Online Appendix: Post-Secondary Funding and the Educational Attainment of Indigenous Students

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A Additional Figures

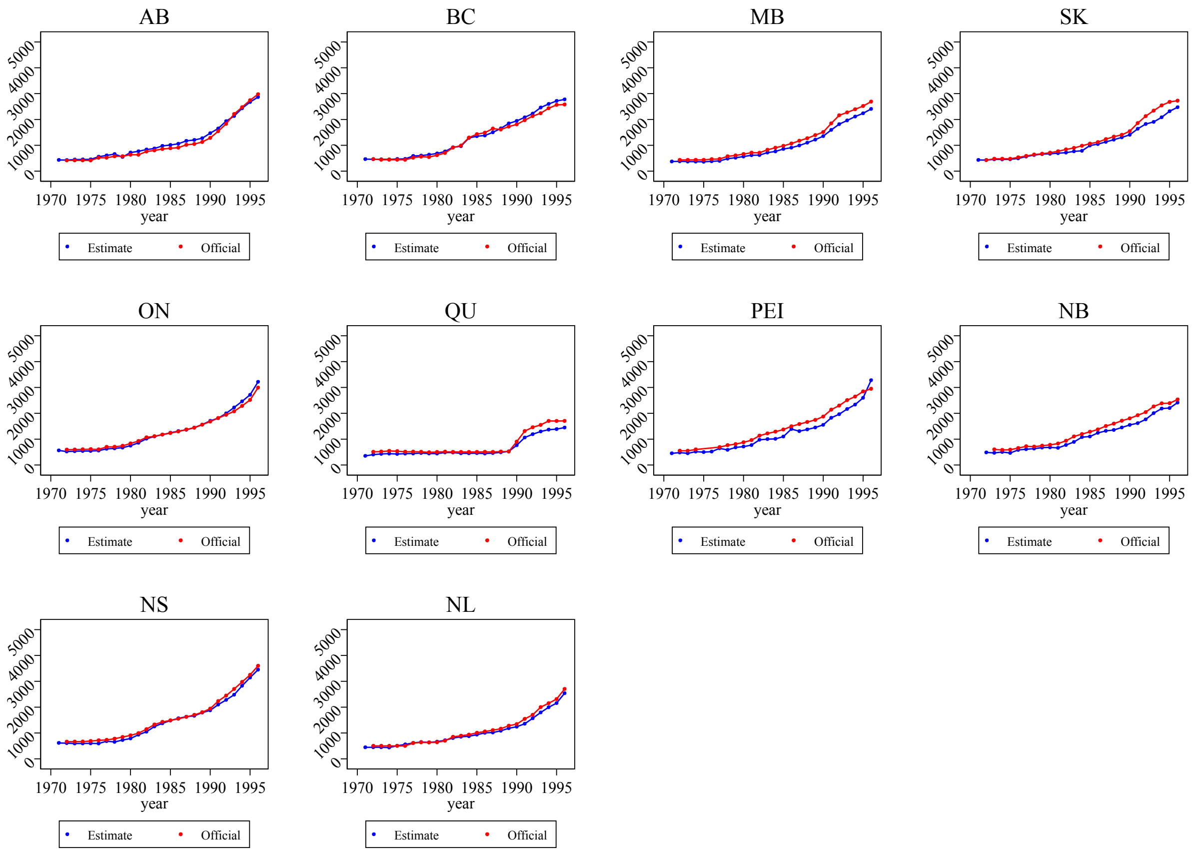


Figure A.1: Verification of tuition estimate for universities in Canada between 1970 and 2000.

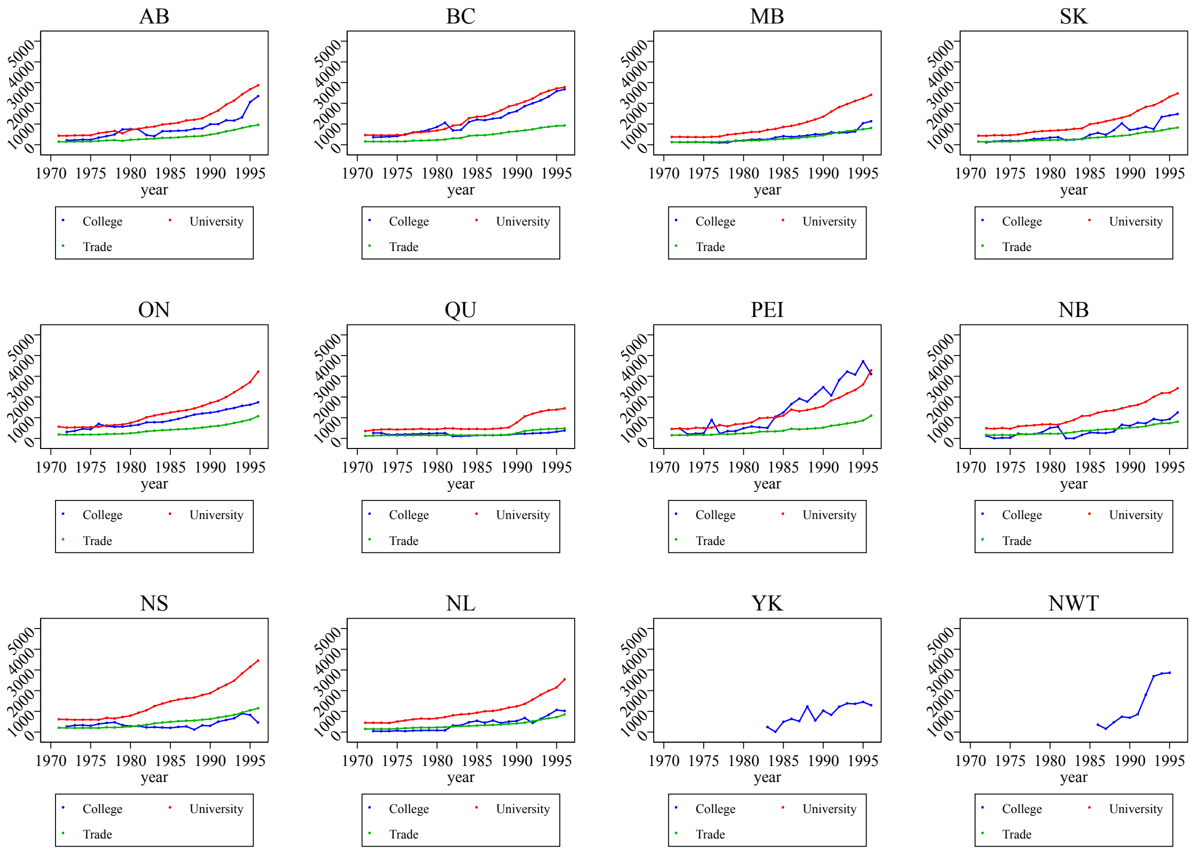
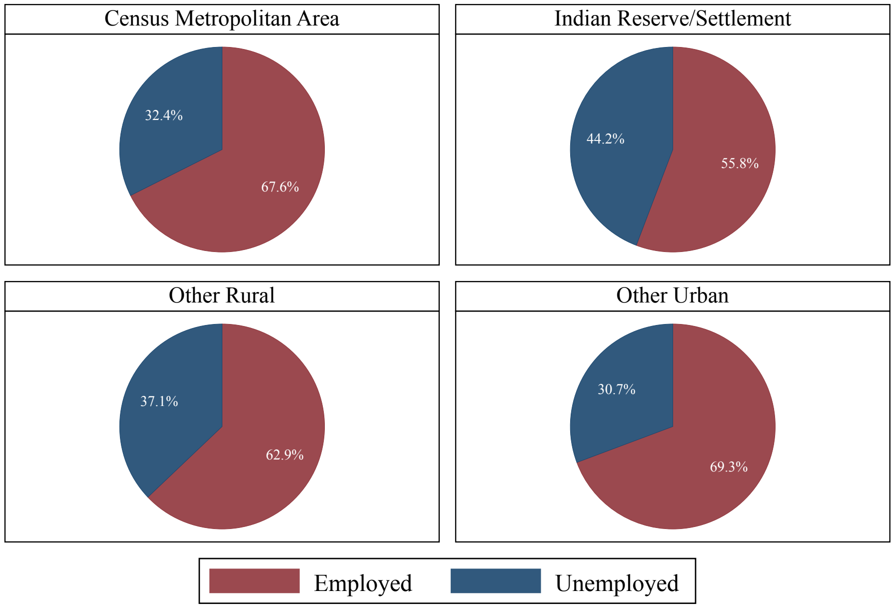
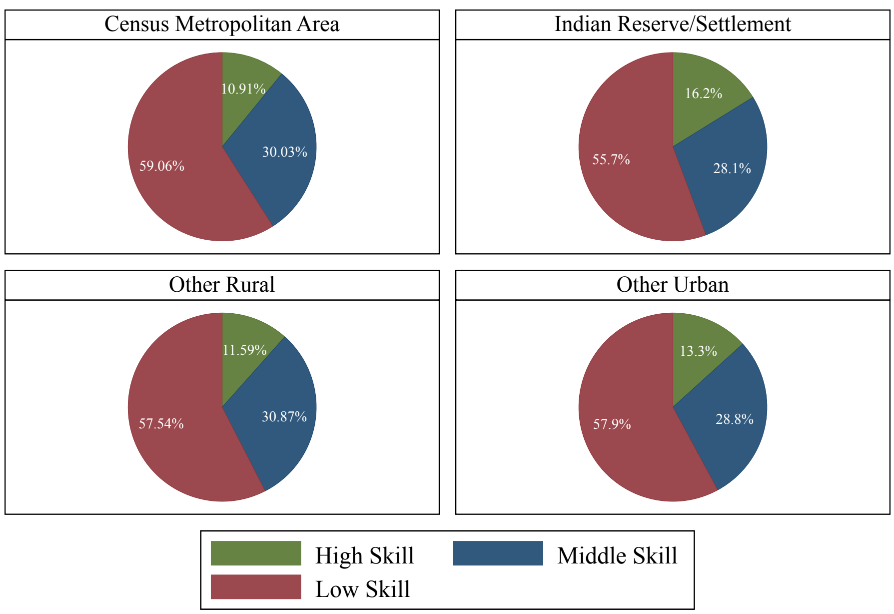


