitude and longitude of CSD, tuition of college and university in province p at time t, and fixed effects for tribe, CMA-province, aboriginal group, year of graduation, and birth quarter. The dashed lines represent 95% confidence intervals constructed from standard errors clustered by province.

strap are reported below coefficient estimates in brackets.[35] Column (1) displays the results from the standard difference-in-differences model of equation 5, where I only include controls for whether the individual belongs to a cohort affected by the cutbacks, whether they belong to the eligible group, and CMA-province fixed effects. Column (2) adds the full set of controls: gender, whether an individual is a Status Indian, whether or not the individual lives on a reserve or northern community, distance to the closest CMA, latitude, longitude of CSD, tuition for college and university in province p in time t, and fixed effects for year of graduation, aboriginal group, birth quarter, tribe, and CMA-province. The final four columns split the sample between men and women and those living on- or off-reserve. Each of these columns includes the full set of controls.[36]

The estimate of the treatment effect suggests that, following the cutbacks high school graduation rates declined by 2.1 percentage points in relation to the control group. This effect is statistically significant at the 1 percent level. Adding the full set of controls reduces the magnitude of the coefficient slightly, to approximately -1.7 percentage points and it remains statistically significant at the 5 percent level. The decline in high school graduation rates is larger for men than

[35]When clusters have vastly different sizes, the standard cluster robust variance estimator has a tendency to over-reject (MacKinnon and Webb, 2017). In this case, the wild cluster bootstrap is an effective alternative.

[36]Table **??** displays the results for First Nations and Inuit separately.

Table 4: Effects of Funding Cutbacks on High School Graduation

			Gender		Location	
	No Controls	Full Controls	Men	Women	On-Reserve	Off-Reserve
Treatment	-0.02053***	-0.01705**	-0.02040**	-0.01363**	-0.04286***	-0.01036
	(0.00555)	(0.00592)	(0.00829)	(0.00457)	(0.00696)	(0.00993)
	[0.00802]	[0.05210]	[0.08417]	[0.04008]	[0.00000]	[0.41683]
N Obs	917,590	917,590	454,860	462,740	55,130	862,460
Adj. R^2	0.04161	0.04924	0.04697	0.04645	0.10947	0.03327

Notes: Standard errors clustered by province in parentheses. Wild cluster bootstrap P-values in brackets. The dependent variable in each specification is a dummy variable for whether or not the individual is a high school graduate. Treatment is the interaction of graduating after the policy change and eligibility for the program. Column (1) includes an indicator for eligibility and for being in a cohort that should have graduated after the policy change, CMA-province fixed effects, and a linear year of graduation time trend. All other columns control for gender, whether an individual lives on a reserve or northern community, whether the individual is a Status Indian, distance to the closest CMA, latitude and longitude of CSD, tuition of college and university in province p at time t, and I include fixed effects for tribe, CMA-province, aboriginal group, year of graduation, and birth quarter.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

for women, but more importantly, seems to be driven entirely by those living on-reserve. After the cutbacks, the high school graduation rate on reserves declined by 4.3 percentage points relative to the control group. This effect is statistically significant at the 1 percent level. In contrast, graduation rates off-reserve declined by 1.0 percentage points, and this effect is not statistically different from 0. In all columns, the wild cluster bootstrap P-value is slightly larger than the P-value implied by the cluster robust variance estimator (CRVE). Since the bootstrap P-values do not alter the main conclusions, the remainder of the paper reports standard errors constructed from the standard CRVE.

The decline in the on-reserve graduation rate relative to the non-eligible group is likely due to the fact that the returns to completing high school are lower than in urban areas (George and Kuhn, 1994; Feir, 2013). The intuition behind this finding was previously made clear in the theoretical section. For many students, if the future of their post-secondary education is uncertain, it may not be worthwhile to complete high school if there are not adequate opportunities upon graduating high school. One particular example from the Standing Committee on Aboriginal Affairs and Northern Development (2007) highlights the educational challenges faced by Indigenous students on reserves:

> *"If our students struggle through their childhood to get to the point where they can go on to advanced training, advanced education, and then find that the resources aren't*

there for them to move on, the tragedy is so painful we simply cannot allow it to happen." - Roberta Jamieson, President and Chief Executive Officer, National Aboriginal Achievement Foundation

In Figure A5 I present evidence that, in addition to a lower wage premium, Indigenous students living on-reserves faced fewer occupation choices with a high school degree compared to those living outside of reserves. The figure shows that, although the unemployment rate is higher on reserves, conditional on being employed, the types of jobs and skill requirements on reserves are different than in census metropolitan areas, other urban areas, and other rural areas. In particular, there are fewer low-skill jobs and more high-skill jobs, compared to other regions.

The following sections discuss several other ways in which the treatment effect may be larger for certain subgroups.

6.2.2 Varying the Cost Parameters

In the theoretical framework, there are three ways in which the cost of schooling enters the individual's decision problem: psychic costs, fixed costs, and opportunity costs. To the extent that I am able to identify variation in these cost parameters, given the limitations of the data, this section considers how they interact with the effects of the funding cutbacks. Specifically, I investigate several ways in which the cost of distance and tuition may vary across students to further assess the heterogeneity of the main results. A priori we may expect that students who live in provinces that experience larger increases in tuition would be more adversely affected by the cutbacks. Similarly, communities that are more geographically isolated may also experience larger declines in high school graduation rates.

Figure A7 displays the location of community colleges, bachelor's institutions, and CMAs in 1989 in relation to Indigenous communities. The location of post-secondary institutions was obtained by combining information from Statistics Canada's "Universities and Colleges of Canada" 1976 catalogue with the present day location of colleges and universities from the Campus Tour website.[37] To examine the possibility that the effect of funding cutbacks on the high school

[37] The 1976 location is from Statistics Canada Catalogue 81-239. The location of current colleges and universities can be found online at `www.campustour.ca/map.html`. For post-secondary institutions that were established between 1976 and the present, I conducted an internet search of university websites to determine whether the institution was open in 1989.

Table 5: Effects of Funding Cutbacks on High School Graduation: Heterogeneity in Distance

	Closest CMA		Closest College		Closest University	
	Above	Below	Above	Below	Above	Below
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Above and Below the Median						
Treatment	-0.01717**	-0.01847**	-0.01589*	-0.01579*	-0.01662*	-0.01932**
	(0.00661)	(0.00786)	(0.00838)	(0.00854)	(0.00773)	(0.00736)
N Obs	457,200	460,390	458,350	459,250	454,150	463,450
Adj. R^2	0.07143	0.02305	0.06269	0.02187	0.05946	0.01722
Panel B: Above and Below the 90th Percentile						
Treatment	-0.01768	-0.02253***	-0.00769	-0.02575***	-0.01577	-0.01953**
	(0.01340)	(0.00651)	(0.01508)	(0.00625)	(0.00957)	(0.00811)
nObs	91,570	826,030	91,110	826,480	91,540	826,050
Adj. R^2	0.10670	0.03012	0.12521	0.03158	0.11968	0.03260

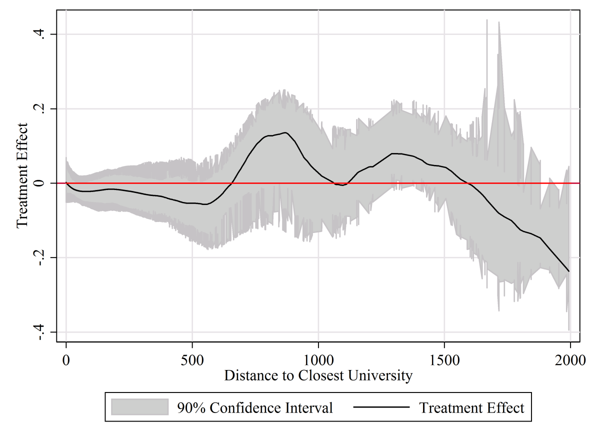
Notes: Standard errors clustered by province in parentheses. The dependent variable in each specification is a dummy variable for whether or not the individual is a high school graduate. Treatment is the interaction of graduating after the policy change and eligibility for the program. All columns control for gender, whether an individual lives on a reserve or northern community, whether the individual is a Status Indian, distance to the closest CMA, latitude and longitude of CSD, tuition of college and university in province p at time t, and I include fixed effects for tribe, CMA-province, aboriginal group, year of graduation, and birth quarter.* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

graduation rate varied based on geographic isolation beyond living on a reserve, I compute the geodetic distance between each census subdivision and the closest college, university, and CMA and reestimate the results for different quantiles of the distribution of distance. Table 5 reports the results of this exercise. Panel A compares communities that are above and below the median distance, and Panel B compares communities that are above and below the 90th percentile.[38]

Column (1) computes the treatment effect for those above the 50th percentile of the distribution of distance to closest CMA, (2) examines the effect for those below the 50th percentile. Columns (3) and (4) do the same for closest community college, and (5) and (6) do the same for closest university. The treatment effect does not seem to vary based on whether someone is located above or below the median distances. However, it does differ based on whether someone is located above or below the 90th percentile. The treatment effect for those who are located in CSDs that are below the 90th percentile is approximately -2.3 percentage points for CMAs, -2.6 percentage points for community colleges, and -2.0 percentage points for universities. The treatment effects for those

[38]Examining how distance interacts with the treatment effect is reminiscent of the literature that uses distance to schools to compute causal estimates of the return to school (e.g., Card (1995); Kane and Rouse (1995)).

(a) Local linear regressions by group and cohort



(b) Semi-parametric difference-in-differences estimate

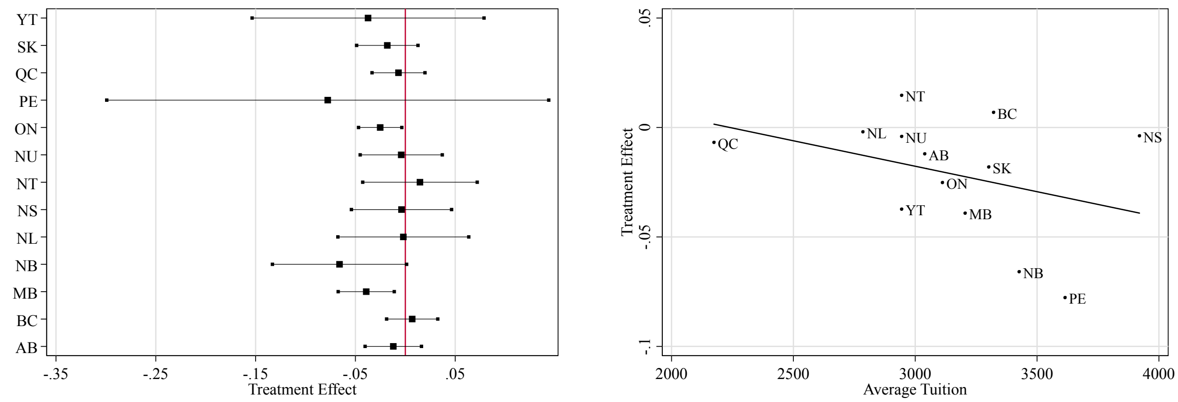
Figure 6: Test of whether the treatment effect varies with distance to CMA. Semi-parametric estimates of residualized high school graduation rate for both groups in the pre- and post-treatment time periods - (a) and (c). Semi-parametric difference-in-differences estimates - (b) and (d). Residuals are calculated from a regression of high school graduation on gender, whether an individual lives on a reserve or northern community, whether the individual is a Status Indian, tuition of college and university in province p at time t, and I include fixed effects for tribe, aboriginal group, year of graduation, and birth quarter. Bootstrap confidence intervals, based on 299 replications and provincial clusters, are included in the plot of semi-parametric difference-in-differences estimates.

living above the 90th percentiles is not statistically different from 0 for any of the distances. This could be due to a low power of the test resulting from a smaller number of observations in the treatment group above the 90th percentile. It could also reflect the fact that those who live in the most isolated areas are perhaps not affected by changes in post-secondary funding programs, as they are less likely to complete higher years of both high school and post-secondary degrees.

I perform one additional exercise to examine the relationship between the treatment effect and geographic isolation. I construct semi-parametric difference-in-differences estimates that compute the treatment effect for each distance to the closest university. I chose to implement this exercise using universities, because there is less variability in the types of courses offered at universities, compared to community colleges. For example, some community colleges may be theological or agricultural, which would not offer a range of general courses, whereas the universities in the sample offer more variation in their academic programs.[39]

Figure 6 graphs the results from local linear regressions of residualized high school graduation

[39]Results using distance to the closest CMA, and distance to the closest college, are unreported, but available upon request.



(a) Treatment effects by province

(b) Treatment effects and average tuition

Figure 7: Each horizontal line represents the difference-in-differences estimate and the 95% confidence interval, constructed from standard errors clustered at the province level, from a regression of high school graduation on a treatment indicator, as well as controls for gender, whether an individual lives on a reserve or northern community, whether the individual is a Status Indian, distance to the closest CMA, latitude and longitude of CSD, tuition of college and university in province p at time t, and I include fixed effects for tribe, CMA-province, aboriginal group, year of graduation, and birth quarter.

rates on the distance to the closest university. These regressions are calculated separately for each group and time-period pair. The semi-parametric difference-in-differences estimates are then computed for each point in the distribution of distance to closest university in Figure 6(a). Although the results of this exercise are noisy, they suggest that changes in high school graduation rates mirror the results from the parametric estimation in that they seem be driven by those that are about 1500-2000 units from a university.[40]

The last cost parameter that I examine is the fixed cost of tuition parameter. To do this, Figure 7(a) plots the treatment effects by province with 95% confidence intervals. Although some of the province-level treatment effects are not statistically different from 0 at the 5 percent level, this result suggests that the mean effects in Table 4 may be masking some important heterogeneity regarding the size of the treatment effects and the degree to which different students were affected by funding cutbacks. Figure 7(b) plots the treatment effects against the average tuition at universities in the post-treatment time period.[41] This average tuition can also be thought of as the

[40]The plots are cut off at 2000 units, because the size of the confidence intervals for estimates above 2000 dominate the plot. In general, after 2000, the treatment effect increases towards 0, but these results are too noisy to make reliable conclusions.

