Three Essays in Development Economics: First Nation Economic Development

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by

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Abstract

This dissertation contains three essays in the economics of development. The first essay investigates the effects of the decentralization of governance over education to communities in terms of individual education outcomes. The next essay relates to the first by exploring the factors that drive communities to adopt decentralized governance, including forms of decentralized governance over education. The last essay returns to the topic of education by examining a policy aimed at decreasing the costs of post-secondary education for a minority group. Each essay probes these topics within the context of First Nations in Canada.

The first essay examines the substantial impacts of education decentralization on high school attendance and completion through the analysis of First Nation education self-government agreements in Canada. These agreements are important institutional arrangements that transfer the authority over education from the federal government to First Nations. I exploit confidential microdata and exogenous variation in the implementation of education self-government agreements to perform the analysis. My results indicate that self-government agreements focused exclusively on education increase high school attendance by 5 to 9 percentage points and high school completion by 3 to 5 percentage points. However, the effects on high school completion rates under multi-sectoral self-government agreements implemented together with comprehensive land claim agreements and for self-government agreements that focus on education alone differ dramatically for women and men. High school completion improves by 8 to 11 percentage points for women, but drops by a staggering 17 to 25 percentage points for men. These results have important policy implications for education

decentralization in general, along with implications for the particular case of First Nation education self-governance in Canada.

The second essay identifies the determinants of decentralized governance by exploring the First Nation self-government agreement claim and implementation processes. I use a novel dataset on self-government agreements and confidential microdata to perform the analysis. My results support the notion that we can treat self-government treatment variables as exogenous, when controlling for reserve fixed effects. This is not an onerous condition to impose. Specifically, I do not find any factors of economic or statistical significance for claims for my richest and most-preferred specification, which includes controlling for reserve fixed effects. Contrary to the results for claims, I find that education and income are important factors for implementation, but only conditional on a reserve having previously made a claim. However, this significance disappears, once I relax this condition and compare the determinants of implementation against reserves that may or may not have made a claim.

The third essay examines the substantial impacts of a targeted policy that provides post-secondary tuition and living expense subsidies for Aboriginal Canadians. To identify the effects of the policy, I exploit a reform of the policy's eligibility requirements in 1985 that lead to a large increase in the number of individuals with access to the subsidies. My results indicate that the reform lead to economically and statistically significant increases in the likelihood of attaining any post-secondary education for a group of women whose eligibility was particularly targeted by the reform and for women generally. These increases range from about 4 to 7 percentage points. The effects for men are positive, but much smaller and not significant.

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For Dan

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General Introduction

This dissertation brings together three essays in development economics. The first essay explores the impacts on high school attendance and completion arising from a community's adoption of decentralized governance over education. The next essay delves further into the topic of decentralization by investigating the economic, demographic, education, and geographic factors that influence a community's decision to decentralize. Lastly, the third essay considers the effectiveness of a (centralized) public policy that provides post-secondary tuition and living expense subsidies for a minority group.

Economists have long sought to understand the sources of large disadvantages in education outcomes for minority groups and communities. Decentralized education governance is often promoted by policymakers as a strategy to overcome these challenges and to reduce the barriers to development.

Collectively, the theoretical literature is less certain than decentralization's advocates. Some theory suggests that local decision-making can lead to improvements in education resource allocation through greater accountability (Barrera-Osorio et al. 2009), although with potentially greater susceptibility to capture by elites (Bardhan 2002). Likewise, the empirical literature shows mixed results, with researchers finding education attainment effects that depend on local fiscal autonomy (Paes de Barros and Medonça 1998), school budgets (Estevan 2015), complementary parental participation (Behrman and King 2001; Eskeland and Filmer 2007; Gunnarsson et al. 2009), and local socioeconomic contexts (Galiani, Gertler, and Schargrodsky 2008).

My first essay extends the empirical literature by evaluating the causal impacts of previously unexamined forms of decentralized governance over education on high school attendance and completion. To perform the analysis, I exploit both plausibly exogenous variation in the implementation of First Nation education self-government agreements and microdata based on the confidential long-form *Census of Canada* and *National Household Survey* master files.

First Nation communities, or reserves, make for an interesting case to study education decentralization. On-reserve education outcomes, along with many other socioeconomic outcomes, are far lower than in off-reserve Aboriginal and non-Aboriginal contexts (Pendakur and Pendakur 2011; Feir 2016). In addition, before the last few decades, reserves had little access to primary or secondary education outside of that provided centrally under the federal *Indian Act*.