Figure A.2: Tuition estimates for college, university and trade school for each province and territory between 1971 and 1998.



(a) Unemployment rate of Indigenous peoples by location



(b) Occupation-type among Indigenous peoples by location

Figure A.3: 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`.

B Additional Tables

Table B.1: 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 B.2: 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.

Table B.3: 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.

Table B.4: Effects of Funding Cutbacks on Education Levels

	(1) None	(2) High School	(3) Trade	(4) College	(5) Bachelor's
$t = -6$	0.0179	-0.0370***	-0.0094	-0.0085	0.0371**
	[0.1892]	[0.0090]	[0.4865]	[0.5285]	[0.0951]
	(0.0117)	(0.0081)	(0.0117)	(0.0125)	(0.0156)
$t = -5$	-0.0043	-0.0258***	-0.0141**	0.0098	0.0343**
	[0.7337]	[0.0070]	[0.0551]	[0.3403]	[0.0460]
	(0.0109)	(0.0071)	(0.0061)	(0.0091)	(0.0113)
$t = -4$	-0.0009	-0.0205*	0.0027	-0.0015	0.0201***
	[0.9349]	[0.1131]	[0.8629]	[0.9510]	[0.0290]
	(0.0090)	(0.0108)	(0.0116)	(0.0217)	(0.0064)
$t = -3$	-0.0008	-0.0019	-0.0069	0.0033	0.0062
	[0.9520]	[0.8609]	[0.5706]	[0.7277]	[0.3884]
	(0.0102)	(0.0082)	(0.0111)	(0.0092)	(0.0067)
$t = -2$	0.0124	-0.0093	0.0068	-0.0199*	0.0100
	[0.2422]	[0.2763]	[0.5435]	[0.0831]	[0.3764]
	(0.0101)	(0.0081)	(0.0098)	(0.0100)	(0.0102)
$t = -1$	.	.	.	.	.
	.	.	.	.	.
	.	.	.	.	.
$t = 0$	0.0195*	0.0030	-0.0021	-0.0072	-0.0132
	[0.0921]	[0.6326]	[0.7778]	[0.5115]	[0.2503]
	(0.0095)	(0.0067)	(0.0070)	(0.0103)	(0.0106)
$t = 1$	-0.0036	0.0183**	0.0043	-0.0069	-0.0120
	[0.8288]	[0.0350]	[0.5856]	[0.4575]	[0.3223]
	(0.0147)	(0.0069)	(0.0079)	(0.0085)	(0.0095)
$t = 2$	0.0344***	0.0131	-0.0058	-0.0371***	-0.0045
	[0.0290]	[0.1682]	[0.6917]	[0.0060]	[0.3544]
	(0.0103)	(0.0079)	(0.0113)	(0.0081)	(0.0048)
$t = 3$	0.0157	0.0378***	-0.0097	-0.0323**	-0.0115**
	[0.2372]	[0.0020]	[0.2753]	[0.0260]	[0.0330]
	(0.0111)	(0.0082)	(0.0078)	(0.0117)	(0.0046)
$t = 4$	0.0193**	0.0450***	-0.0175*	-0.0371***	-0.0096
	[0.0711]	[0.0060]	[0.1081]	[0.0000]	[0.5345]
	(0.0074)	(0.0093)	(0.0081)	(0.0107)	(0.0125)
$t = 5$	0.0404***	0.0333*	-0.0134	-0.0410**	-0.0193*
	[0.0260]	[0.1291]	[0.2072]	[0.0711]	[0.1251]
	(0.0124)	(0.0168)	(0.0096)	(0.0157)	(0.0108)
$t = 6$	0.0348***	0.0459**	-0.0154*	-0.0429**	-0.0224**
	[0.0360]	[0.0601]	[0.1341]	[0.0360]	[0.0440]
	(0.0102)	(0.0185)	(0.0082)	(0.0154)	(0.0075)
N Obs	901080	901080	901080	901080	901080
Adj. R^2	0.049	0.017	0.041	0.012	0.059

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. 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 B.5: Effects of Funding Cutbacks on Distribution of Education by Subsample

	(1) None	(2) High School	(3) Trade	(4) College	(5) Bachelor's
			Panel A: Full Sample		
Treatment	0.0171**	0.0452***	-0.0063	-0.0294***	-0.0267***
	[0.0330]	[0.0000]	[0.2452]	[0.0000]	[0.0010]
	(0.0060)	(0.0039)	(0.0040)	(0.0054)	(0.0043)
N Obs	901080	901080	901080	901080	901080
Adj. R^2	0.048	0.017	0.041	0.012	0.059
			Panel B: Men		
Treatment	0.0203**	0.0254***	-0.0137**	-0.0235***	-0.0084
	[0.0681]	[0.0000]	[0.0330]	[0.0090]	[0.3844]
	(0.0083)	(0.0034)	(0.0045)	(0.0065)	(0.0066)
N Obs	446900	446900	446900	446900	446900
Adj. R^2	0.046	0.017	0.036	0.007	0.054
			Panel C: Women		
Treatment	0.0136**	0.0660***	-0.0006	-0.0344***	-0.0446***
	[0.0440]	[0.0000]	[0.9329]	[0.0010]	[0.0000]
	(0.0047)	(0.0068)	(0.0051)	(0.0062)	(0.0061)
N Obs	454180	454180	454180	454180	454180
Adj. R^2	0.046	0.017	0.032	0.007	0.054
			Panel D: On-Reserve		
Treatment	0.0505***	0.0248	-0.0106	0.0009	-0.0656***
	[0.0090]	[0.0701]	[0.1692]	[0.9550]	[0.0010]
	(0.0087)	(0.0149)	(0.0089)	(0.0149)	(0.0105)
N Obs	54260	54260	54260	54260	54260
Adj. R^2	0.110	0.031	0.038	0.051	0.094
			Panel E: Off-Reserve		
Treatment	0.0106	0.0456***	-0.0070	-0.0271***	-0.0220***
	[0.3934]	[0.0000]	[0.4074]	[0.0030]	[0.0020]
	(0.0103)	(0.0061)	(0.0065)	(0.0084)	(0.0054)
N Obs	846820	846820	846820	846820	846820
Adj. R^2	0.032	0.017	0.042	0.011	0.056

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 B.6: 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	0.0202***	0.0280***	0.0061***	-0.0137***	-0.0407***
	(0.0032)	(0.0053)	(0.0015)	(0.0020)	(0.0064)
N Obs	901,080				
Pseudo R^2	0.0267564				

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 B.7: Return to School on Reserves 1986-1996