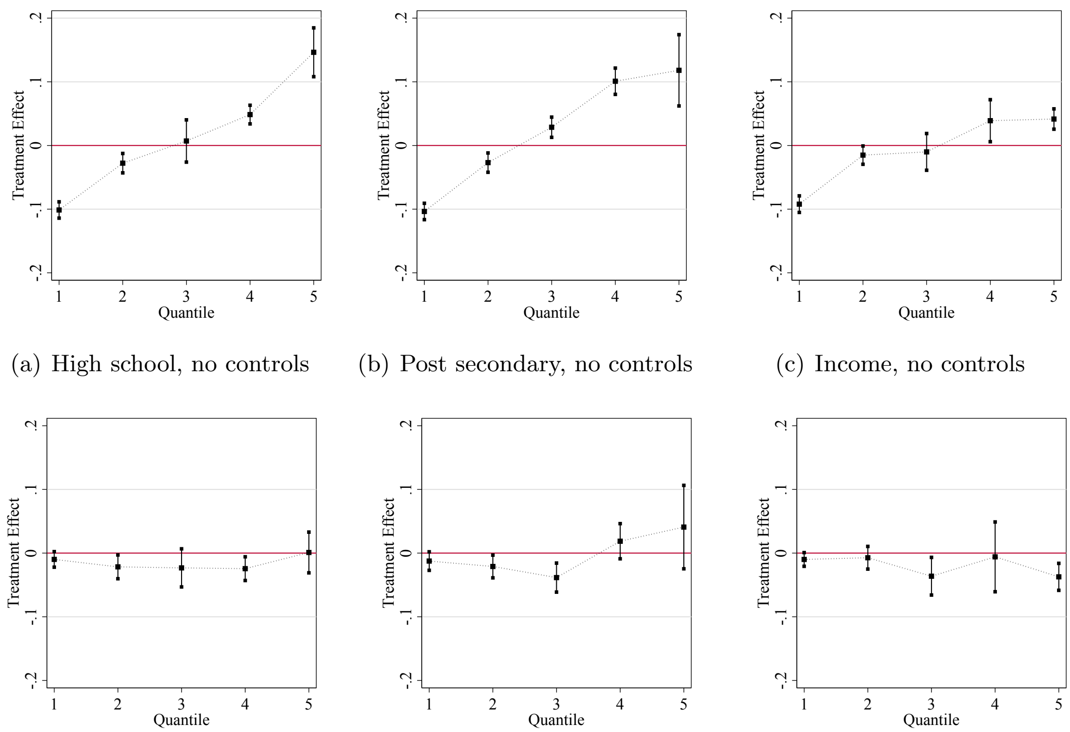
[41]The Yukon, Northwest Territories and Nunavut did not have universities in 1989, so I assume they face a tuition level equivalent to the national average.

average change in tuition after 1989, given that tuition was effectively 0 for eligible students in the pre-treatment period. The figure displays a negative correlation between the treatment effect and average tuition, implying that provinces whose eligible students experienced the largest increase in tuition also experienced the largest declines in high school graduation.

6.2.3 Baseline Income, High-School, and Post-Secondary Attendance

A natural question in evaluating the effects of the policy changes is whether the program disproportionately affected students according to their baseline characteristics. For example, students with lower incomes may face additional credit constraints that prevent them from attaining post-secondary education even though they may want to enrol in a post-secondary program (Stinebrickner and Stinebrickner, 2008; Lochner and Monge-Naranjo, 2011). If this is the case, then we may expect to see a larger treatment effect for students from lower quantiles of the income distribution. While I cannot infer students' baseline characteristics, like their family income or parental education levels when they were schooling age, from the 2006 census, I can construct estimates of average income, high school graduation rates, and post-secondary completion of First Nations individuals at the tribe level. I use the 55 tribal groupings contained in the 1991 census of population, to compute these estimates. I then rank tribes by their position in the distribution of each of the outcomes. To ensure that each quantile has a sufficiently large number of observations, I split the distribution into quintiles. Based on this exercise, I can determine whether there are heterogeneous treatment effects for individuals who belong to a tribe that was in a relatively higher or lower outcome quintile in 1991.

Figure 8 displays the results from this exercise. The top three plots do not include any controls and the bottom three include a full set of controls. The results from including the full set of controls do not suggest that there is substantial heterogeneity connected to baseline characteristics. However, the results do reveal that individuals from tribes in the third quintile of the distribution of post-secondary attendance and income were most affected by the cutbacks to funding. While it is difficult to comment on the exact mechanism behind this finding, it may relate to the results assessing heterogeneity in distance, in the sense that the result is not being driven by extremes, rather it is the median individual who is most affected by the cutbacks.



(a) High school, no controls (b) Post secondary, no controls (c) Income, no controls

(d) High school, controls (e) Post secondary, controls (f) Income, controls

Figure 8: Heterogeneous effects by where the individual's tribe was located in the 1990 distribution of high school, income, or post-secondary attendance. The controls included are gender, whether an individual lives on a reserve or northern community, whether the individual is a Status Indian, distance to the closest CMA, latitude and longitude of CSD, tuition of college and university in province p at time t, and I include fixed effects for tribe, CMA-province, aboriginal group, year of graduation, and birth quarter.

6.3 Robustness

To convincingly attribute the changes in educational attainment to the effects of the education policies, I investigate several additional threats to identification in the main findings of Sections 6.1 and 6.2. I start by ruling out confounding factors that arise from other policy changes that occurred near the same time as each of the changes to post-secondary funding. Next I consider alternative definitions of “treatment”, that rely on whether an individual is registered with the federal government as a Status Indian. I also consider an alternative definition of the “control” group that classifies students as non-eligible if they are Métis, so that comparisons are being made within the Indigenous population. In theory, the Métis population should not respond to changes to the post-secondary funding program, so this exercise assists in ruling out underlying trends in educational attainment within Canada's Aboriginal population more broadly. Finally, I show that mobility does not appear to be confounding my results. In summary, this section shows that the main results of Section 6 are not driven by other policy changes, the way I define treatment, mobility issues, or a result of general changes in educational attainment among Indigenous peoples.

6.3.1 Possible Confounding Factors

Since the 1970s, the Canadian government and Indigenous groups have negotiated modern treaties, also known as land claims. Land claims are either comprehensive claims, which always involve a transfer of land ownership, or specific claims, which are not necessarily land related.[42] If the timing of these modern treaties and changes in education funding occurred simultaneously then the effect of post-secondary funding would be confounded by the income and investment effects of the modern settlements.

It is not immediately clear how these claims might affect educational attainment. On the one hand, the settlements can be interpreted as a positive income shock, which might lead to an increase in educational attainment among the groups affected by the settlements, if credit constraints were a significant factor limiting post-secondary attainment. On the other hand, if these settlements change the outside option, then some students may feel they no longer need post-secondary certification to maintain an adequate standard of living, which would lead to a decrease in educational attainment.[43] Due to the ambiguous nature of the land and specific claims, I re-estimate the main SUR results excluding bands that received settlements coinciding with the timing of each change. Since the share of the population with no school is the inverse of the high school graduation rate, I only present results for the distribution of educational attainment to avoid redundancy.

I obtain a list of land claim agreements and affected communities directly from the Indigenous and Northern Affairs Canada (INAC) website. For specific claims communities, I obtain the list of bands that settled specific claims from INAC's website and then match bands to their communities using the 2011 Band to Community Linkage File that was provided to me by INAC.[44] Finally, I

[42] These agreements have been shown to be beneficial to communities through securing property rights (Aragón, 2015), and the right to self-govern (Pendakur and Pendakur, 2015).

[43] For example, Rice (2016) shows this to be the case for multi-sector self-government agreements that were implemented together with comprehensive land claims.

[44] The list of bands that signed comprehensive land claims can be found at: `https://www.aadnc-aandc.gc.ca/eng/1373385502190/1373385561540` and the list of communities that signed specific claims can be found at: `http://services.aadnc-aandc.gc.ca/SCBRI_E/Main/ReportingCentre/External/externalreporting.aspx`. The

update any discrepancies between the 2011 and 2006 community codes using Statistics Canada's geographic concordance tables[45].

There was 1 land claim affecting 4 communities in the time period immediately surrounding the cutbacks to funding. The results without land claim communities are found in Table A7. There are no outstanding differences between these results and the main results from Section 6: again, community college and bachelor's degree completion declined relative to the control group after the cutbacks; the share of the population with no formal education or whose highest level of education was a high school degree increased relative to the non-eligible population. The magnitude of the coefficient estimates are in line with the previous results.

In addition to the land claims that were made between Indigenous groups and the federal government, between 1973 and 1996, the Canadian government negotiated 132 specific claims involving monetary settlements with Indigenous groups across the country. I focus on specific claims immediately surrounding the cutbacks to funding, and restrict the claims to those that were greater than $100,000 in value. This amounts to dropping 63 communities from the sample. The results from this exercise can be found in Table A8. Once again, these results do not differ from those in the main results section.

To rule out the possibility that other large-scale education policies are driving the observed changes in educational attainment among the eligible population, I conduct a series of online searches of leading Canadian newspapers.[46] Table A9 displays summary statistics for the search. Out of the keywords *Education Policy*, *Education Law*, *Indian Education*, and *Post-Secondary* the search returned 7,461 articles. Table A10 summarizes the articles alluding to possible confounding policies. Although most of the uncovered policy changes should lead to increases in educational attainment–e.g., increases in student aid in Ontario, increased funding for Indigenous students with children, etc.–two policy changes could be potential confounding factors for the analysis in this paper.

Between 1968 and 1990 university tuition in Quebec was frozen at $540 per year (see Figure A3) and in 1990 the Premier of Quebec announced a 140% increase in tuition. If the large decline in

band to community linkage file can be requested through INAC's statistics division.

[45]The geographic concordance tables are located at: `http://www.statcan.gc.ca/eng/subjects/standard/sgc/2011/concordances-2006-2011-2`

[46]The newspapers in the search include the Globe and Mail, the Ottawa Citizen, and the Financial Times.

post-secondary completion after 1989 appears only in Quebec, the change in educational attainment would not be attributable to the change in post-secondary funding for Indigenous students that occurred at this time. Further, between July and September of 1990 a land dispute between the Mohawk community of Kanesatake and the town of Oka, Quebec, which was planning to expand a golf course on to a traditional Mohawk burial ground, resulted in a three-month stand-off between Canadian soldiers and members of the Mohawk peoples. If the political instability of the time was great enough to influence people's schooling choices, perhaps due to a loss of trust in federal institutions, then the change in educational attainment after the 1989 policy change would not be attributable to the policy change itself. I therefore re-estimate the main results surrounding the 1989 policy change excluding Quebec residents.

The SUR results excluding Quebec can be found in Table A11 and do not suggest that the changes in educational attainment after 1989 are driven by those in Quebec. All results are similar in magnitude to the original estimates, and are consistent with the storyline that community college and bachelor's degree completion declined after 1989, and this was offset primarily by an increase in the share of the population whose highest level of schooling is a high school degree, with additional increases in the share of the population without any education certification.

The other notable policy change pertaining to the 1989 time period, was a cutback to education grants by the Alberta government. Once again, if the changes in educational attainment are driven by Alberta residents, then it might be the cutback to education grants by the Alberta government that are driving the results, rather than the change to post-secondary funding for Indigenous students at the federal level. I re-estimate the results surrounding the cutbacks without the residents of Alberta. These results can be found in Table A12, and again do not alter the conclusions from the main results.

6.3.2 Alternative Treatment and Control Group Specifications

So far the treatment group has been classified based on whether the individual identifies as First Nation or Inuit in the census; however, many people who identify as First Nation may not be eligible for the program, since they may not be registered with the federal government as a Status Indian. For example, within the pre-treatment eligible population, approximately 93% identify as First Nation, but only 77% are Status Indians (Table A4). For the main analysis, I avoid classifying individuals as eligible based on whether they are Status Indians since it is possible that students apply to become Status Indians in order to receive the educational benefits, which may lead to a bias in the estimate of treatment. Nevertheless, in this section I consider this alternative classification of treatment. Here, I assign an individual to the eligible population if they are Inuit (since Inuit are eligible without having to apply to become Status Indians) or Status Indians, and the non-eligible population are Métis, non-Indigenous, and non-Status First Nations.

Table A13 displays the results with this alternative eligibility classification. The decline in community college and bachelor's completion are similar to the main results; however, for the share of the population with no school and the share whose highest level of education is high school, the pre-treatment trends are not parallel between the eligible and non-eligible populations, as indicated by nearly all coefficients in the pre-treatment period being statistically different from 0 and economically meaningful.

An additional concern with the current definition of treatment and control is that the way in which the control group is defined may not minimize biases induced by a violation of the common support assumption. This would be the case if the additional controls included in the regression do not fully reduce the unobservable differences to 0. To alleviate this concern, I provide estimation results that define the eligible group as only First Nations or Inuit, and the control group as only Métis. In this sense, I am comparing trends in educational attainment over time within Canada's Indigenous population. The Métis population was not eligible for the program and should not be affected by the cutbacks, but they have the potential to be affected by other factors influencing the educational attainment of Indigenous peoples that have not been addressed in the previous robustness checks. Table A14 presents the results from this analysis and verifies that the community college and bachelor's degree effects are not being driven by general changes in educational attainment among the Indigenous population over this time period. Unfortunately the parallel trends assumption is violated for the share with no school, and high school, and therefore we cannot identify the causal effect of the policy for these levels of education.

In a final exercise to evaluate whether the definitions of treatment and control are appropriate, I look within First Nations peoples. Since only First Nations are eligible to apply to be Registered Status Indians, which was one of the program requirements, I split the First Nations group into those who are Status Indians (treatment) and those who are not (control) and re-estimate the results. Table A15 displays these results. The results for community college and bachelor's completion are consistent with the main results, but again the share of the population with no school and with a high school degree cannot be evaluated because the parallel trends assumption does not hold. Interestingly, the share completing trades programs increased, suggesting that within the First Nations populations, some people may have responded to the program cutbacks by shifting out of community college and into trades programs.

6.3.3 Mobility Restrictions

Next, I evaluate the role of mobility. In the 2006 census of population there is very little information on where people grew up, which means that I assign people to a graduation cohort based on the provincial school attendance rule of the province in which they currently reside. Additionally, the CMA-province fixed effects, and the province-level tuition estimates, are coded based on the province in which the individual currently resides. Given that most provinces have similar school attendance rules, tuition does not vary widely across provinces (with the exception of Quebec), and CMA-province fixed effects are important for capturing general region-level differences in educational attainment, the use of individual's current province should not make a large difference in the results.[47] Despite this, column (1) of Table A16 uses an indicator for whether an individual moved provinces as the outcome variable. Eligible cohorts graduating after 1989 appear more likely to move provinces, relative to the control group. In Table A17, I consider the effect of this result by reestimating the main specification, while restricting the sample to include those who live in the same province they were born. These results do not alter the main conclusions.

Mobility may be of additional concern in regressions that split the sample between those living on- and off-reserves. Although the bias resulting from the program incentivizing people to leave reservations would likely work in the opposite direction of the findings–for instance, if those who are most likely to graduate high school also leave the reserve to pursue post-secondary education, then we should expect high school graduation rates to increase on reserves after the program is cut back–I present additional results in Table A16 that reveal no differential trends in the probability

[47] One reason the mis-classification of province may be of concern in the Canadian context is that, unlike the United States, where there are vast differences between in-state and out-of-state tuition, Canadian students pay the same price at any post-secondary institution, regardless of their province of residence.

of living on a reserve between the eligible and non-eligible populations post-policy change.

6.4 The Long-Run Returns to the Policy

It is well-established that additional educational attainment increases earnings later in life (Card, 1999, 2001). Moreover, obtaining a credential, like a high school degree, can be accompanied by its own wage premium that exceeds the typical premium for an additional year of schooling (Hungerford and Solon, 1987). Given the link between education and labour market outcomes, in this section I examine the long term effects of the cutbacks to funding. An important consideration is that the funding cutbacks affected many levels of educational attainment simultaneously, so that this section evaluates the long-run effects of the policy, instead of the return to a specific level of education or additional year of schooling.[48] I estimate the effect of the policy on the likelihood of earning above the median wage and of relying on government transfers, in addition to the effect on labour supply. At the extensive margin, I examine the probability that an individual does not participate in the labour force, and at the intensive margin, I examine their number of hours and weeks worked.

6.4.1 Labour Market Outcomes

Figure 10 presents the results from estimating the difference-in-differences event study of equation 8 with employment outcomes in place of education outcomes. Column (1) evaluates the effect of the policy on the likelihood of being employed full time. In this specification, the pre-treatment trends between the eligible and non-eligible populations are statistically different from one another, invalidating the use of difference-in-differences to identify the causal effect of the policy. Column (2) evaluates the likelihood of relying on government transfers, and suggests that cohorts who graduated after the program was cut back are up to 2 percentage points more likely to rely on government transfers compared to the non-eligible population. The treatment effects of the policy on labour supply (columns (3)-(5)) suggest that these outcomes were adversely affected by the reduction in student aid. The following section quantifies these effects in more detail.

[48] An alternative way of putting this is that I am not estimating the causal effect of dropping out of high school on earnings, for example. Rather, I estimate the causal effect of the changes to post-secondary funding to long-run outcomes.

Table 6: Effects of Funding Cutbacks on Labour Market Outcomes

	(1) Above Med	(2) Govt. Transfer	(3) Not in LF	(4) Weeks	(5) Hours
$t = -6$	-0.02160*	-0.00845	-0.00119	0.05774	-0.13881
	(0.01089)	(0.01536)	(0.01552)	(0.44573)	(0.65668)
$t = -5$	-0.00663	-0.01801	-0.01103	0.52342	0.50245
	(0.01202)	(0.01669)	(0.01401)	(0.67023)	(0.47358)
$t = -4$	-0.01669**	0.00117	0.00236	0.11475	0.09338
	(0.00588)	(0.01062)	(0.01185)	(0.50204)	(0.59061)
$t = -3$	-0.01354	-0.00007	-0.00131	-0.02904	-0.53096
	(0.01200)	(0.01117)	(0.01342)	(0.41542)	(0.45137)
$t = -2$	-0.01790**	0.00226	-0.00160	-0.37192	-0.72572
	(0.00706)	(0.00896)	(0.01052)	(0.28224)	(0.69148)
$t = -1$	.	.	.	.	
	.	.	.	.	
$t = 0$	-0.00224	0.01580**	0.02346*	-1.05737***	-1.03027***
	(0.00650)	(0.00676)	(0.01169)	(0.24506)	(0.29435)
$t = 1$	0.00971	0.00266	0.00568	-0.26366	-0.03896
	(0.01070)	(0.01039)	(0.01107)	(0.33729)	(0.52326)
$t = 2$	0.02358**	0.01553	0.01077*	-0.70972*	-0.44851
	(0.00904)	(0.01068)	(0.00498)	(0.33216)	(0.50478)
$t = 3$	0.03423**	0.02191**	0.01857*	-1.18013*	-1.32065**
	(0.01204)	(0.00877)	(0.01016)	(0.56296)	(0.58769)
$t = 4$	0.04153***	0.02135**	0.03950***	-1.82568***	-1.63502***
	(0.00775)	(0.00889)	(0.01210)	(0.41945)	(0.42591)
$t = 5$	0.04034***	0.01901**	0.04019**	-2.50334***	-1.93811***
	(0.01051)	(0.00780)	(0.01465)	(0.55404)	(0.61852)
$t = 6$	0.06815***	-0.00266	0.05646***	-2.60215***	-2.23635***
	(0.01329)	(0.00669)	(0.00691)	(0.38960)	(0.34291)
N Obs	917,590	917,590	917,590	917,590	
Adj. R^2	0.09595	0.13013	0.02992	0.05745	0.09400

Notes: Standard errors clustered by province in parentheses. I exclude the dummy variable for $t = -1$ so that all effects are measured relative to one cohort before the policy change occurred. All regressions control for gender, whether an individual lives on a reserve or northern community, whether the individual is a Status Indian, distance to the closest CMA, latitude and longitude of CSD, tuition of education level r in province p at time t, and I include fixed effects for tribe, CMA-province, aboriginal group, and birth quarter.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

6.4.2 Labour Supply and the Distribution of Hours Worked

Table 7 summarizes the average treatment effect on labour supply. At the extensive margin, cohorts affected by the cutbacks to funding were 2.7 percentage points less likely to be in the labour force, relative to those who were not eligible for funding. At the intensive margin, the number of hours and weeks worked declined by an average of 1.03 and 1.4 respectively. Each of these estimates is statistically significant at the one percent level.

To examine the heterogeneity of the treatment effect at the intensive margin, this section presents estimates of the treatment effect on the distribution of hours worked using the changes-in-changes (CIC) model put forth in Athey and Imbens (2006). Standard difference-in-differences models use the change in the average outcomes of the control group as a counterfactual to which the change in average outcomes of the treatment group can be compared. The changes-in-changes framework estimates an entire counterfactual distribution of outcomes that the treatment group would have experienced in the absence of the treatment in order to evaluate quantile treatment effects.

Let Y_{gt} be the outcome of group $g \in \{\text{control=0, treatment=1}\}$ in time $t \in \{\text{before=0, after=1}\}$. Let Y^I_{11} be the outcome of the treatment group in the period after treatment. Let $F_{Y_{gt}}(y)$ be the quantile of the hours distribution for group g in time period t associated with the value of hours equal to y. The goal of the CIC methodology is to map out the counterfactual distribution of hours worked, Y^N_{11}. This distribution is identified by:

$$F_{Y^N_{11}}(y) = F_{Y_{10}}\left(F^{-1}_{Y_{00}}\left(F_{Y_{01}}(y)\right)\right) \tag{9}$$

under three assumptions. First, within a given time period, the data generating process has to be the same across groups. That is, the function that maps observables and unobservables into outcomes is the same for the eligible and non-eligible populations. Second, is the monotonicity assumption, which requires observables and unobservables to be rank invariant in the outcome, so that the relative position of a pair of observables and unobservables is the same across distributions. The third and final assumption is that the composition of the population of agents in a given group does not change over time. This is required to attribute the CIC estimates to changes in the policy rather than changes in the underlying characteristics of the treatment group.

Table 7: Effects of Funding Cutbacks on Labour Supply

	(1) Not in LF	(2) Weeks	(3) Hours
Treatment	0.02712***	-1.42011***	-1.02830***
	(0.00379)	(0.22479)	(0.24138)
N Obs			
Adj. R^2	0.02987	0.05744	0.09405

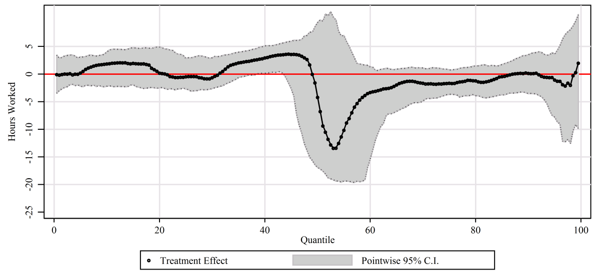
Notes: Standard errors clustered by province in parentheses. The dependent variable in column (1) is an indicator for whether or not the individual is in the labour force. In column (2) the dependent variable is the number of weeks worked in the previous year and in column (3) the dependent variable is the number of hours worked in the previous week . Treatment is the interaction of graduating after the policy change and eligibility for the program. All columns control for gender, whether an individual lives on a reserve or northern community, whether the individual is a Status Indian, distance to the closest CMA, latitude and longitude of CSD, tuition of college and university in province p at time t, and I include fixed effects for tribe, CMA-province, aboriginal group, year of graduation, and birth quarter. * $p < 0.1$, ** $p < 0.05$,*** $p < 0.01$

Under these assumptions, the CIC treatment effect associated with quantile q is:

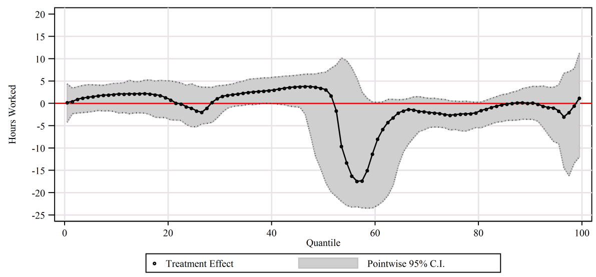
$$\tau_q^{CIC} := F_{Y_{11}^I}^{-1}(q) - \underbrace{F_{Y_{01}}^{-1}\left(F_{Y_{00}}\left(F_{Y_{10}}^{-1}(q)\right)\right)}_{F_{Y_{11}^N}^{-1}(q)}, \tag{10}$$

The basic idea behind the methodology is the following. For a given quantile q, locate the hours worked associated with this quantile in the pre-treatment/treatment distribution, $F_{Y_{10}}^{-1}$. Next, determine what quantile is associated with this level of hours worked in the pre-treatment/control distribution, $F_{Y_{00}}$. From here, find the hours worked in the post-treatment/control distribution that is associated with this quantile, $F_{Y_{01}}^{-1}$. This value of hours worked identifies the counterfactual outcome to which the observed post-treatment/treatment outcome, $F_{Y_{11}^I}^{-1}$, is compared. By computing this estimate for every value of q, we can map out the counterfactual distribution and compute the quantile treatment effects at each point in the distribution of hours worked.

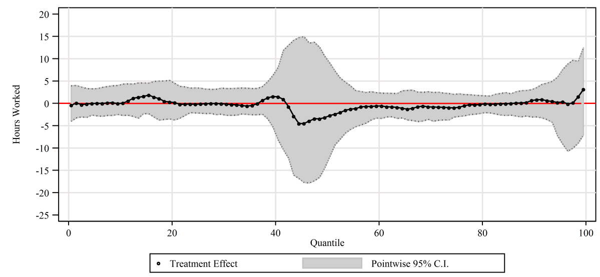
To account for covariates in this framework, I compute the residualized hours worked by regressing hours worked on gender, an indicator for whether an individual lives on a reserve or northern community, distance to the closest CMA, latitude and longitude, tuition of college and university, and dummies for year of graduation, birth quarter, and CMA-province. I do not include aboriginal group indicators or tribe dummies, because these indicators would be unique to the eligible population, and as a result, the predicted values of the treatment group that rely on the calculation of the counterfactual distribution may lie outside the bounds of this distribution.



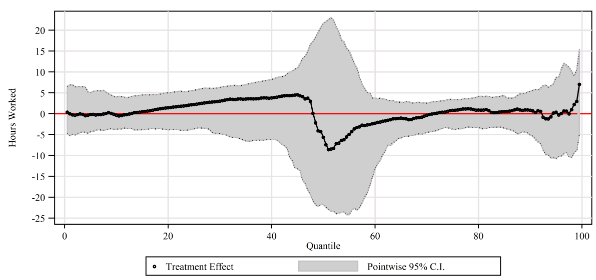
(a) Full Sample



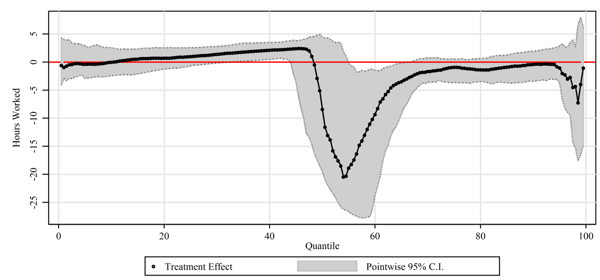
(b) On-Reserve Sample



(c) Off-Reserve Sample



(d) Male Sample



(e) Female Sample

Figure 9: Quantile treatment effects on hours worked from estimating non-linear difference-in-differences specifications with 95% confidence intervals estimated using 199 bootstrap samples. Residuals constructed from a regression of hours worked on gender, distance to the closest CMA, latitude and longitude of CSD, tuition of college and university in province p at time t, and I include fixed effects for CMA-province, year of graduation, and birth quarter.

The CIC estimates are presented in Figure 9 and the counterfactual and actual CDFs of hours worked are found in Figure A8.[49] Quantiles are estimated from 0.5-99.5 in 0.5 unit increments for the full, male, and female samples, and in 1 unit increments for the on-reserve and off-reserve samples. I conduct statistical inference on the treatment effects using two methodologies. First, I use a Komolgorov-Smirnov test to check for equivalence between the actual and counterfactual distributions. Second, I display 95% bootstrap confidence intervals, clustered by province, surrounding

[49]Estimates were obtained using the software of Robert Garlick: `http://www.robgarlick.com/code`.

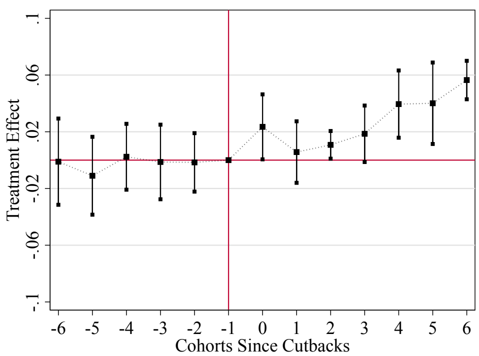
the coefficient estimates.

Figure 9(a) displays the results for the full sample. The Komolgorov- Smirnov test for equality of distribution functions rejects the null hypothesis that the actual and counterfactual distributions are equivalent at the 10% level with an exact P-value of 0.086, suggesting that on the whole, the program cutbacks had an effect on the distribution of hours worked. A closer examination of the changes reveals that following the program cutbacks, hours worked declined in the 50th-90th quantiles, and this was offset by an increase in hours worked just below the median, in addition to below the 20th quantile. The largest decline was at the median, where hours worked decreased by roughly 13 hours, relative to the control group, although this result is not statistically different from 0.