	(1)	(2)	(3)
$hs \times 1986$	0.38564***	0.37927***	0.34728***
	(0.07716)	(0.05509)	(0.07238)
$hs \times 1991$	0.35492***	0.37539***	0.34992***
	(0.05530)	(0.02659)	(0.04841)
$hs \times 1996$	0.40724***	0.43268***	0.39856***
	(0.05268)	(0.04891)	(0.07342)
$Constant$	9.49492***	8.17133***	8.20553***
	(0.08589)	(0.05672)	(0.05039)
Year F.E.		✓	✓
Prov F.E.		✓	
CSD F.E.			✓
N Obs	88,840	88,840	88,840
R^2	0.02572	0.12480	0.16864

Notes: Standard errors clustered by province in parentheses. The sample includes full time workers. The dependent variable in each specification is the natural logarithm of wages. All regressions control for gender and age. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

Table B.8: Effects of Funding Cutbacks on Labour Market Outcomes

	(1) Market Income	(2) Pr(Above Median Inc)	(3) Gov Transfers	(4) Pr(Receive Gov Tr)	(5) Pr(Not in LF)	(6) Weeks	(7) Hours
$t = -6$	-2871.1***	-0.00541	-346.0	-0.00950	-0.00066	0.04621	-0.21038
	[0.0010]	[0.2142]	[0.4254]	[0.7467]	[0.9620]	[0.1251]	[0.3213]
	(641.8)	(0.01376)	(233.0)	(0.01479)	(0.01511)	(0.46276)	(0.64114)
$t = -5$	-1488.5	0.01387	-505.5**	-0.01738	-0.01002	0.48741	0.49665
	[0.1011]	[0.8809]	[0.2643]	[0.8879]	[0.9980]	[0.9089]	[0.1992]
	(1252.9)	(0.01325)	(185.6)	(0.01585)	(0.01404)	(0.69285)	(0.48575)
$t = -4$	-1649.4*	0.00271	241.8	0.00145	-0.00002	-0.05086	-0.57516
	[0.0440]	[0.7738]	[0.0871]	[0.9199]	[0.9499]	[0.6256]	[0.7267]
	(864.8)	(0.01386)	(190.3)	(0.01107)	(0.01340)	(0.42090)	(0.46019)
$t = -3$	-1649.4*	0.00271	241.8	0.00145	-0.00002	-0.05086	-0.57516
	[0.2893]	[0.3584]	[0.0561]	[0.3684]	[0.5085]	[0.5105]	[0.3964]
	(864.8)	(0.01386)	(190.3)	(0.01107)	(0.01340)	(0.42090)	(0.46019)
$t = -2$	-1971.3***	-0.01349	-85.8	0.00240	-0.00057	-0.45034	-0.71932
	[0.0010]	[0.7297]	[0.2072]	[0.5335]	[0.9690]	[0.9229]	[0.8078]
	(513.2)	(0.01036)	(104.4)	(0.00810)	(0.01059)	(0.28609)	(0.67525)
$t = -1$	.	.	.	.	.	.	
	.	.	.	.	.	.	
$t = 0$	-56.0	-0.01145	129.9*	0.01589**	0.02325*	-1.07723***	-0.99411**
	[0.9389]	[0.3373]	[0.1261]	[0.0991]	[0.1612]	[0.0210]	[0.0320]
	(625.1)	(0.01086)	(68.2)	(0.00691)	(0.01247)	(0.27652)	(0.34760)
$t = 1$	1584.5**	0.00131	-161.3	0.00348	0.00546	-0.24007	-0.07562
	[0.0350]	[0.9309]	[0.4685]	[0.8438]	[0.6667]	[0.5105]	[0.8869]
	(604.7)	(0.01546)	(199.7)	(0.01041)	(0.01135)	(0.34629)	(0.50914)
$t = 2$	2247.3***	0.00763	-151.1	0.01553	0.01095*	-0.72672**	-0.41572
	[0.0420]	[0.5686]	[0.3574]	[0.1642]	[0.0541]	[0.0691]	[0.3914]
	(548.2)	(0.01390)	(137.0)	(0.01048)	(0.00504)	(0.33178)	(0.49228)
$t = 3$	3034.2***	0.00576	-199.2	0.02155**	0.01890*	-1.14291**	-1.17138*
	[0.0220]	[0.7447]	[0.3123]	[0.0541]	[0.0350]	[0.0390]	[0.0561]
	(770.1)	(0.01696)	(155.1)	(0.00935)	(0.00896)	(0.51836)	(0.55291)
$t = 4$	3157.4***	-0.00282	-246.0	0.02175**	0.04015***	-1.87914***	-1.66929***
	[0.0260]	[0.8268]	[0.2963]	[0.0280]	[0.0080]	[0.0010]	[0.0000]
	(627.3)	(0.01384)	(220.4)	(0.00921)	(0.01278)	(0.43579)	(0.42255)
$t = 5$	3532.6***	-0.01165	-63.8	0.01888**	0.04009**	-2.46783***	-1.92463***
	[0.0230]	[0.6707]	[0.7247]	[0.0490]	[0.0230]	[0.0010]	[0.0210]
	(719.0)	(0.01502)	(179.2)	(0.00796)	(0.01550)	(0.56260)	(0.61092)
$t = 6$	5372.4***	0.01636	154.3	-0.00247	0.05804***	-2.63827***	-2.22251***
	[0.0260]	[0.4555]	[0.8288]	[0.7708]	[0.0000]	[0.0010]	[0.0010]
	(955.5)	(0.02023)	(226.8)	(0.00686)	(0.00742)	(0.40619)	(0.36677)
N Obs	901080	901080	901080	901080	901080	901080	901080
Adj. R^2	0.06668	0.10078	0.10879	0.12953	0.02977	0.05700	0.09432

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

C Definition of Métis People

The third Indigenous group in Canada is the Métis population. At the time of this study, Métis people were not included under the *Indian Act*; however, it is not clear how one would classify Métis people in the context of my empirical analysis. Walter (2013) points out some of the difficulties doing quantitative research using data from Statistics Canada on Métis people. The main issue is summarized by Vowel (2016) in terms of big M and little m "Métis" classifications.

Big M is based on a national identity. It refers to the population of Métis that arose from intermarriage between European fur traders and Indigenous women and ultimately led to the Métis people as a distinct identity—a group of individuals with a shared common experience. Among some groups, Métis has also become synonymous with "mixed-blood". This classification, referred to as little m, is primarily based on blood quantum—e.g., what portion of your blood is First Nations? The former definition (big M) is how the Métis federations (e.g., The Manitoba Métis Federation) treat citizenship. At the time of this analysis, these individuals were not eligible for federal provisions under the Indian Act.[22] The latter definition is how some individuals with both First Nations and non-Aboriginal ancestry refer to themselves. These individuals may be eligible for provisions under the Indian Act. Thus, depending on how an individual identifying as Métis defines their own identity when filling out the census, they may be either eligible *or* ineligible for post-secondary funding under the PSSSP.

Table C.1 displays the breakdown of ancestries among those who identify as Métis. While some Métis respondents state that they have only Métis ancestry, many indicate a wide range of ancestries, including nearly 15% who state that their ancestry is "Non-Aboriginal Only", 4% who state that their ancestry is North American Indian (First Nation), and 17% stating their ancestry is North American Indian and Non-Aboriginal.

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 Métis people tend to have higher levels of socioeconomic outcomes compared to First Nation and Inuit populations, they still have lower levels of health, education, and income than non-Indigenous Canadians (Wilson and Macdonald, 2010). It is not yet clear which (if any) social programs will be provided to the Métis and non-Status populations under this new ruling, which should affect almost 700,000 people country-wide.

[22] In April of 2016, the Supreme Court of Canada passed a ruling that determined that Métis are considered "Indian" within the meaning of the constitution; however, to date, Métis people are still not eligible for the Post-Secondary Student Support Program.

Table C.1: Reported ancestries for those identifying as Métis

Ancestry	Number	% of Total Métis
North American Indian Only	7138	3.88
Métis Only	30175	16.40
Inuit Only	82	0.04
North American Indian and Métis Only	2325	1.26
North American Indian and Inuit Only	15	0.01
Métis and Inuit Only	87	0.05
North American Indian, Métis and Inuit Only	12	0.01
North American Indian and non-Aboriginal Only	32141	17.47
Métis and non-Aboriginal Only	75481	41.02
Inuit and non-Aboriginal Only	361	0.20
North American Indian, Métis and non-Aboriginal Only	9046	4.92
North American Indian, Inuit and non-Aboriginal Only	129	0.07
Métis, Inuit and non-Aboriginal Only	316	0.17
North American Indian, Métis, Inuit and non-Aboriginal	49	0.03
Non-Aboriginal Only	26665	14.49

Notes: This table presents the ancestral breakdown of individuals who identify as "Métis" in the census.

D An Estimate of the Cost of the Program Cutbacks

To understand the magnitude of the cutbacks, consider the following back-of-the-envelope calculation. Assume that the average costs of post-secondary education in the pre-cutback period were exactly covered by the average financial support from the program. Then,

$$[\text{Tuition}_{pre} + \text{Other Costs}_{pre}] - \mu_{pre} \times \text{Financial Aid}_{pre} = 0, \tag{D.1}$$

where the subscript *pre* indicates the pre-cutback period, μ_{pre} is the fraction of students who receive funding before the program was cut back and is equal to 1. After the cutbacks:

$$[\text{Tuition}_{post} + \text{Other Costs}_{post}] - \mu_{post} \times \text{Financial Aid}_{post} = x, \tag{D.2}$$

where x represents the additional financial burden of the average student after the funding cutbacks. If we assume that other costs do not change between the pre- and post-cutback periods and that the average financial aid package remained the same in the pre- and post-cutback periods, then, (D.2)-(D.1) implies:

$$[\text{Tuition}_{post} - \text{Tuition}_{pre}] + [\mu_{pre} - \mu_{post}] \times \text{Financial Aid} = x \tag{D.3}$$

To be consistent with the empirical analysis, we can substitute the estimate for average college tuition (in 2016 CAD) in the pre-period ($1,118) and the post-period ($1,811), the average financial aid in both periods ($14,000), and the fraction of students who receive funding in the pre-period ($\mu_{pre} = 1$).[23] Using the lower bound of the estimate of the fraction of students who receive funding in the post-period from the Eskasoni example above—i.e., $\mu_{post} = \frac{80}{120} = \frac{2}{3}$ students who apply actually receive funding—yields:

$$[\$1,811 - \$1,118] + \left[1 - \frac{2}{3}\right] \times \$14,000 = x \tag{D.4}$$

implying that $x = \$5,360$.

[23] The same calculation can be done using university tuition; however, the empirical section focusses on college completion.

E 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 B.2 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}).[24] 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.[25]

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,[26] then this structure ensures that the indirect utility of student i in province p in time t is:

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

If students complete high school they can start working directly afterwards for a wage of w^h_{pt}, which

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

[25] 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.

[26] 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.

is either high H or low L.[27] Then the indirect utility of student i in province p in year t is:

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

where l^h is the length (in years) of high school.[28] 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:

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

Through backwards induction, students will choose the level of schooling $r \in \{o, h, a, c, u\}$ that yields the highest conditional indirect utility:[29]

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

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

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

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 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

[27] 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.

[28] 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.

[29] 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 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 E.1 plots equation E.4 for each level of education. Figure 1(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.

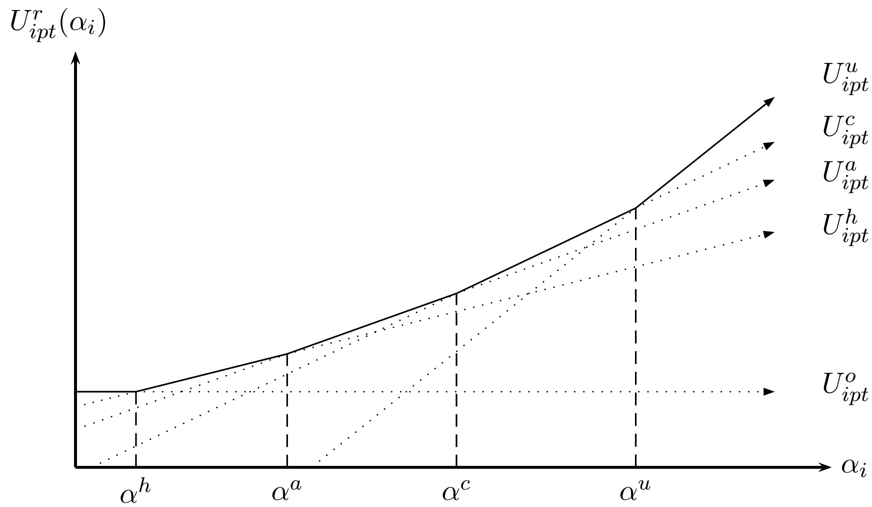
Figure 1(b) displays an equilibrium when $w^h_{pt} = L$. In this circumstance, it is never optimal for a student to choose high school as their highest level of education, since the return to a high school degree is so low that it is not worth paying the psychic cost of schooling. Here, for all levels 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 1(a) and 1(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.

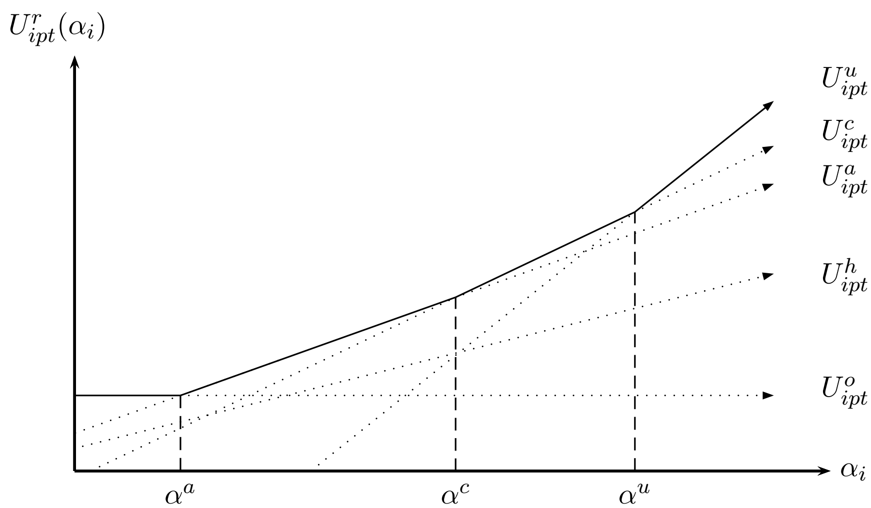
Figure E.2 demonstrates the effects of increasing the expected cost of post-secondary education on the cutoff values of α_i for a situation where the fixed costs of attending post-secondary school are increasing in their level of difficulty ($F^a < F^c < F^u$).[30] In this situation, a decrease in student 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 post-secondary funding should not affect the high school graduation rate (Figure 1(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 1(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.

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 E.4, we can solve for each ability level α_r for which a student is indifferent between education level r and

[30]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) Optimal schooling choices when $w^h_{pt} = H$



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

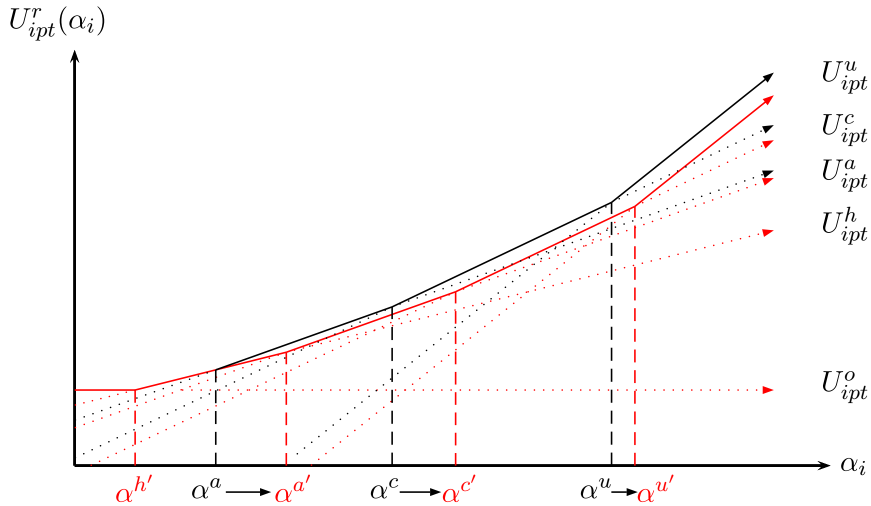
Figure E.1: This figure displays the optimal allocation of schooling (conditional on ability) when $w^h_{pt} = H$ versus $w^h_{pt} = L$

education level $r - 1$.