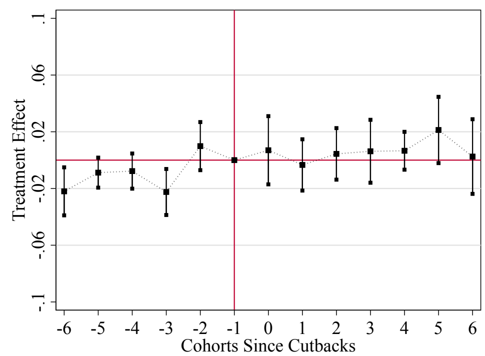
Figures 9(b) and 9(c) show that this result is driven by those living on-reserves; and Figures 9(d) and 9(e) show that women were more adversely affected than men. In each case, the Komolgorov-Smirnov test rejects the null hypothesis that the distributions are equivalent at the 10% level, with the exception of the off-reserve estimates. The fact that the decline in hours worked was driven by those living on-reserves, suggests that it may be linked to the indirect effect on high school graduation. Although men were more likely to drop out of high school after the cutbacks compared to women, men may have had more employment opportunities as high school dropouts and as a result, would not have seen large changes in labour supply.[50]

The CIC estimates reveal that the average treatment effect computed from the difference-in-differences estimator conceals the full effect of the cutbacks on labour supply. Overall, the decline in hours worked above the median and increases below the median and in the lowest quantiles is consistent with a fraction of workers transferring out of full-time employment and into part-time employment or out of the labour force altogether. Figure 10 confirms this result using the difference-in-differences event study framework. Each panel plot estimates of the treatment effect by graduation cohort, along with 95% confidence intervals. The regressions are estimated jointly in the SUR framework to account for cross-correlation of the error terms. Consistent with the gradual decline in educational attainment observed in the previous sections, the changes in employment occurred gradually after the program cutbacks, with later cohorts experiencing a larger effect on

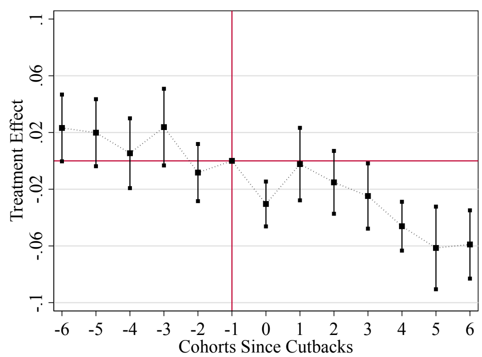
[50]Figure A9 uses the CIC estimation to show that the distribution of wages and transfers were not affected by the program cutbacks.



(a) Not working



(b) Part time



(c) Full time

Figure 10: Each plot displays the coefficients from a difference-in-differences event study with 95% confidence intervals. Each equation is estimated jointly to account for potential cross-equation correlation of the error terms. I include controls for gender, whether an individual lives on a reserve or northern community (in panel a and d), whether the individual is a Status Indian, distance to the closest CMA, latitude and longitude of CSD, tuition of college and university in province p at time t, and I include fixed effects for tribe, CMA-province, aboriginal group, year of graduation, and birth quarter.

labour supply.

Taken as a whole, the results of this section show that the cutbacks to student aid in the late 1980s had lasting effects on labour market outcomes, with particularly strong effects on labour supply. Although it is not possible to discern the effect of the cutbacks on earnings, the fact that affected cohorts were more likely to rely on government transfers suggests that the cutbacks may have created an unintended social cost, in addition to the detrimental effects on educational attainment and labour supply at the individual level.

7 Discussion

This paper uses cutbacks to a post-secondary funding program for Indigenous students in Canada to contribute to the understanding of how the rising costs of college affect the educational attainment and labour market outcomes of marginalized populations. I exploit cross-cohort and cross-ethnicity variation in student aid eligibility to show that cutbacks to funding that occurred the late 1980s had a large negative impact on educational attainment, including a substantial impact on high school graduation rates, and that subsequent labour supply was affected at both the extensive and intensive margins.

The result that high school graduation declined in response to the cutbacks is consistent with a theoretical model that embeds the expected costs and benefits of higher education into the decision to graduate high school. In this framework, students who live in areas where the labour market return to a high school degree is low, and thus where completing high school serves only as a stepping stone towards completing university, will respond to changes in the cost of post-secondary education by altering their decision to attend high school. Accordingly, I find that the decline in high school graduation is driven by students who live on Indian reserves, where the return to a high school degree was low during the time period surrounding the funding cutbacks.

In the final section of the paper, I examine the long-run impacts of the cutbacks to post-secondary funding to understand how the rising costs of college contribute to the persistence of socioeconomic inequalities between groups. I find that the declines in student aid led to an increased likelihood of relying on government transfers among those affected, suggesting that the cutbacks may have resulted in additional social costs beyond the average effects on educational attainment. I also find substantial effects on labour supply: at the extensive margin, the funding cutbacks led to an increase in the likelihood of being out of the labour force, and at the intensive margin, the cutbacks resulted in a decline in the number of weeks and hours worked. Using the changes-in-changes model of Athey and Imbens (2006) to evaluate the policy response across the distribution of hours worked, I show that the average decline conceals a considerable policy response above the median. At the 55th quantile, the number of hours worked declined by up to 13 hours, while below the median and in the lower quantiles of the distribution, hours worked increased, resulting in an average decline of 1.03 hours.

In 2009, a report from the Canadian Centre of Living Standards estimated that if by 2026, the educational attainment and labour market outcomes among Indigenous peoples reached those of the non-Indigenous population in 2001, tax revenues alone could be up to $3.5 billion CAD higher in 2026 (Sharpe, Jean-François, Lapointe, and Cowan, 2009). Overall, the findings of this paper suggest that rising costs of higher education actually have the potential to reduce educational attainment and labour market outcomes of Canada's Indigenous population. To this end, they may provide a channel through which socioeconomic inequalities are perpetuated in the long-run. On the other hand, investing in programs designed to increase educational attainment, and specifically programs that fund post-secondary education, can be an effective public policy tool for reducing inequality.[51]

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[51] In 2016, the Supreme Court of Canada unanimously passed a ruling stating that Métis and non-Status Indians are "Indians" within the meaning of the 1867 Constitution (Galloway and Fine, 2016). While this demographic is not as socioeconomically underdeveloped as the First Nation and Inuit populations, they still lag behind non-Aboriginal Canadians along dimensions such as health, education and income (Wilson and Macdonald, 2010). It is not yet clear which social benefits and programs will be provided to the Métis and non-Status populations under this new ruling, which should affect almost 700,000 people country-wide. If the federal government decides to split the existing funding between the population who is currently eligible for post-secondary assistance and the newcomers, it may result in a decline in First Nations and Inuit post-secondary graduates and the persistence of long-run inequalities.

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A Additional Tables and Figures

Table A1: Summary of levels of schooling in Canada

Levels	Description
None	A person is categorized as having no education if they have not completed high school or any higher levels of schooling.
High School	The respondent must have graduated from high school or completed their high school equivalency.
Trade	Anyone whose highest degree is a trades certificate or registered apprenticeship. This is typically a 1-2 year program and comprises fields like welding, plumbing, carpentry, etc.
College	College, CEGEP, other non-university degree programs, and university programs below the Bachelor's level are included in this category. These programs are usually 2-3 years to complete.
University	Anyone with a Bachelor's degree and above is included in this category. The standard length of a Bachelor's degree is 4 years, although many people take longer to complete.

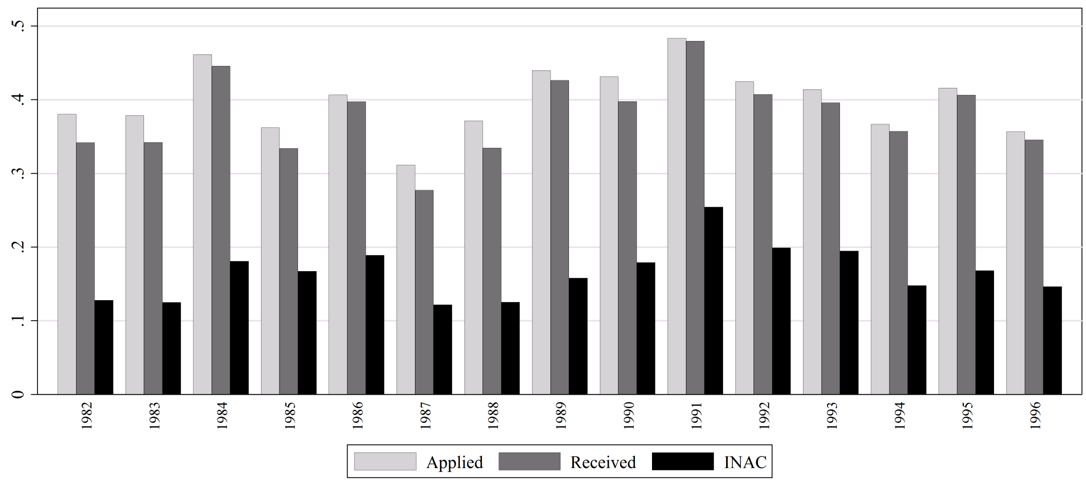


Figure A1: Fraction of students in each graduating cohort who applied for funding, received post-secondary funding, and received band funding, which would generally have been through the PSEAP or PSSSP. Data from the 2006 Aboriginal People's Survey which does not survey the on-reserve population.

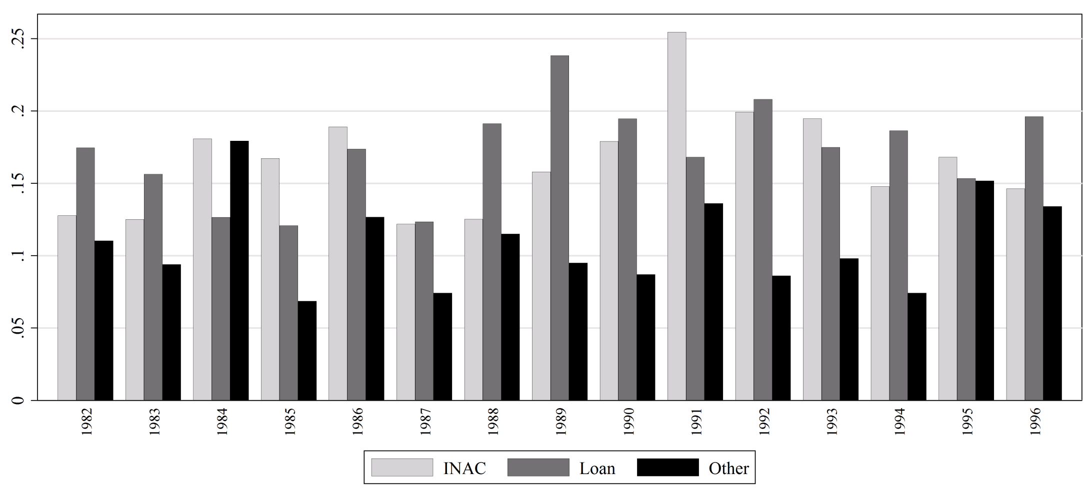


Figure A2: Fraction of students in each graduating cohort who received band funding, loans, or other types of funding. Data from the 2006 Aboriginal People's Survey which does not survey the on-reserve population.

Table A2: Summary of financial aid from the PSEAP and PSSSP

	Description
Training Allowances	Normal daily living expenditures such as food, lodging, local travel, recreation, etc.
Shelter Allowance	The support for living expenses is expected to cover such costs as food, shelter, daily transportation, daycare, rental costs and contingency funding. Living allowances are paid for Christmas and study breaks.
Tuition	Equal to the actual tuition and registration fees of the student's post-secondary institution. Students attending a foreign institution are eligible to receive tuition fees equivalent to a comparable program of studies offered by a Canadian institution, unless the program is not available in Canada. Tuition to a foreign institution will be approved only if the training received is recognized by Canadian institutions (employers, licensing agencies, etc).
Travel Allowances	Travel costs are allowed from the student's usual place of residence to the nearest accredited Canadian university or college which offers the program of studies which the student has selected.
Clothing and Equipment	Allowances are not provided for regular clothing except in cases of obvious and reasonable need. Funding is provided for the rental or purchase of special equipment or clothing if it is necessary for the student's program of studies. Items such as special tools, microscopes, drafting equipment, etc., are included in this category.
Books and Supplies	The cost of textbooks and supplies which are officially listed as requirements by the institution for the student's program will be paid in full. Additional consideration will be given to reference works and professional journal subscriptions which will assist the student and are not readily available in the institution's library.
Tutorial Assistance	Upon the strength of a written recommendation of the student's instructor(s), which has been approved by the appropriate department head or dean of the institution, an allowance will be provided to the student to cover the cost of special tutorial assistance to overcome areas of academic weakness.
Services and Contingencies	If required, students may receive a special allowance to cover the costs of babysitting or child-care for single parent families or for families where both parents are full-time students, to allow the parents to attend required classes. Other uncontrollable situations may require a student to request a special allowance under the terms of this category of assistance.

Table A3: Provincial and territorial school entry and graduation rules

Province	Age of entry	Grades
Alberta	No provincially mandated entry age.	12
British Columbia	No mandatory entry age prior to 1989. After 1989, students who celebrated their 5th birthday between November 1st and April 30th would begin school on January 1st of that school year. Students who celebrated their 5th birthday between May 1st and October 31st would begin school on September 1st of that school year.	12
Manitoba	N/A	12
New Brunswick	Prior to 1991 students had to start grade 1 if they were 6 years of age by Dec. 31st of the year they were to start school. After 1991 kindergarten was introduced the same rule applied, but for 5 year olds.	12
Newfoundland	N/A	12
Northwest Territories	N/A	12
Nova Scotia	N/A	12
Nunavut	N/A	12
Ontario	N/A	13
P.E.I.	Prior to 2003 there was no mandatory kindergarten. If they chose to attend kindergarten the age was 5 by December 31st of that school year, otherwise they had to register in grade 1 if they were 6 by January 31st of that school year.	12
Quebec	5 by September 30th of that school year.	11
Saskatchewan	No provincially mandated entry age.	12
Yukon	N/A	12

Notes: This table gives the age of entry for students in each province and territory over the time period in this analysis. It also lists the final grade in high school before graduation. By using students' birthdays along with the combination of the age of entry and the number of grades each student must complete before graduation allows me to calculate a "year in which the student should have graduated" variable.