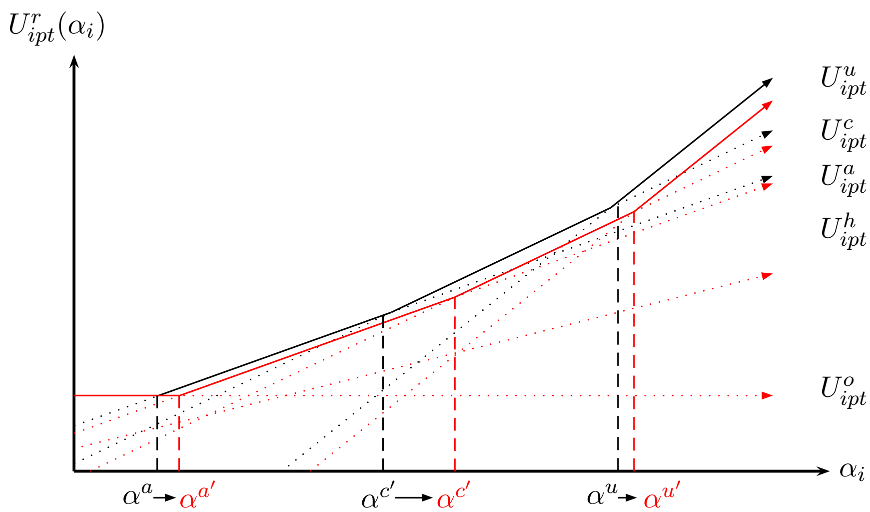
$$\alpha^r_{pt} = \frac{\Pi^r_{pt} - \Pi^{r-1}_{pt}}{\kappa^{r-1} - \kappa^r} \tag{E.5}$$

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

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



(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 E.2: This figure displays the effects of increasing student aid when $w^h_{pt} = H$ and $w^h_{pt} = L$.

To obtain an analytical solution to the share equations and to calculate the relevant comparative statics, I assume that $\alpha \sim U[0,1]$.[31] In this case the share of the population choosing education level r in province p at time t is

$$s^r_{pt} = \alpha^{r+1}_{pt} - \alpha^r_{pt} \tag{E.6}$$

Substituting equation E.5 for each cutoff α^r_{pt} yields the following expression for the change in the share of the population choosing education level r

$$\Delta s^r_p = \left[\frac{\left(\Delta B^{r+1}_p - \Delta B^r_p\right) - \left(\Delta F^{r+1}_p - \Delta F^r_p\right)}{\kappa^r - \kappa^{r+1}} \right] - \left[\frac{\left(\Delta B^r_p - \Delta B^{r-1}_p\right) - \left(\Delta F^r_p - \Delta F^{r-1}_p\right)}{\kappa^{r-1} - \kappa^r} \right] \tag{E.7}$$

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

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) $\frac{\partial \Delta s_p^r}{\partial \Delta B_p^{r-1}} < 0$

F The Decision to Use the 2006 Census of Population

While other studies that use contemporary data to examine historical trends pool multiple waves of data, partialling out differences between surveys using dummy variables (e.g., Goldin and Katz (2008); Charles, Hurst, and Notowidigdo (2016)), I take the approach of Dynarski (2008) and focus on one census. I use the 2006 Census of Population throughout my analysis; however, the results are similar using the 2001 Census of Population. The rationale for using the 2006 census is the following. The likelihood that an individual with Indigenous ethnic origins self-identifies on the census has increased over time. This phenomenon, known as ethnic mobility, has been well documented for the Indigenous population in Canada (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 over time is in some way correlated with the likelihood of being affected by the policy. An additional concern with pooling multiple waves of data is that the nature of the census questions on ethnic identity has changed over time in a way that directly affects the Indigenous population (Saku, 1999).[32]

Thus, I focus on one census wave—the 2006 Census of Population. Earlier census waves, like 1996 or 2001 are so close to the funding cutbacks that people enumerated in these censuses may not have had enough time to complete their educational attainment. Further, in 2011, the federal government cut funding to Statistics Canada and, as a result, the long-form census which was mandatory under the Statistics Act was replaced with the optional National Household Survey. The NHS received a response rate of 68.6% compared to the 93.8% response rate in the 2006 Census long form (Statistics Canada, 2015). Statistics Canada took a number of steps to try and address data reliability issues, but ultimately they did not publish community-level data for about 1,100 communities, including 413 reserves, due to data quality risks. Although my analysis uses restricted access micro-data, the analysis would still be compromised by the same data limitations that prevented Statistics Canada from publishing the community-level data.

[32] The 2001 question was phrased as *"To which ethnic or cultural group(s) did this person's ancestors belong?"* and the 2006 question was *"What were the ethnic or cultural origins of this person's 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.

G A Detailed Explanation of the Robustness Checks

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.[33] 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.[34]

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.[35] Finally, I update any discrepancies between the 2011 and 2006 community codes using Statistics Canada's geographic concordance tables.[36] 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 depicted in Figure G.1 by black circles.

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 point estimates from this exercise are depicted by dark gray "x"s in Figure G.1.

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.[37] Out of the keywords *Education Policy*, *Education Law*, *Indian Education*, and *Post-Secondary* the search returned 7,461 articles. 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. Table G.1 displays summary statistics for the search. Table G.2 summarizes the articles alluding to possible confounding policies.

Between 1968 and 1990 university tuition in Quebec was frozen at $540 per year (see Figure A.1)

[33] 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).

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

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

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

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

Table G.1: 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 G.2: 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

and in 1990 the Premier of Quebec announced a 140% increase in tuition. If the large decline in 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. These estimates are shown by gray diamonds in Figure G.1.

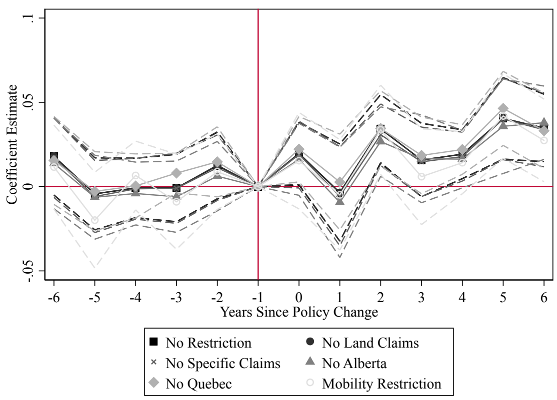
The other notable policy change pertaining to the 1989 time period, was a cutback to education grants by the Alberta government. Once again, if the changes in educational attainment are driven by Alberta residents, then it might be the cutback to education grants by the Alberta government that are driving the results, rather than the change to post-secondary funding for Indigenous students at the federal level. Gray diamonds in Figure G.1 display the results without the province of Alberta.

Finally, one important concern is the role of geographic mobility. Unfortunately, in the 2006 census of population includes limited information on people's geographic histories. 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, it is unlikely that the use of individuals' current province to construct many of the controls would largely affect the results.[38] Nevertheless, the hollow gray circles in Figure G.1 display the results of restricting the sample to those who live in the same province they were born.

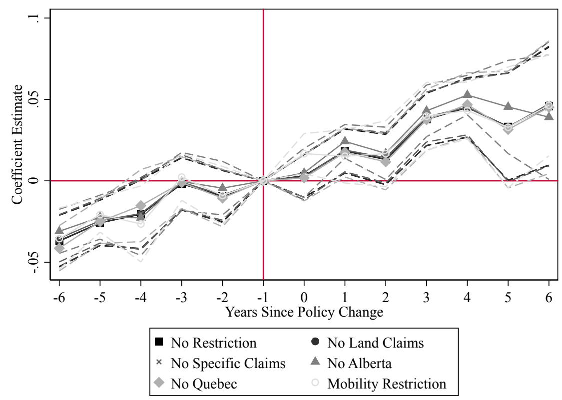
Mobility may be of additional concern in regressions that split the sample between those living on- and off-reserves. Although the bias resulting from the program incentivizing people to leave reservations would likely work in the opposite direction of the findings–for instance, if those who are most 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–it is still important to consider whether this could be affecting the results in any way.

Figure G.2 presents event study estimates of the probability of moving provinces (effectively whether you live in a different province from where you were born) and the probability of living on a reserve. There appears to be a slight increase in the probability of moving provinces for the treated cohorts; however, the main results are largely the same when we restrict to those in the same province. The estimates in Figure G.2 also suggest that the probability of living on-reserve did not change in response to the funding cutbacks, alleviating some concern that mobility is confounding the on-reserve/off-reserve results. That being said, this particular exercise does not rule out a selection effect, wherein the composition of ability among those living on reserve changes. Although this type of effect would likely work in such a way that suggests the estimates on the on-reserve high school graduation effect is a lower bound on the true effect, it is still an important consideration to keep in mind.