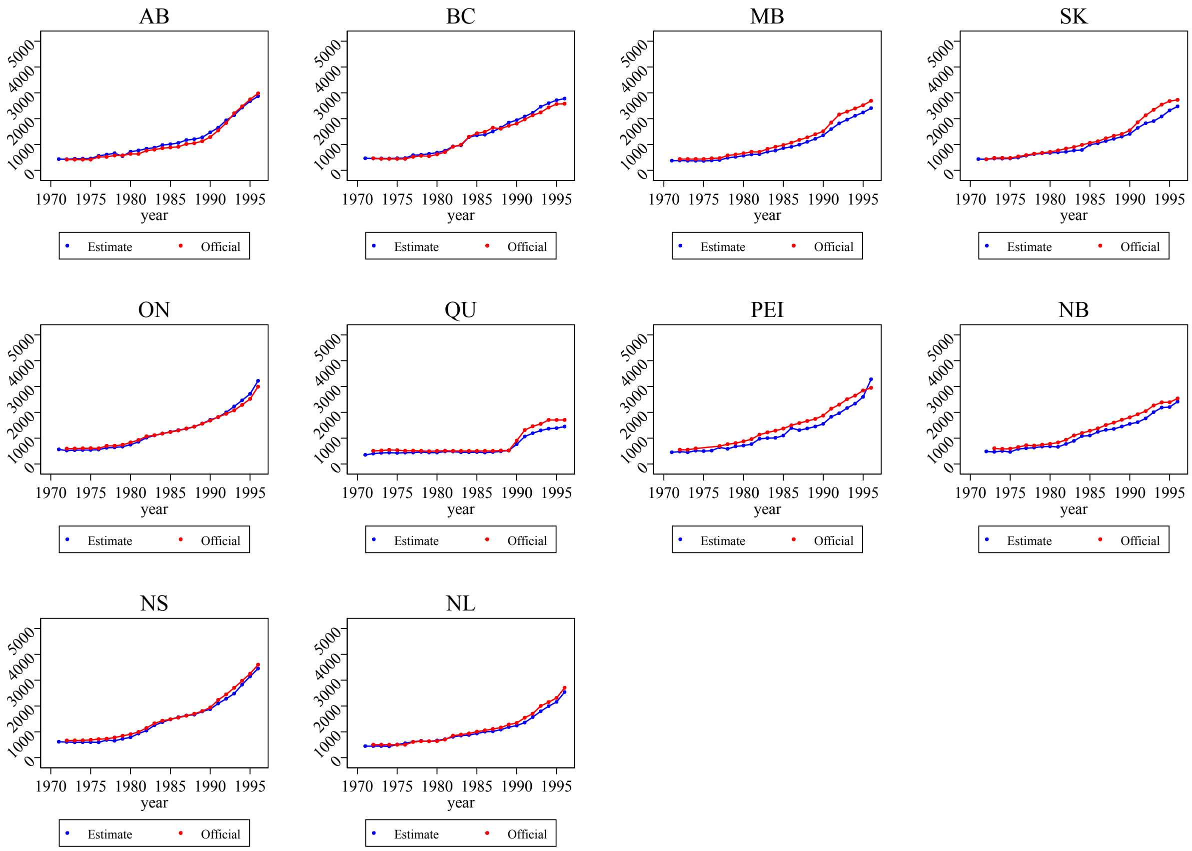


Figure A3: Verification of tuition estimate for universities in Canada between 1970 and 2000.

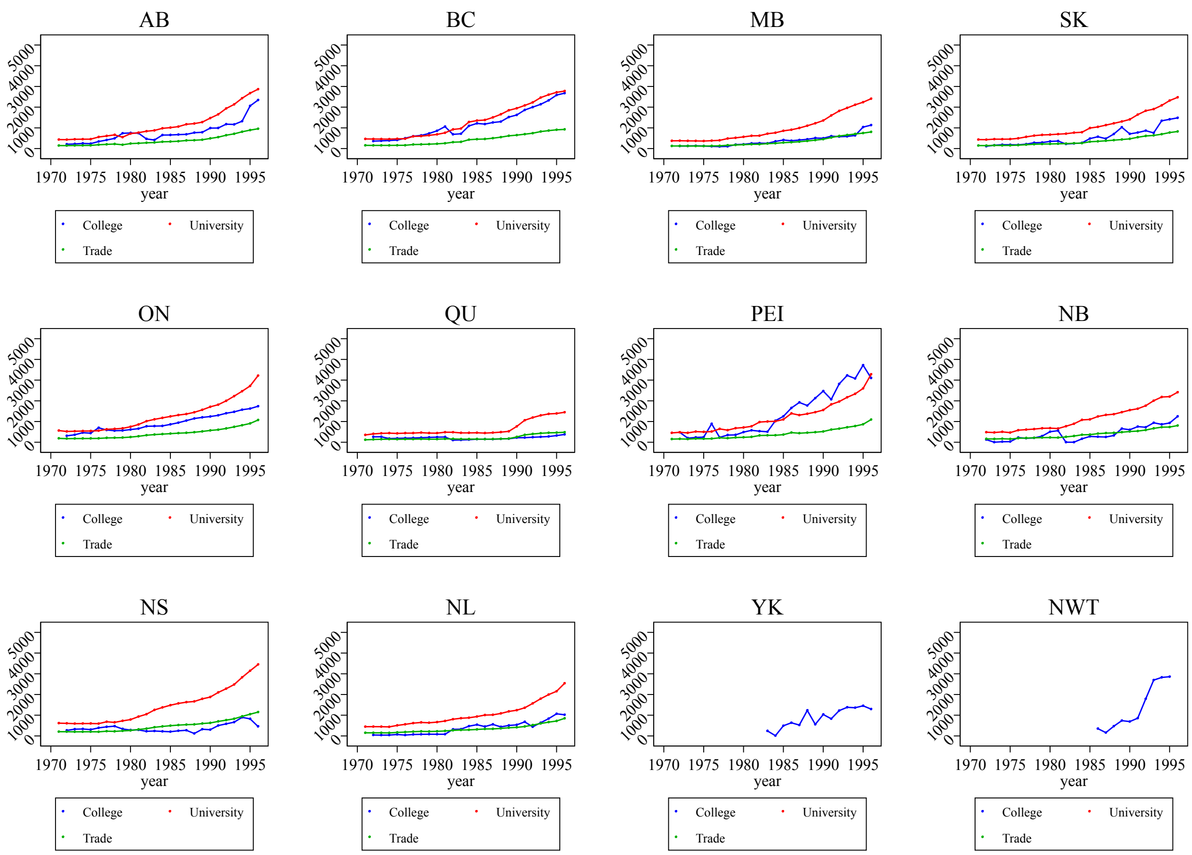
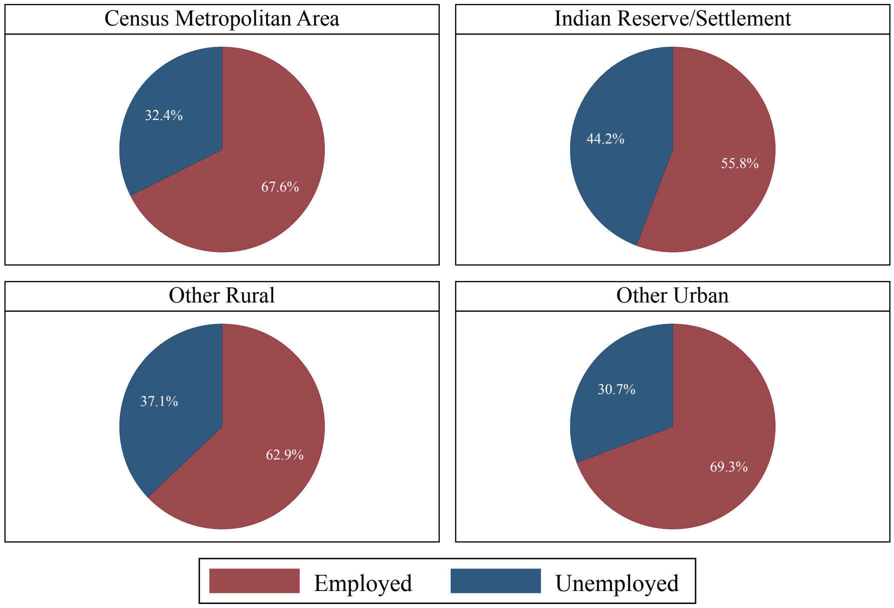


Figure A4: Tuition estimates for college, university and trade school for each province and territory between 1971 and 1998.

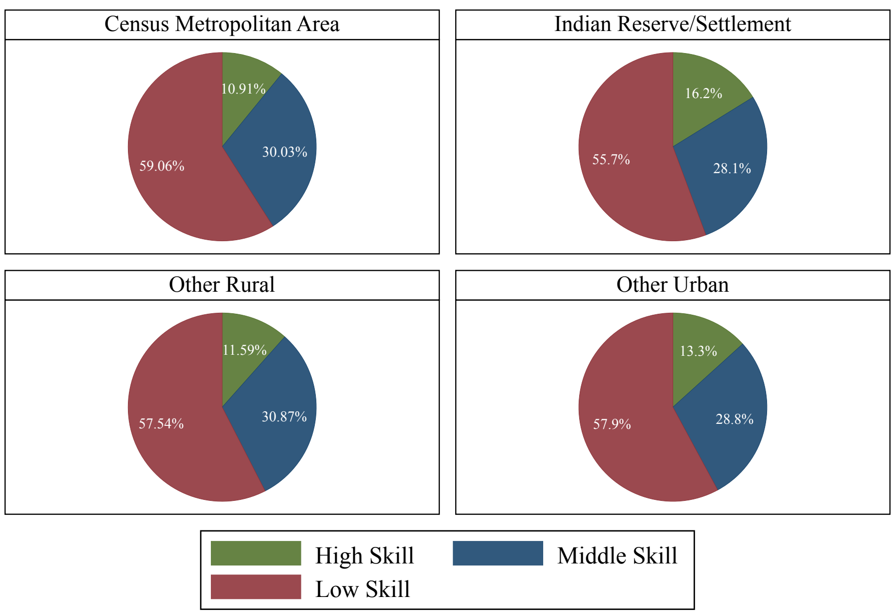
Table A4: Additional Summary Statistics Pre- and Post-1989

	Pre-1989			Post-1989		
	Eligible (1)	Non-Eligible (2)	Difference (1) - (2)	Eligible (4)	Non-Eligible (5)	Difference (4) - (5)
Gender	0.464	0.495	-0.031	0.463	0.498	-0.035
	(0.004)	(0.001)	(0.004)	(0.004)	(0.001)	(0.004)
Inuit	0.067	0.000	0.067	0.071	0.000	0.071
	(0.001)	(0.001)	(0.001)	(0.002)	(0.000)	(0.002)
Métis	0.008	0.016	-0.009	0.008	0.017	-0.008
	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)
First Nation	0.933	0.000	0.933	0.930	0.000	0.930
	(0.001)	(0.058)	(0.001)	(0.002)	(0.000)	(0.002)
On-Reserve/Northern	0.380	0.001	0.379	0.381	0.001	0.379
	(0.003)	(0.000)	(0.003)	(0.003)	(0.000)	(0.003)
Distance to CMA	141.290	24.585	116.705	145.596	23.239	122.357
	(1.311)	(0.058)	(1.312)	(1.378)	(0.057)	(1.379)
Registered Status	0.771	0.002	0.769	0.764	0.002	0.762
	(0.003)	(0.000)	(0.003)	(0.004)	(0.000)	(0.004)
Trade Tuition	721.693	690.571	31.122	980.533	935.992	44.540
	(1.361)	(0.393)	(1.416)	(0.428)	(1.536)	(1.594)
College Tuition	1334.853	1293.926	40.927	1834.320	1633.473	200.847
	(5.224)	(1.262)	(5.374)	(1.596)	(7.168)	(7.343)
University Tuition	2165.078	2071.712	93.367	2941.598	2807.977	133.621
	(4.083)	(1.178)	(1.262)	(1.285)	(4.607)	(4.783)

Notes: Sample means for eligible and non-eligible groups in the pre- and post-cutback time periods. Standard deviations are displayed in parentheses and difference-in-means tests are also computed. All statistics are weighted by the same weights provided in the census of population.



(a) Unemployment rate of Indigenous peoples by location



(b) Occupation-type among Indigenous peoples by location

Figure A5: Unemployment rate and occupational type among Indigenous population by location. "Skilled Jobs" include senior managers, professionals, and supervisors. "Middle-Skill Jobs" include middle managers, semi-professionals, foremen and women, senior administrative or clerical work, and skilled craftsmen or trades. "Low-Skilled Jobs" include sales and services, clerical work, semi-skilled manual work, and other manual work. Occupational definitions according to the 1991 Standard Occupational Classification. Data obtained from the 1991 Aboriginal People's Survey Public Use Micro Files through the ¡odesi¿ data repository: `http://guides.scholarsportal.info/odesi`.

Table A5: Ordered Logit Estimation of Marginal Effects of Funding Cutbacks on Education Levels

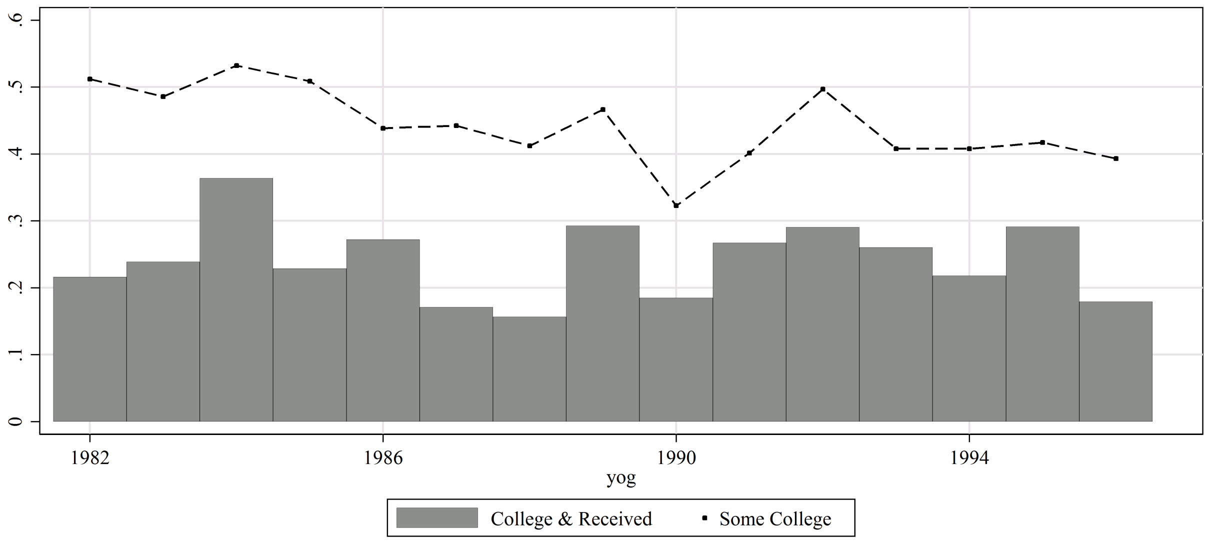
	(1) None	(2) High School	(3) Trade	(4) College	(5) Bachelor's
Treatment	0.02031***	0.02774***	0.00598***	-0.01394***	-0.04010***
	(0.00324)	(0.00525)	(0.00142)	(0.00200)	(0.00629)
N Obs	917,590	917,590	917,590	917,590	917,590
Pseudo R^2	0.27351	0.27351	0.27351	0.27351	0.27351

Notes: Standard errors clustered by province constructed using the delta-method in parentheses. The dependent variable in each specification is an ordered variable equal to the individual's highest level of schooling: no school, trade school, community college, or a bachelor's program. All regressions control for gender, whether an individual lives on a reserve or northern community, whether the individual is a Status Indian, distance to the closest CMA, latitude and longitude of CSD, tuition of education level r in province p at time t, and I include fixed effects for tribe, CMA-province, aboriginal group, and birth quarter.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

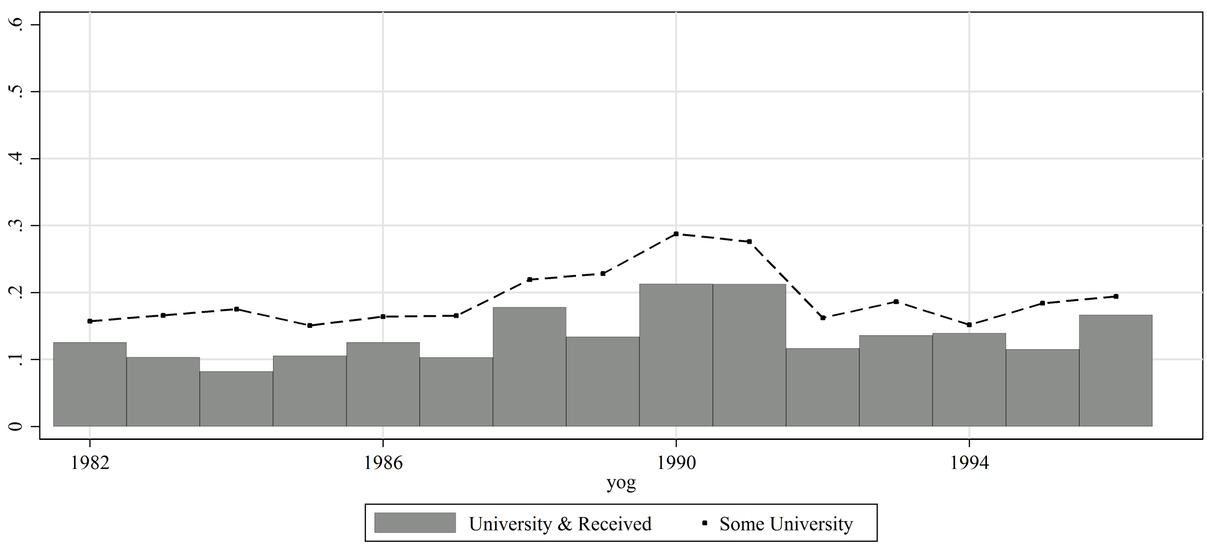
Table A6: Effects of Funding Cutbacks on High School Graduation by Indigenous Group

	(1) First Nations	(2) Inuit
Treatment	-0.02011***	0.02111
	(0.00531)	(0.01496)
N Obs	909,880	850,760
Adj. R^2	0.04681	0.02944

Notes: Standard errors clustered by province in parentheses. The dependent variable in column (1) is an indicator for whether or not the individual graduated high school. In column (2) the dependent variable is the number of weeks worked in the previous year and in column (3) the dependent variable is the number of hours worked in the previous week . Treatment is the interaction of graduating after the policy change and eligibility for the program. All columns control for gender, whether an individual lives on a reserve or northern community, whether the individual is a Status Indian, distance to the closest CMA, latitude and longitude of CSD, tuition of college and university in province p at time t, and I include fixed effects for tribe, CMA-province, aboriginal group, year of graduation, and birth quarter. * $p < 0.1$, ** $p < 0.05$,*** $p < 0.01$



(a) Community College



(b) University

Figure A6: The share of each cohort with some level of community college or university, and the share with some level of community college or university who also received funding for their studies. Data are from the 2006 Aboriginal People's Survey and do not include the on-reserve population.

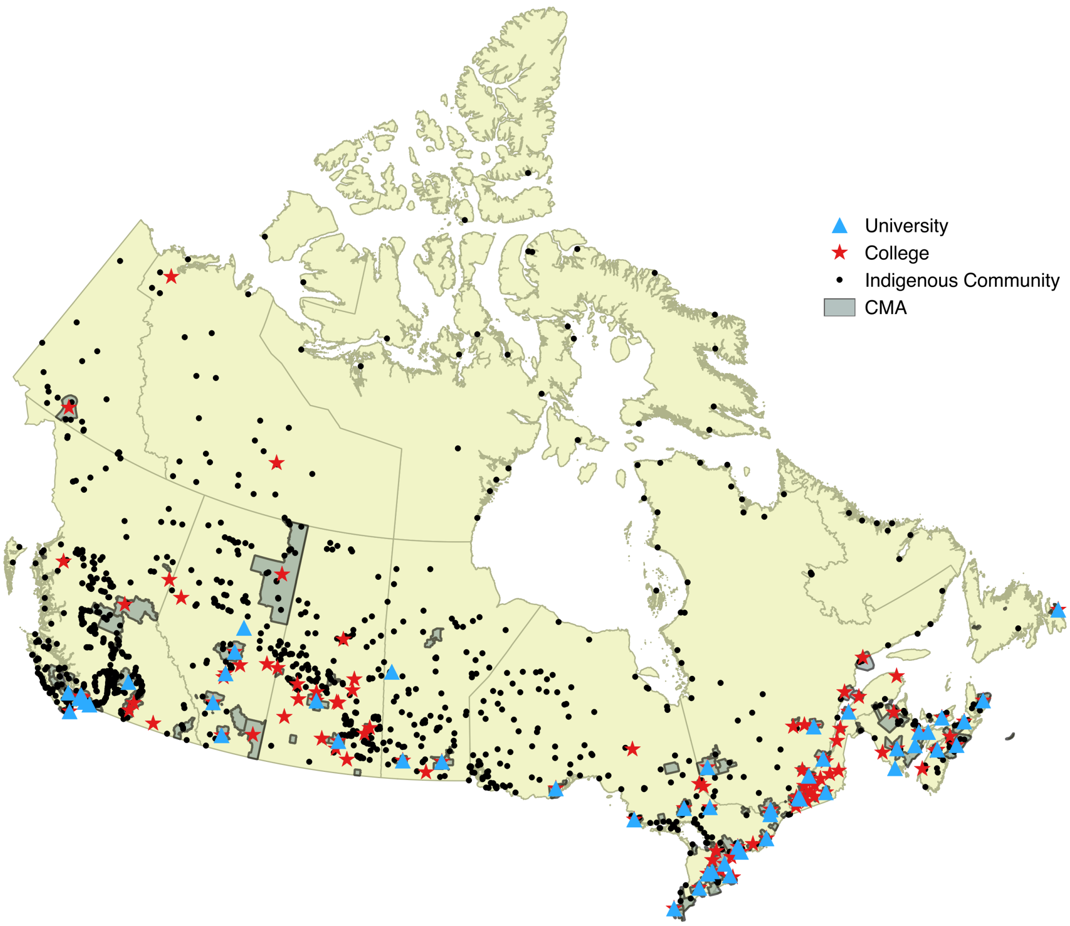


Figure A7: Location of colleges, universities and CMAs in 1989 in relation to Indigenous communities. Data from Statistics Canada Geographic Boundary Files, Association of Universities and Colleges of Canada, Campus Tour, and university websites.

Table A7: Effects of Funding Cutbacks on Education Levels: Excluding Land Claims Communities

	(1) None	(2) High School	(3) Trade	(4) College	(5) University
$t = -6$	0.01881*	-0.03899***	-0.00882	-0.00878	0.03778***
	(0.00961)	(0.01281)	(0.00997)	(0.01386)	(0.01307)
$t = -5$	-0.00357	-0.02569**	-0.01338	0.00712	0.03552***
	(0.00953)	(0.01270)	(0.00988)	(0.01373)	(0.01296)
$t = -4$	0.00062	-0.02038	0.00246	-0.00347	0.02077
	(0.00966)	(0.01287)	(0.01001)	(0.01392)	(0.01313)
$t = -3$	-0.00116	-0.00264	-0.00619	0.00281	0.00717
	(0.00960)	(0.01280)	(0.00995)	(0.01384)	(0.01305)
$t = -2$	0.01272	-0.01022	0.00689	-0.02132	0.01192
	(0.00955)	(0.01273)	(0.00990)	(0.01377)	(0.01299)
$t = -1$	.	.	.	.	.
	.	.	.	.	.
$t = 0$	0.01948**	0.00565	-0.00164	-0.01197	-0.01152
	(0.00959)	(0.01278)	(0.00994)	(0.01382)	(0.01304)
$t = 1$	-0.00134	0.01779	0.00555	-0.01019	-0.01181
	(0.00971)	(0.01295)	(0.01006)	(0.01400)	(0.01320)
$t = 2$	0.03346***	0.01232	-0.00411	-0.03683***	-0.00485
	(0.00968)	(0.01290)	(0.01003)	(0.01395)	(0.01316)
$t = 3$	0.01542	0.03684***	-0.00953	-0.03263**	-0.01011
	(0.00965)	(0.01286)	(0.01000)	(0.01391)	(0.01312)
$t = 4$	0.01935**	0.04509***	-0.01726*	-0.03813***	-0.00905
	(0.00970)	(0.01294)	(0.01006)	(0.01399)	(0.01320)
$t = 5$	0.04164***	0.03250**	-0.01330	-0.04269***	-0.01816
	(0.00974)	(0.01298)	(0.01009)	(0.01404)	(0.01324)
$t = 6$	0.03837***	0.04816***	-0.01687*	-0.04893***	-0.02074
	(0.00972)	(0.01295)	(0.01007)	(0.01401)	(0.01321)
N Obs	916,680	916,680	916,680	916,680	916,680
R^2	0.04945	0.01693	0.04120	0.01210	0.06046

Notes: Standard errors in parentheses. The dependent variable in each specification is a dummy variable for whether or not the highest level of education completed is the one being examined in the regression. The 5 equations are estimated jointly in a Seemingly Unrelated Regression model. A Breusch-Pagan test of independence among the error terms strongly rejects the null hypothesis that the errors are independent: $\chi^2(10) = 593,300$. I exclude the dummy variable for $t = -1$ so that all effects are measured relative to one cohort before the policy change occurred. All regressions control for gender, whether an individual lives on a reserve or northern community, whether the individual is a Status Indian, distance to the closest CMA, latitude and longitude of CSD, tuition of education level r in province p at time t, and I include fixed effects for tribe, CMA-province, aboriginal group, and birth quarter.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A8: Effects of Funding Cutbacks on Education Levels: Excluding Specific Claims Communities

	(1) None	(2) High School	(3) Trade	(4) College	(5) University
$t=-6$	0.01796*	-0.03755***	-0.00979	-0.00832	0.03770***
	(0.00971)	(0.01295)	(0.01007)	(0.01401)	(0.01322)
$t=-5$	-0.00508	-0.02444*	-0.01416	0.00806	0.03562***
	(0.00963)	(0.01284)	(0.00998)	(0.01389)	(0.01310)
$t=-4$	0.00002	-0.02022	0.00186	-0.00226	0.02060
	(0.00977)	(0.01303)	(0.01013)	(0.01409)	(0.01329)
$t=-3$	-0.00132	-0.00179	-0.00755	0.00383	0.00683
	(0.00970)	(0.01293)	(0.01005)	(0.01399)	(0.01320)
$t=-2$	0.01133	-0.00936	0.00584	-0.01984	0.01204
	(0.00966)	(0.01288)	(0.01001)	(0.01393)	(0.01314)
$t=-1$	.	.	.	.	.
	.	.	.	.	.
$t=0$	0.01880*	0.00513	-0.00197	-0.01008	-0.01187
	(0.00968)	(0.01292)	(0.01004)	(0.01397)	(0.01318)
$t=1$	-0.00355	0.01812	0.00445	-0.00743	-0.01158
	(0.00981)	(0.01309)	(0.01017)	(0.01416)	(0.01335)
$t=2$	0.03024***	0.01323	-0.00461	-0.03461**	-0.00425
	(0.00979)	(0.01305)	(0.01014)	(0.01412)	(0.01332)
$t=3$	0.01437	0.03829***	-0.01074	-0.03196**	-0.00995
	(0.00974)	(0.01299)	(0.01010)	(0.01405)	(0.01326)
$t=4$	0.01815*	0.04522***	-0.01851*	-0.03623**	-0.00863
	(0.00980)	(0.01308)	(0.01017)	(0.01414)	(0.01334)
$t=5$	0.04130***	0.03220**	-0.01421	-0.04092***	-0.01837
	(0.00985)	(0.01313)	(0.01021)	(0.01420)	(0.01340)
$t=6$	0.03739***	0.04927***	-0.01776*	-0.04832***	-0.02057
	(0.00981)	(0.01309)	(0.01018)	(0.01416)	(0.01336)
N Obs	914,200	914,200	914,200	914,200	914,200
R^2	0.04878	0.01694	0.04122	0.01206	0.06031

Notes: Standard errors in parentheses. The dependent variable in each specification is a dummy variable for whether or not the highest level of education completed is the one being examined in the regression. The 5 equations are estimated jointly in a Seemingly Unrelated Regression model. A Breusch-Pagan test of independence among the error terms strongly rejects the null hypothesis that the errors are independent: $\chi^2(10) = 591,710$. I exclude the dummy variable for $t = -1$ so that all effects are measured relative to one cohort before the policy change occurred. All regressions control for gender, whether an individual lives on a reserve or northern community, whether the individual is a Status Indian, distance to the closest CMA, latitude and longitude of CSD, tuition of education level r in province p at time t, and I include fixed effects for tribe, CMA-province, aboriginal group, and birth quarter.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A9: Number of Search Results for Confounding Events

	Globe and Mail (1)	Ottawa Citizen (2)	Financial Times (3)
	January 1st, 1987 - December 31st, 1991		
Education Policy	156	2027	763
Education Law	125	1883	433
Indian Education	59	601	79
Post-Secondary	561	587	187

Table A10: Summary of Policy Changes from Online Searches

Date	Summary	Source
87-01-26	Alberta government cuts education grants	Globe and Mail
87-02-27	OSAP gets a 17% boost	Globe and Mail
88-02-24	Ontario adds scholarship program for universities	Globe and Mail
88-10-11	Native Language programs introduced into Ontario Schools	Globe and Mail
89-04-01	Ontario School Boards required to enact employment-equity policies for women	Globe and Mail
89-04-17	New policy increases post-secondary tuition assistance	Ottawa Citizen
89-04-25	Student Aid increased by 15.4 Million in Ontario	Globe and Mail
89-06-01	Queen's Park Donation to disabled students allows for new financial assistance	Globe and Mail
89-09-13	Native Students with children to get more funding	Ottawa Citizen
89-10-07	BC Government adopts Royal Commission Recommendations for education	Globe and Mail
90-02-06	Premier Bourassa raises tuition by 140%	Financial Times
90-07-11	Alberta Universities cut back class sizes	Globe and Mail
91-04-24	Ontario adds $220 Million to post-secondary assistance	Ottawa Citizen