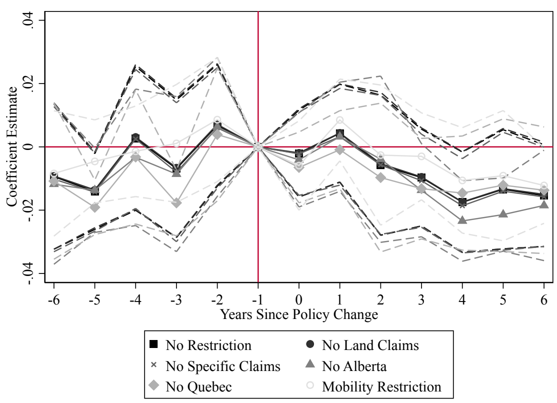
[38] One reason why a potential mis-classification of province may not be as large of a concern in the Canadian context is that, unlike the United States, where there are vast differences between in-state and out-of-state tuition, Canadian students pay the same price at any post-secondary institution, regardless of their province of residence.



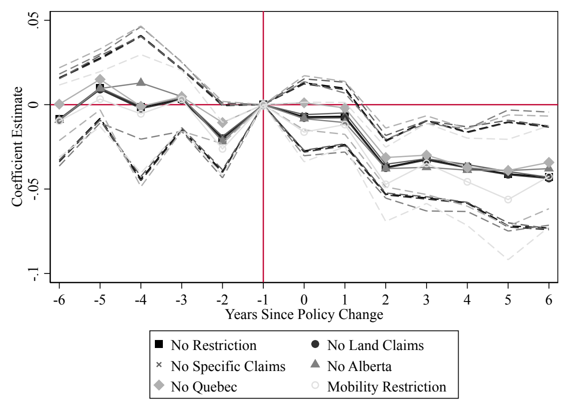
(a) No Certification



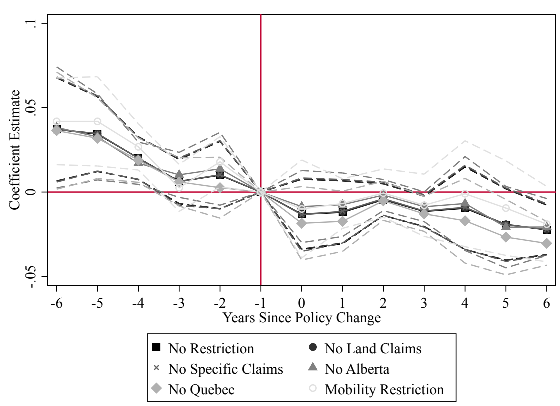
(b) At Most High School



(c) At Most Trade School



(d) At Most Community College



(e) At Most University

Figure G.1: Results from a series of robustness checks that omit communities involved in specific claims or land claims, drop individuals in Alberta or Quebec, and impose the restriction that individuals must live in the same province in which they were born. Coefficient estimates of β are plotted, along with 95% confidence intervals. Each regression 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 CMA-province, year of graduation, and birth quarter.

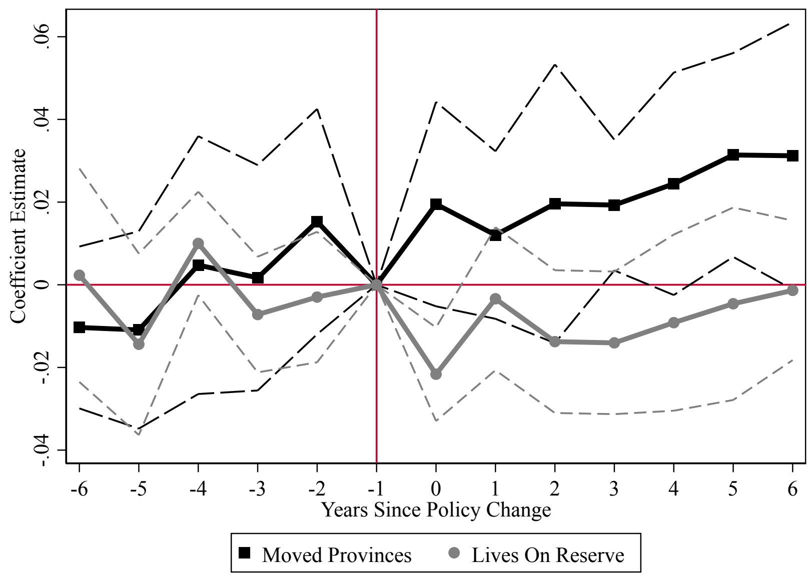


Figure G.2: Event study estimates and 95% confidence intervals for the probability of moving provinces and the probability of living on a reserve.

H Heterogeneity in Post-Secondary Funding

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, students from communities that are more geographically isolated or who are from lower income backgrounds may also experience larger declines in high school graduation rates.

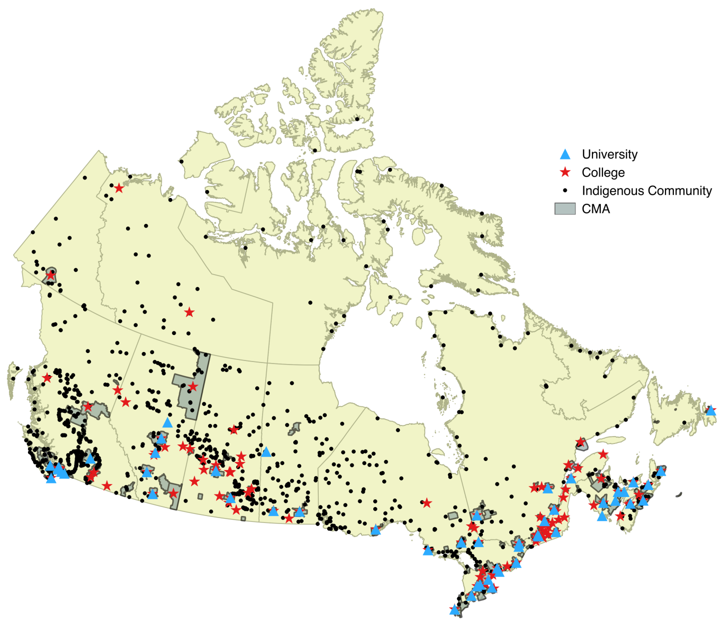


Figure H.1: Location of colleges, universities and CMAs in 1989 in relation to Indigenous communities. Data from Statistics Canada Geographic Boundary Files, Association of Universities and Colleges of Canada, Campus Tour, and university websites.

To examine the possibility that the effect of funding cutbacks on the high school 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 re-estimate the results for different quantiles of the distribution of distance. Figure H.1 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. Table H.1 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.[39]

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. Interestingly, the treatment effect does not vary based on whether someone is located above or below the median distances and also is less likely to be driven by students who are the most geographically isolated, as measured by being above the 90th percentile of the distance distribution. This could reflect the fact that those who live in the most isolated areas are perhaps

[39]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)).

Table H.1: Effects of Funding Cutbacks on High School Graduation: Heterogeneity in Distance

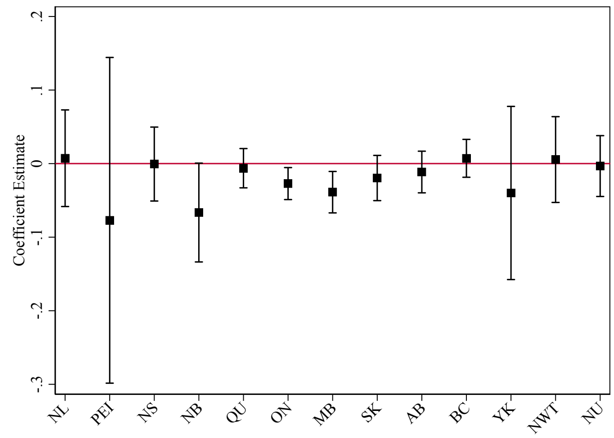
	Closest CMA		Closest College		Closest University	
	Above	Below	Above	Below	Above	Below
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Above and Below the Median						
Treatment (Tr)	-0.0170**	-0.0183**	-0.0165*	-0.0157	-0.0170**	-0.0192**
	[0.0380]	[0.135]	[0.1291]	[0.1081]	[0.0991]	[0.1111]
	(0.0065)	(0.0082)	(0.0085)	(0.0088)	(0.0077)	(0.0076)
N Obs	449970	451110	449210	451870	449900	451180
Adj. R^2	0.071	0.022	0.062	0.020	0.060	0.016
Panel B: Above and Below the 90th Percentile						
Treatment (Tr)	-0.0153	-0.0228***	-0.0091	-0.0248***	-0.0184*	-0.0189**
	[0.3524]	[0.0000]	[0.5966]	[0.0000]	[0.0601]	[0.1001]
	(0.0134)	(0.0070)	(0.0144)	(0.0068)	(0.0091)	(0.0082)
N Obs	90100	810980	89690	811390	89880	811200
Adj. R^2	0.109	0.029	0.128	0.031	0.121	0.031

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

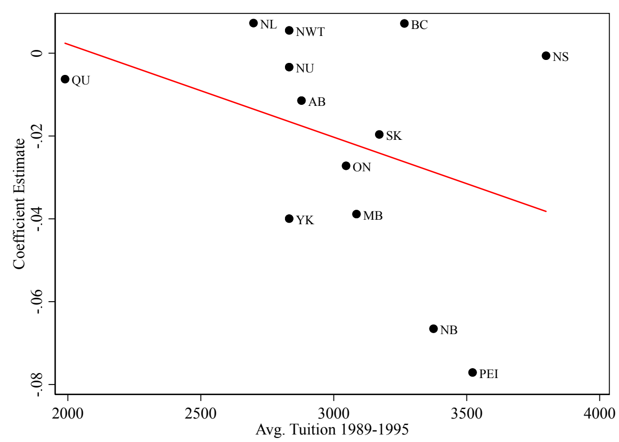
not affected by changes in post-secondary funding programs, as they are less likely to complete higher years of both high school and post-secondary degrees.

The second cost dimension I examine is the fixed cost of tuition. To do this, Figure 2(a) plots the treatment effects by province with 95% confidence intervals. Some of the province-level treatment effects are not statistically different from 0 at the 5 percent level suggesting that the mean effects in Table 2 mask some important heterogeneity regarding the size of the treatment effects and the degree to which different students were affected by funding cutbacks. Figure 2(b) plots the treatment effects against the average tuition at universities in the post-treatment time period.[40] This average tuition can also be thought of as the 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.

[40]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.



(a) Treatment effect for high school graduation by province



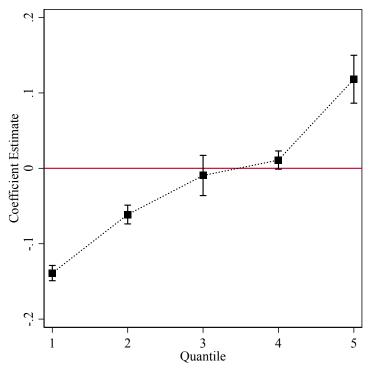
(b) Provincial treatment effect for high school graduation (y-axis) against the average provincial tuition (x-axis)

Figure H.2: In the top panel each vertical line represents the difference-in-differences estimate for high school graduation and the 95% confidence interval by province. Each specification includes the full set of controls. The bottom panel plots these treatment effects against the average university tuition in the post-treatment period.

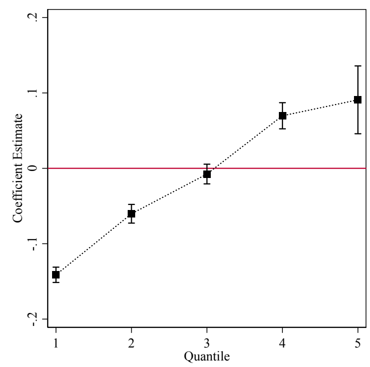
Finally, a natural question in evaluating the heterogeneous response to the funding cutbacks, and in understanding the effectiveness of post-secondary funding more generally, is whether the program disproportionately affected students according to their baseline characteristics. For example, students 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 baseline 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 H.3 displays the results from this exercise. The top three panels do not include any controls and the bottom three include a full set of controls. The results from including the full set of controls show that, as expected, there is a statistically significant decline in high school graduation among students whose tribes fell in the lowest quintile of high school graduation, post-secondary completion, and income in 1990. That being said, for the distribution of income, both the highest and lowest quintiles have economically and statistically meaningful estimates.

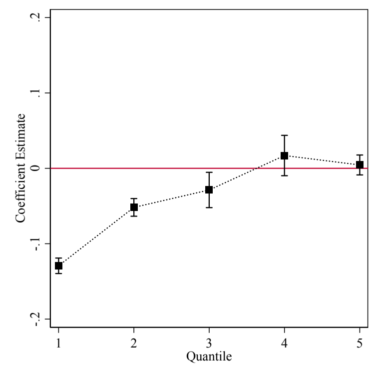
Overall, these findings suggest that those most adversely affected by the program cutbacks, in terms of reductions in high school graduation rates, were from Indigenous nations that already had lower high school graduation, post-secondary completion, and income prior to the funding cutbacks.



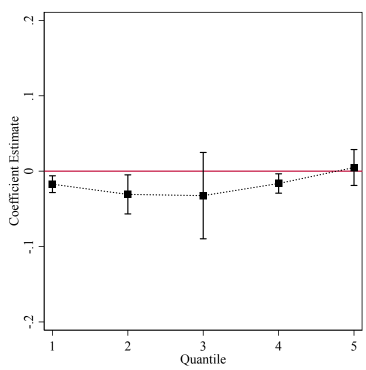
(a) High school, no controls



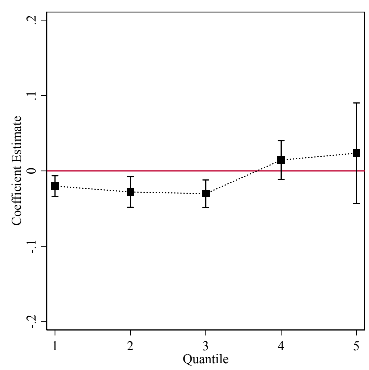
(b) Post secondary, no controls



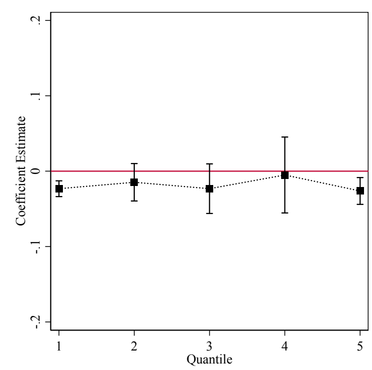
(c) Income, no controls



(d) High school, controls



(e) Post secondary, controls



(f) Income, controls

Figure H.3: Heterogeneous treatment effects and 95% confidence intervals for the high school graduation effect according to where the individual's tribe was located in the 1990 distribution of high school, income, or post-secondary attendance. Each specification includes the full set of controls.

I Labour Supply and the Distribution of Hours Worked

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_{11}^{I} 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_{11}^{N}. This distribution is identified by:

$$F_{Y_{11}^{N}}(y) = F_{Y_{10}}\left(F_{Y_{00}}^{-1}\left(F_{Y_{01}}(y)\right)\right) \tag{I.1}$$

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.

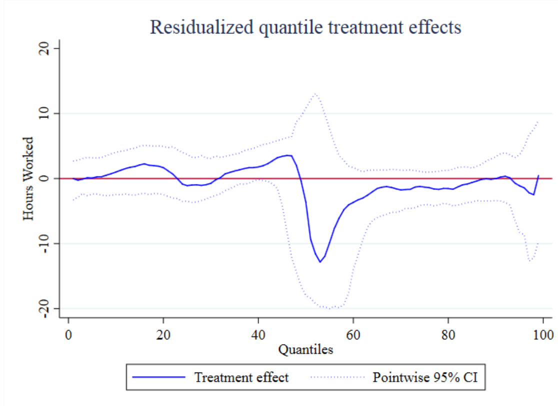
Under these assumptions, the CIC treatment effect associated with quantile q is:

$$\tau_q^{CIC} := F_{Y_{11}^{I}}^{-1}(q) - \underbrace{F_{Y_{01}}^{-1}\left(F_{Y_{00}}\left(F_{Y_{10}}^{-1}(q)\right)\right)}_{F_{Y_{11}^{N}}^{-1}(q)}, \tag{I.2}$$

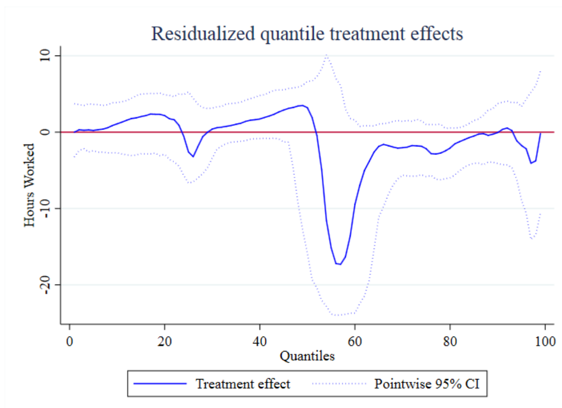
The basic idea behind the methodology is the following. For a given quantile q, locate the hours worked associated with this quantile in the pre-treatment/treatment distribution, $F_{Y_{10}}^{-1}$. Next, determine what quantile is associated with this level of hours worked in the pre-treatment/control 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.