Table A11: Effects of Funding Cutbacks on Education Levels: Excluding Quebec

	(1) None	(2) High School	(3) Trade	(4) College	(5) University
$t = -6$	0.01527	-0.04204***	-0.01078	0.00068	0.03687***
	(0.00991)	(0.01389)	(0.00950)	(0.01462)	(0.01368)
$t = -5$	-0.00246	-0.02486*	-0.01835*	0.01332	0.03235**
	(0.00983)	(0.01378)	(0.00942)	(0.01450)	(0.01357)
$t = -4$	0.00222	-0.01522	-0.00310	-0.00263	0.01874
	(0.00995)	(0.01394)	(0.00953)	(0.01468)	(0.01373)
$t = -3$	0.00740	-0.00192	-0.01735*	0.00529	0.00657
	(0.00989)	(0.01387)	(0.00948)	(0.01460)	(0.01366)
$t = -2$	0.01498	-0.01185	0.00377	-0.01171	0.00481
	(0.00985)	(0.01380)	(0.00944)	(0.01453)	(0.01359)
$t = -1$	.	.	.	.	.
	.	.	.	.	.
$t = 0$	0.02271**	0.00392	-0.00657	-0.00293	-0.01713
	(0.00989)	(0.01387)	(0.00948)	(0.01460)	(0.01366)
$t = 1$	0.00492	0.01684	0.00085	-0.00497	-0.01764
	(0.01001)	(0.01403)	(0.00959)	(0.01477)	(0.01382)
$t = 2$	0.03411***	0.01236	-0.00875	-0.03135**	-0.00638
	(0.01000)	(0.01401)	(0.00958)	(0.01475)	(0.01380)
$t = 3$	0.01796*	0.03817***	-0.01200	-0.03124**	-0.01289
	(0.00995)	(0.01395)	(0.00954)	(0.01469)	(0.01374)
$t = 4$	0.02218**	0.04655***	-0.01342	-0.03789**	-0.01742
	(0.01003)	(0.01406)	(0.00961)	(0.01480)	(0.01384)
$t = 5$	0.04695***	0.03004**	-0.00988	-0.04015***	-0.02696*
	(0.01005)	(0.01409)	(0.00963)	(0.01483)	(0.01388)
$t = 6$	0.03626***	0.04549***	-0.01381	-0.03743**	-0.03050**
	(0.01003)	(0.01406)	(0.00962)	(0.01480)	(0.01385)
N Obs	700,320	700,320	700,320	700,320	700,320
R^2	0.05538	0.01053	0.02264	0.01260	0.06565

Notes: Standard errors in parentheses. The dependent variable in each specification is a dummy variable for whether or not the highest level of education completed is the one being examined in the regression. The 5 equations are estimated jointly in a Seemingly Unrelated Regression model. A Breusch-Pagan test of independence among the error terms strongly rejects the null hypothesis that the errors are independent: $\chi^2(10) = 458,050$. I exclude the dummy variable for $t = -1$ so that all effects are measured relative to one cohort before the policy change occurred. All regressions control for gender, whether an individual lives on a reserve or northern community, whether the individual is a Status Indian, distance to the closest CMA, latitude and longitude of CSD, tuition of education level r in province p at time t, and I include fixed effects for tribe, CMA-province, aboriginal group, and birth quarter.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A12: Effects of Funding Cutbacks on Education Levels: Excluding Alberta

	(1) None	(2) High School	(3) Trade	(4) College	(5) University
$t=-6$	0.01589	-0.03482**	-0.01093	-0.00820	0.03806***
	(0.01019)	(0.01367)	(0.01071)	(0.01484)	(0.01404)
$t=-5$	-0.00513	-0.02330*	-0.01297	0.00776	0.03364**
	(0.01009)	(0.01353)	(0.01060)	(0.01470)	(0.01390)
$t=-4$	-0.00333	-0.02353*	-0.00363	0.01261	0.01787
	(0.01025)	(0.01374)	(0.01076)	(0.01492)	(0.01411)
$t=-3$	-0.00549	-0.00195	-0.00764	0.00441	0.01067
	(0.01020)	(0.01369)	(0.01072)	(0.01486)	(0.01405)
$t=-2$	0.00667	-0.00562	0.00672	-0.02227	0.01450
	(0.01017)	(0.01364)	(0.01068)	(0.01482)	(0.01401)
$t=-1$	.	.	.	.	.
	.	.	.	.	.
$t=0$	0.01619	0.00702	-0.00387	-0.01234	-0.00700
	(0.01018)	(0.01365)	(0.01069)	(0.01483)	(0.01402)
$t=1$	-0.00688	0.02283*	0.00466	-0.01282	-0.00779
	(0.01030)	(0.01381)	(0.01081)	(0.01500)	(0.01418)
$t=2$	0.02554**	0.01540	-0.00211	-0.03664**	-0.00218
	(0.01034)	(0.01387)	(0.01086)	(0.01506)	(0.01424)
$t=3$	0.01649	0.04139***	-0.01480	-0.03609**	-0.00700
	(0.01028)	(0.01379)	(0.01079)	(0.01498)	(0.01416)
$t=4$	0.01747*	0.05184***	-0.02352**	-0.03920***	-0.00659
	(0.01034)	(0.01387)	(0.01086)	(0.01506)	(0.01424)
$t=5$	0.03711***	0.04381***	-0.02130*	-0.04023***	-0.01938
	(0.01044)	(0.01400)	(0.01096)	(0.01520)	(0.01437)
$t=6$	0.04065***	0.04108***	-0.02018*	-0.04331***	-0.01824
	(0.01035)	(0.01388)	(0.01086)	(0.01507)	(0.01425)
N Obs	807,620	807,620	807,620	807,620	807,620
R^2	0.04871	0.01852	0.04310	0.01231	0.06068

Notes: Standard errors in parentheses. The dependent variable in each specification is a dummy variable for whether or not the highest level of education completed is the one being examined in the regression. The 5 equations are estimated jointly in a Seemingly Unrelated Regression model. A Breusch-Pagan test of independence among the error terms strongly rejects the null hypothesis that the errors are independent: $\chi^2(10) = 523,090$. I exclude the dummy variable for $t = -1$ so that all effects are measured relative to one cohort before the policy change occurred. All regressions control for gender, whether an individual lives on a reserve or northern community, whether the individual is a Status Indian, distance to the closest CMA, latitude and longitude of CSD, tuition of education level r in province p at time t, and I include fixed effects for tribe, CMA-province, aboriginal group, and birth quarter.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A13: Effects of Funding Cutbacks on Education Levels (Status Indian Treatment Group)

	(1) None	(2) High School	(3) Trade	(4) College	(5) University
$t = -6$	0.03513***	-0.06268***	-0.00286	-0.00650	0.03691***
	(0.01000)	(0.01332)	(0.01036)	(0.01441)	(0.01359)
$t = -5$	0.01901*	-0.03870***	-0.01347	-0.00119	0.03435**
	(0.00986)	(0.01315)	(0.01022)	(0.01422)	(0.01341)
$t = -4$	0.01642	-0.02793**	-0.00116	-0.00853	0.02121
	(0.01004)	(0.01338)	(0.01040)	(0.01447)	(0.01364)
$t = -3$	0.02844***	-0.01004	-0.01145	-0.00774	0.00079
	(0.00997)	(0.01329)	(0.01033)	(0.01438)	(0.01356)
$t = -2$	0.03731***	-0.02197*	0.00072	-0.02505*	0.00898
	(0.00992)	(0.01323)	(0.01028)	(0.01430)	(0.01349)
$t = -1$	.	.	.	.	.
	.	.	.	.	.
$t = 0$	0.04564***	0.00513	-0.00111	-0.03098**	-0.01867
	(0.00993)	(0.01324)	(0.01029)	(0.01432)	(0.01351)
$t = 1$	0.01404	0.00753	0.00215	-0.01108	-0.01263
	(0.01007)	(0.01342)	(0.01043)	(0.01451)	(0.01369)
$t = 2$	0.05043***	0.00194	-0.00340	-0.04475***	-0.00422
	(0.01004)	(0.01339)	(0.01041)	(0.01448)	(0.01365)
$t = 3$	0.03305***	0.03709***	-0.00665	-0.04515***	-0.01834
	(0.01006)	(0.01341)	(0.01042)	(0.01450)	(0.01368)
$t = 4$	0.04490***	0.03377**	-0.00498	-0.06200***	-0.01169
	(0.01002)	(0.01336)	(0.01039)	(0.01445)	(0.01363)
$t = 5$	0.06373***	0.02189	-0.00689	-0.05356***	-0.02517*
	(0.01008)	(0.01344)	(0.01045)	(0.01454)	(0.01371)
$t = 6$	0.04667***	0.04929***	-0.00793	-0.06508***	-0.02294*
	(0.01011)	(0.01347)	(0.01047)	(0.01457)	(0.01374)
N Obs	917,590	917,590	917,590	917,590	917,590
R^2	0.04955	0.01696	0.04119	0.01212	0.06049

Notes: Standard errors in parentheses. The dependent variable in each specification is a dummy variable for whether or not the highest level of education completed is the one being examined in the regression. The 5 equations are estimated jointly in a Seemingly Unrelated Regression model. A Breusch-Pagan test of independence among the error terms strongly rejects the null hypothesis that the errors are independent: $\chi^2(10) = 593,890$. I exclude the dummy variable for $t = -1$ so that all effects are measured relative to one cohort before the policy change occurred. All regressions control for gender, whether an individual lives on a reserve or northern community, whether the individual is a Status Indian, distance to the closest CMA, latitude and longitude of CSD, tuition of education level r in province p at time t, and I include fixed effects for tribe, CMA-province, aboriginal group, and birth quarter.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A14: Effects of Funding Cutbacks on Education Levels (Métis Control Group)

	(1) None	(2) High School	(3) Trade	(4) College	(5) University
$t=-6$	-0.05138***	0.02054	0.00468	0.00907	0.01709*
	(0.01584)	(0.01518)	(0.01215)	(0.01509)	(0.00975)
$t=-5$	-0.05125***	0.04133***	-0.00560	0.01647	-0.00095
	(0.01578)	(0.01512)	(0.01210)	(0.01502)	(0.00971)
$t=-4$	-0.03292**	0.01602	0.03373***	-0.02632*	0.00949
	(0.01583)	(0.01517)	(0.01214)	(0.01508)	(0.00975)
$t=-3$	-0.07077***	0.03226**	-0.00191	0.02233	0.01809*
	(0.01578)	(0.01513)	(0.01210)	(0.01503)	(0.00972)
$t=-2$	-0.02158	0.00694	0.02920**	-0.02194	0.00737
	(0.01587)	(0.01521)	(0.01217)	(0.01512)	(0.00977)
$t=-1$	.	.	.	.	.
	.	.	.	.	.
$t=0$	-0.00045	0.02737*	0.00847	-0.03148**	-0.00392
	(0.01575)	(0.01509)	(0.01207)	(0.01499)	(0.00969)
$t=1$	-0.00897	0.01862	0.01976	0.00157	-0.03098***
	(0.01596)	(0.01529)	(0.01224)	(0.01520)	(0.00983)
$t=2$	-0.00149	0.01868	0.01779	-0.02760*	-0.00738
	(0.01597)	(0.01530)	(0.01224)	(0.01520)	(0.00983)
$t=3$	-0.01623	0.03386**	0.00543	-0.00017	-0.02289**
	(0.01605)	(0.01538)	(0.01231)	(0.01528)	(0.00988)
$t=4$	-0.00887	0.01170	0.00243	0.01396	-0.01922*
	(0.01594)	(0.01528)	(0.01223)	(0.01518)	(0.00982)
$t=5$	0.00166	-0.00514	0.01366	0.00853	-0.01871*
	(0.01579)	(0.01513)	(0.01211)	(0.01503)	(0.00972)
$t=6$	0.00740	0.04276***	-0.00218	-0.03018**	-0.01781*
	(0.01588)	(0.01521)	(0.01218)	(0.01512)	(0.00978)
N Obs	87,030	87,030	87,030	87,030	87,030
R^2	0.11096	0.03096	0.03174	0.04348	0.05145

Notes: Standard errors in parentheses. The dependent variable in each specification is a dummy variable for whether or not the highest level of education completed is the one being examined in the regression. The 5 equations are estimated jointly in a Seemingly Unrelated Regression model. A Breusch-Pagan test of independence among the error terms strongly rejects the null hypothesis that the errors are independent: $\chi^2(10) = 56,560$. I exclude the dummy variable for $t = -1$ so that all effects are measured relative to one cohort before the policy change occurred. All regressions control for gender, whether an individual lives on a reserve or northern community, whether the individual is a Status Indian, distance to the closest CMA, latitude and longitude of CSD, tuition of education level r in province p at time t, and I include fixed effects for tribe, CMA-province, aboriginal group, and birth quarter.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A15: Effects of Funding Cutbacks on Education Levels (Within First Nations)

	(1) None	(2) High School	(3) Trade	(4) College	(5) University
$t=-6$	0.00505	-0.11786***	0.02898*	0.07610***	0.00773
	(0.02308)	(0.02103)	(0.01676)	(0.02057)	(0.01289)
$t=-5$	0.03946*	-0.07119***	0.02065	0.00932	0.00176
	(0.02325)	(0.02112)	(0.01682)	(0.02071)	(0.01293)
$t=-4$	0.05759**	-0.07650***	0.00407	-0.00346	0.01831
	(0.02337)	(0.02123)	(0.01690)	(0.02082)	(0.01299)
$t=-3$	0.07439***	-0.02693	-0.00909	-0.02628	-0.01210
	(0.02320)	(0.02108)	(0.01678)	(0.02068)	(0.01290)
$t=-2$	0.07530***	-0.05094**	-0.02014	0.01899	-0.02322*
	(0.02332)	(0.02119)	(0.01687)	(0.02078)	(0.01296)
$t=-1$	.	.	.	.	.
	.	.	.	.	.
$t=0$	0.08076***	-0.01058	0.02361	-0.06276***	-0.03103**
	(0.02336)	(0.02122)	(0.01689)	(0.02082)	(0.01299)
$t=1$	0.06266***	-0.02680	-0.01961	-0.01833	0.00207
	(0.02364)	(0.02148)	(0.01710)	(0.02107)	(0.01314)
$t=2$	0.04757**	-0.03366	0.01528	-0.04578**	0.01659
	(0.02378)	(0.02161)	(0.01720)	(0.02119)	(0.01322)
$t=3$	0.05860**	-0.02943	0.01690	-0.01844	-0.02763**
	(0.02307)	(0.02096)	(0.01669)	(0.02056)	(0.01283)
$t=4$	0.07550***	-0.05134**	0.04237**	-0.07006***	0.00353
	(0.02363)	(0.02147)	(0.01709)	(0.02106)	(0.01313)
$t=5$	0.08700***	-0.06860***	0.05282***	-0.03755*	-0.03366**
	(0.02380)	(0.02162)	(0.01721)	(0.02121)	(0.01323)
$t=6$	0.01581	0.03139	0.05336***	-0.09456***	-0.00599
	(0.02314)	(0.02103)	(0.01674)	(0.02062)	(0.01286)
N Obs	66,830	66,830	66,830	66,830	66,830
R^2	0.11221	0.03645	0.04062	0.05256	0.05769