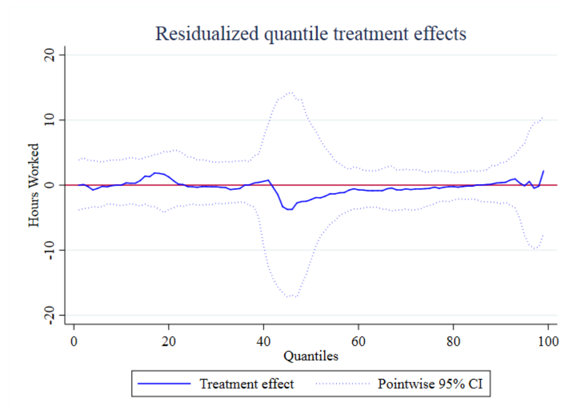
The CIC estimates are presented in Figure I.1 and the counterfactual and actual CDFs of hours



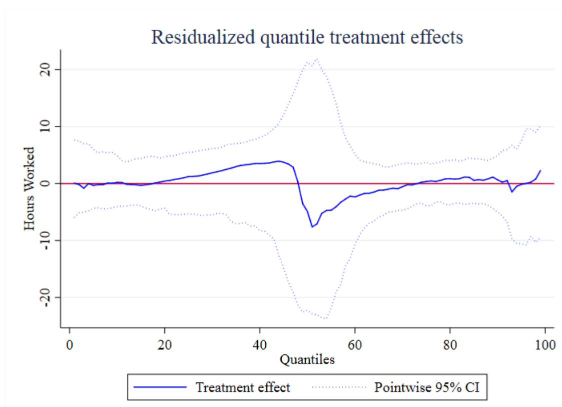
(a) Full Sample



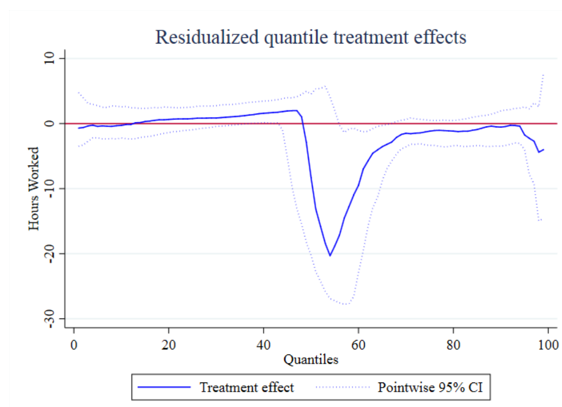
(b) On-Reserve Sample



(c) Off-Reserve Sample



(d) Male Sample



(e) Female Sample

Figure I.1: 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.

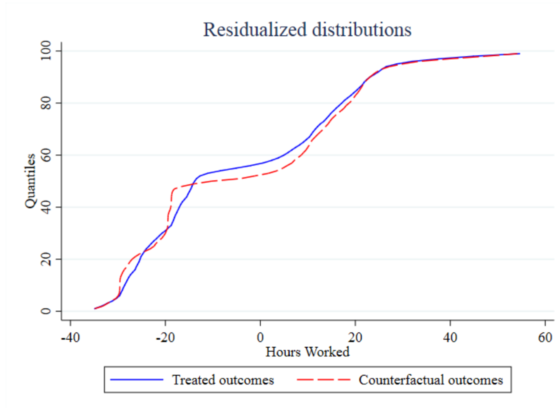
worked are found in Figure I.2.[41] Quantiles are estimated from 0.5-99.5 in 0.5 unit increments for the full, male, and female samples, and in 1 unit increments for the on-reserve and off-reserve samples. I conduct statistical inference on the treatment effects using two methodologies. First, I use a Komolgorov-Smirnov test to check for equivalence between the actual and counterfactual distributions. Second, I display 90% bootstrap confidence intervals, clustered by province, surrounding the coefficient estimates.

Figure 1(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. The largest decline was just above the median of residualized hours worked, which decreased by roughly 13 hours, relative to the control group. Although the quantile treatment effects are not individually statistically significant, splitting the sample into men, women, and those living on- or off-reserve further reveals the heterogeneity of the policy response.

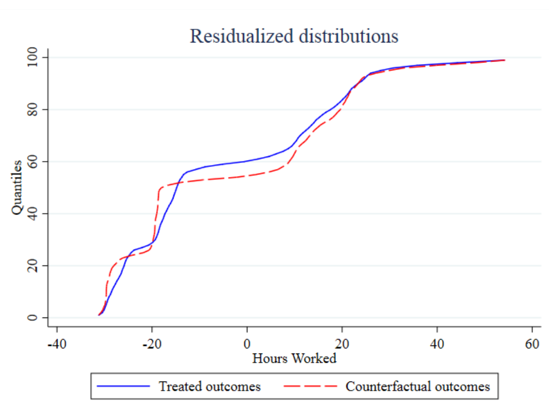
Figures 1(b) and 1(c) show that the decline in hours worked is driven by those living on-reserves; and Figures 1(d) and 1(e) show that women were more adversely affected than men. In each case, the Komolgorov-Smirnov test rejects the null hypothesis that the distributions are equivalent at the 10% level, 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.

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 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.

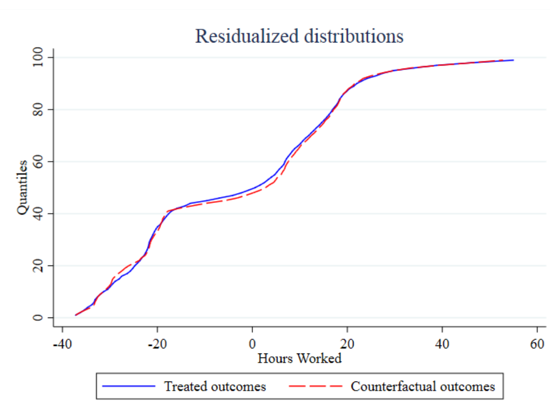
[41] Estimates were obtained using the software of Robert Garlick: `http://www.robgarlick.com/code`.



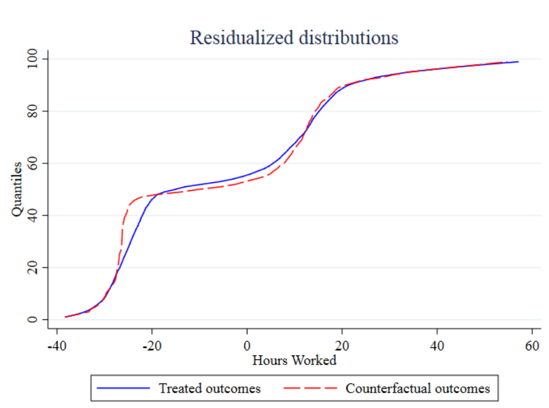
(a) Full sample



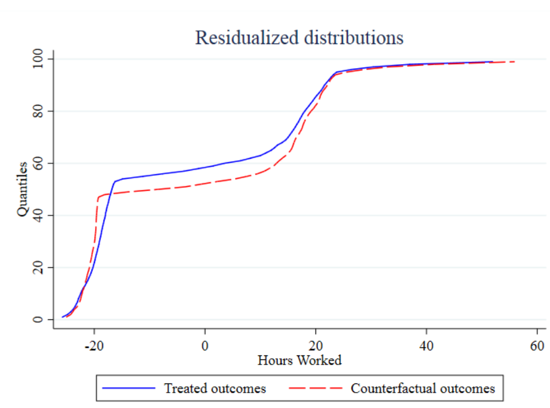
(b) On-reserve sample



(c) Off-reserve sample



(d) Male sample



(e) Female sample

Figure I.2: 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.