Notes: Standard errors in parentheses. The dependent variable in each specification is a dummy variable for whether or not the highest level of education completed is the one being examined in the regression. The 5 equations are estimated jointly in a Seemingly Unrelated Regression model. A Breusch-Pagan test of independence among the error terms strongly rejects the null hypothesis that the errors are independent: $\chi^2(10) = 43,960$. I exclude the dummy variable for $t = -1$ so that all effects are measured relative to one cohort before the policy change occurred. All regressions control for gender, whether an individual lives on a reserve or northern community, whether the individual is a Status Indian, distance to the closest CMA, latitude and longitude of CSD, tuition of education level r in province p at time t, and I include fixed effects for tribe, CMA-province, aboriginal group, and birth quarter.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A16: Effects of Funding Cutbacks on Mobility

	Moved Provinces	On-Reserve
$t = -6$	-0.01047	0.00281
	(0.01066)	(0.01241)
$t = -5$	-0.00954	-0.01327
	(0.01283)	(0.01092)
$t = -4$	0.00754	0.01086*
	(0.01605)	(0.00584)
$t = -3$	0.00341	-0.00604
	(0.01393)	(0.00601)
$t = -2$	0.01709	-0.00162
	(0.01414)	(0.00745)
$t = -1$	.	.
	.	.
$t = 0$	0.01997	-0.02082***
	(0.01238)	(0.00519)
$t = 1$	0.01466	-0.00232
	(0.01082)	(0.00850)
$t = 2$	0.02102	-0.01210
	(0.01782)	(0.00839)
$t = 3$	0.02085**	-0.01337
	(0.00861)	(0.00849)
$t = 4$	0.02409	-0.00800
	(0.01370)	(0.01100)
$t = 5$	0.03158**	-0.00300
	(0.01232)	(0.01112)
$t = 6$	0.03250*	-0.00068
	(0.01684)	(0.00787)
N Obs	853,820	853,820
Adj. R^2	0.14800	0.52493

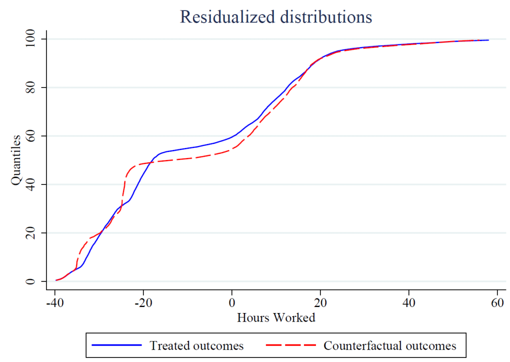
Notes: Standard errors in parentheses. The dependent variable in each specification is either a dummy variable for whether or not the individual lives in the same province they were born, or a dummy for whether the individual lives on a reserve. I exclude the dummy variable for $t = -1$ so that all effects are measured relative to one cohort before the policy change occurred. All regressions control for gender, whether the individual is a Status Indian, distance to the closest CMA, latitude and longitude of CSD, tuition of education level r in province p at time t, and I include fixed effects for tribe, CMA-province, aboriginal group, and birth quarter.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

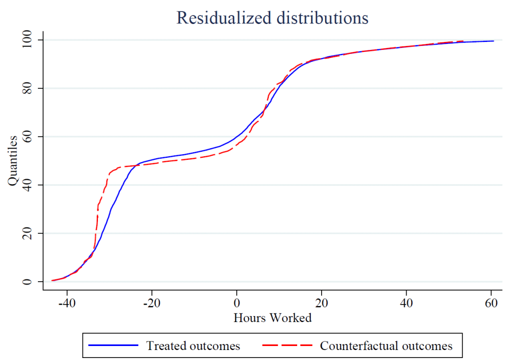
Table A17: Effects of Funding Cutbacks on Education Levels: Restricting Mobility

	(1) None	(2) High School	(3) Trade	(4) College	(5) University
$t = -6$	0.01401	-0.03854***	-0.00833	-0.00854	0.04139***
	(0.01068)	(0.01397)	(0.01116)	(0.01511)	(0.01378)
$t = -5$	-0.01782*	-0.02251	-0.00482	0.00257	0.04258***
	(0.01057)	(0.01382)	(0.01104)	(0.01495)	(0.01363)
$t = -4$	0.00793	-0.02799**	-0.00216	-0.00553	0.02775**
	(0.01077)	(0.01409)	(0.01124)	(0.01523)	(0.01389)
$t = -3$	-0.00962	0.00043	0.00190	0.00368	0.00361
	(0.01069)	(0.01398)	(0.01116)	(0.01512)	(0.01378)
$t = -2$	0.00890	-0.00985	0.00885	-0.02781*	0.01992
	(0.01067)	(0.01396)	(0.01114)	(0.01509)	(0.01376)
$t = -1$	.	.	.	.	.
	.	.	.	.	.
$t = 0$	0.01495	0.01926	-0.00589	-0.02083	-0.00749
	(0.01069)	(0.01399)	(0.01116)	(0.01512)	(0.01379)
$t = 1$	-0.00327	0.01383	0.00959	-0.01400	-0.00615
	(0.01077)	(0.01409)	(0.01125)	(0.01524)	(0.01389)
$t = 2$	0.03340***	0.01564	-0.00283	-0.04624***	0.00003
	(0.01077)	(0.01408)	(0.01124)	(0.01523)	(0.01388)
$t = 3$	0.00644	0.03856***	-0.00358	-0.03648**	-0.00494
	(0.01072)	(0.01403)	(0.01120)	(0.01517)	(0.01383)
$t = 4$	0.01491	0.04287***	-0.01079	-0.04740***	0.00041
	(0.01077)	(0.01408)	(0.01124)	(0.01523)	(0.01388)
$t = 5$	0.04261***	0.03173**	-0.00996	-0.05799***	-0.00639
	(0.01083)	(0.01416)	(0.01131)	(0.01532)	(0.01396)
$t = 6$	0.02891***	0.04902***	-0.01479	-0.04915***	-0.01399
	(0.01077)	(0.01408)	(0.01124)	(0.01523)	(0.01388)
N Obs	699,900	699,900	699,900	699,900	699,900
R^2	0.05337	0.02027	0.04419	0.01444	0.05706

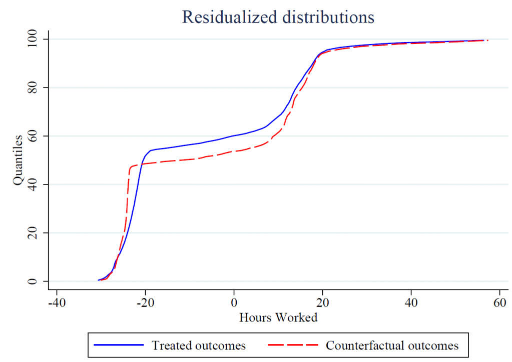
Notes: Standard errors in parentheses. The dependent variable in each specification is a dummy variable for whether or not the highest level of education completed is the one being examined in the regression. The 5 equations are estimated jointly in a Seemingly Unrelated Regression model. A Breusch-Pagan test of independence among the error terms strongly rejects the null hypothesis that the errors are independent: $\chi^2(10) = 451,220$. I exclude the dummy variable for $t = -1$ so that all effects are measured relative to one cohort before the policy change occurred. All regressions control for gender, whether an individual lives on a reserve or northern community, whether the individual is a Status Indian, distance to the closest CMA, latitude and longitude of CSD, tuition of education level r in province p at time t, and I include fixed effects for tribe, CMA-province, aboriginal group, and birth quarter.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$



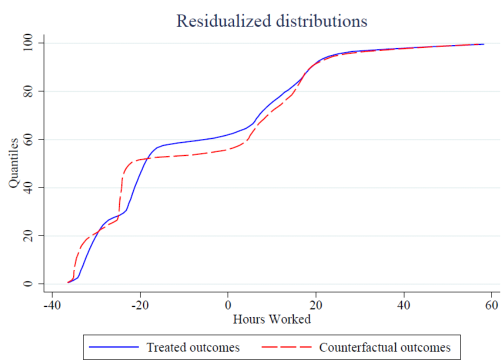
(a) Full sample



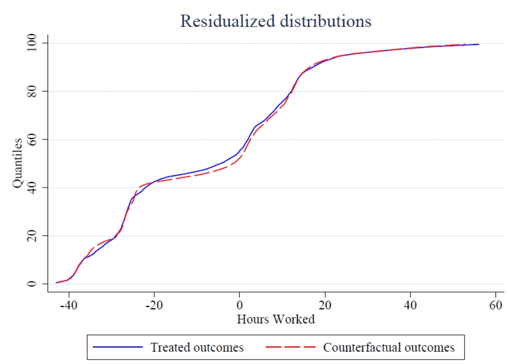
(b) Male sample



(c) Female sample

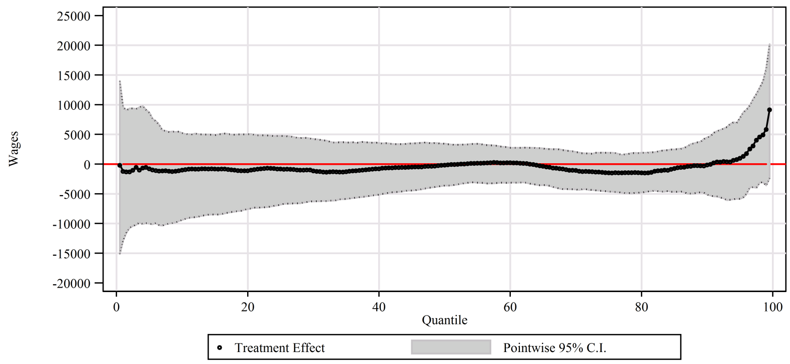


(d) On-reserve sample

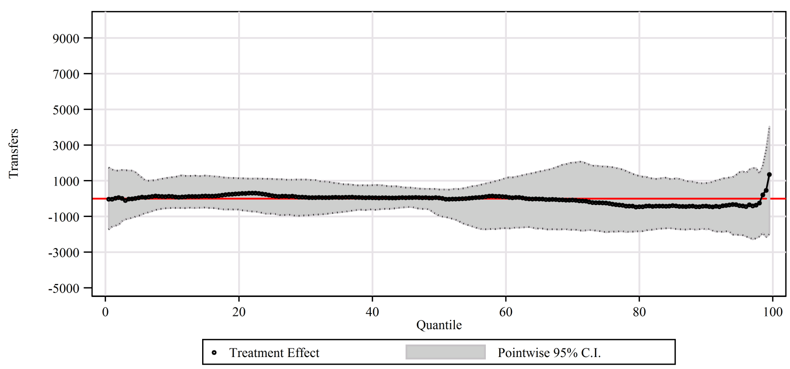


(e) Off-reserve sample

Figure A8: Treated and counterfactual cdfs of the residualized distribution of hours worked. A Komolgorov-Smirnov test for equality of distribution functions rejects the null hypothesis that the treated and counterfactual distributions are equivalent at the 10% level with an exact P-value of 0.086 for the full sample, at the 1% level with an exact P-value of 0.006 for the male sample, and at the 1% level with an exact P-value of 0.000 for the female sample, at the 10% level with an exact P-value of 0.078 for the on-reserve sample. The Komolgorov-Smirnov test does not reject the null hypothesis that the treated and counterfactual distributions are equivalent for the off-reserve population.



(a) Wages



(b) Transfers

Figure A9: Quantile treatment effects on wages and transfers from estimating non-linear difference-in-differences specifications with 95% confidence intervals estimated using 199 bootstrap samples. Residuals constructed from a regression of hours worked on gender, distance to the closest CMA, latitude and longitude of CSD, tuition of college and university in province p at time t, and I include fixed effects for CMA-province, year of graduation, and birth quarter.

B Comparative Statics

It is not immediately clear how a change in student aid should affect the share of people choosing each level of education. Using the simplified indirect utility function in equation 4, we can solve for each ability level α_r for which a student is indifferent between education level r and education level $r-1$.

$$\alpha_{pt}^{r} = \frac{\Pi_{pt}^{r} - \Pi_{pt}^{r-1}}{\kappa^{r-1} - \kappa^{r}} \tag{11}$$

Integrating over the distribution of ability yields the share of people choosing each education level in each province at each point in time,

$$\begin{aligned} s_{pt}^{r} &= \int_{\alpha_{pt}^{r}}^{\alpha_{pt}^{r+1}} \psi(x)dx \\ s_{pt}^{r} &= \int_{\underline{\alpha}}^{\alpha_{pt}^{r+1}} \psi(x)dx - \int_{\underline{\alpha}}^{\alpha_{pt}^{r}} \psi(x)dx \\ s_{pt}^{r} &= \Psi(\alpha_{pt}^{r+1}) - \Psi(\alpha_{pt}^{r}) \end{aligned}$$

To obtain an analytical solution to the share equations and to calculate the relevant comparative statics, I assume that $\alpha \sim U[0,1]$.[52] In this case the share of the population choosing education level r in province p at time t is

$$s_{pt}^{r} = \alpha_{pt}^{r+1} - \alpha_{pt}^{r} \tag{12}$$

Substituting equation 11 for each cutoff α_{pt}^{r} yields the following expression for the change in the share of the population choosing education level r

$$\Delta s_{p}^{r} = \left[\frac{\left(\Delta B_{p}^{r+1} - \Delta B_{p}^{r}\right) - \left(\Delta F_{p}^{r+1} - \Delta F_{p}^{r}\right)}{\kappa^{r} - \kappa^{r+1}}\right] - \left[\frac{\left(\Delta B_{p}^{r} - \Delta B_{p}^{r-1}\right) - \left(\Delta F_{p}^{r} - \Delta F_{p}^{r-1}\right)}{\kappa^{r-1} - \kappa^{r}}\right] \tag{13}$$

Some properties of Δs_{p}^{r} are as follows:

1. The change in the share of the population choosing education level r is increasing in the change in the benefits associated with this education level ΔB_{p}^{r}, the change in the cost of the next level of education level ΔF_{p}^{r+1}, and the change in the cost of the lower education level ΔF_{p}^{r-1}.
   (i) $\frac{\partial \Delta s_{p}^{r}}{\partial \Delta B_{p}^{r}} > 0$ (ii) $\frac{\partial \Delta s_{p}^{r}}{\partial \Delta F_{p}^{r+1}} > 0$ (iii) $\frac{\partial \Delta s_{p}^{r}}{\partial \Delta F_{p}^{r-1}} > 0$
2. The change in the share of the population choosing education level r is decreasing in the change in the costs associated with this education level ΔF_{p}^{r}, the change in the benefits of the next level of education level ΔB_{p}^{r+1}, and the change in the benefit of the lower education level ΔB_{p}^{r-1}.
   (i) $\frac{\partial \Delta s_{p}^{r}}{\partial \Delta F_{p}^{r}} < 0$ (ii) $\frac{\partial \Delta s_{p}^{r}}{\partial \Delta B_{p}^{r+1}} < 0$ (iii) $\frac{\partial \Delta s_{p}^{r}}{\partial \Delta B_{p}^{r-1}} < 0$

[52] One should not expect this assumption to alter the main conclusions, rather it simplifies the exposition.