The potential for socioeconomic outcome improvements from decentralization begs the question of what drives the decentralization process. However, the previous literature on decentralization appears to have only lightly explored this topic. My second essay contributes to the discussion by examining the influence of economic, demographic, education, and geographic factors in determining whether or not a community seeks to decentralize and whether or not the community proceeds to decentralization.

To perform the analysis, I again explore the case of First Nation self-government agreements, as in my first essay. However, now I consider a broader set of self-government agreements that may or may not involve the decentralization of governance over education. This analysis relies on a set of custom built datasets, including one compiling reserve-level socioeconomic data from the confidential long-form *Census of Canada* and *National Household Survey* master files, another that provides reserve-level geographic data, and a third that lists years that reserves claim self-governance or implemented a self-government agreement.

My third essay contributes to a small, but growing, body of empirical literature on non-merit-based student financial aid by investigating the impact on post-secondary education

attainment arising from a substantial tuition and living expense subsidy targeted at a large group of Aboriginal peoples in Canada. Identification relies on a reform of the *Indian* registration policy in 1985 that lead to a large increase in the number of Canadians entitled to the policy's benefits.

All of the essays additionally contribute to the literature on First Nation economic development in Canada. Previous research has explored large and persistent gaps in socioeconomic outcomes between Aboriginal peoples and other demographic groups in Canada (George and Kuhn 1994; Pendakur and Pendakur 2011; Feir 2013, 2016). Recently, a small empirical literature has developed that examines the effects of First Nation governance arrangements (Aragón 2015; Pendakur and Pendakur, forthcoming). However, the previous literature has yet to explore the topics that I present in this thesis.

Chapter 1

The Impact of Education Decentralization on High School Attendance and Completion: Evidence from First Nation Education Self-Government Agreements in Canada

1.1 Introduction

Enhancing local authority over education through decentralization is a prominent strategy aimed at improving education outcomes. This paper investigates the impact of education decentralization on high school attendance and completion by analyzing First Nation education self-government agreements (ESGAs) in Canada. The evaluation of education decentralization reforms is important, as their effectiveness in improving education attainment

and achievement has not been clearly demonstrated in either the theoretical or empirical literature.

The theoretical literature suggests that the attainment effects of education decentralization are ambiguous. For instance, while Barrera-Osorio et al. (2009) argue that improvements in the allocation of education resources can be achieved through enhanced local decision-making and accountability incentives, Bardhan (2002) suggests that such improvements may come at the cost of greater susceptibility to capture by local elites. Others argue that education decentralization effects on achievement depend on complementary household and administrative responses, which may not be adequately understood or planned for (Behrman and King 2001; Faguet 2004; Gunnarsson et al. 2009).

The empirical evidence from education decentralization reforms in many countries is likewise mixed. Galiani, Gertler, and Schargrodsky (2008), for instance, find that the decentralization of high schools in Argentina generated a positive effect on student test scores in non-poor municipalities, but a neutral effect in poor municipalities. Somewhat similarly, Hanushek, Link, and Woessmann (2013) determine that education decentralization reforms raised high school student achievement in the developed countries in their sample, but lowered it in developing countries. These results, perhaps, are unsurprising, given the heterogeneity of local and national capacities to adopt complex education reforms. This paper contributes to this literature by evaluating the effects of previously unexamined forms of education decentralization policy.

ESGAs differ from education decentralization policies that evolve out of centrally-led devolution programs, such as those implemented in Argentina. ESGAs are negotiated multilaterally between the community and governments at the federal, provincial, or territorial levels. Some ESGAs may differ further through the accompaniment of broader governance decentralization programs, possibly involving the decentralization of land rights, justice, and health, together with education.

For most Canadians, the decentralization of education has long been embodied by pro-

vincial or territorial systems and local school boards. This is contrasted by First Nation reserves, which form some of the nation's most centrally-governed communities. In the absence of an ESGA, on-reserve education is administered, along with many other domains of governance, under the federal *Indian Act*.[1] This act institutes a very limited education system, with no provisions for curriculum requirements, teacher qualifications, student supports, and funding arrangements.[2] As a result, several First Nations have sought the legal foundation, and in some cases the financial resources, to form their own education systems through ESGAs.

This paper additionally contributes to a small body of literature that has just recently begun to explore the impacts of First Nation governance arrangements. For instance, Aragón (2015) demonstrated that comprehensive land claim agreements (CLCA) negotiated by First Nations increased individual real income by approximately 13 per cent. Pendakur and Pendakur (forthcoming), similarly, found positive impacts on household income from a broader set of institutional arrangements.

The evaluation of ESGAs has important policy implications for education decentralization, in general, but additionally for the particular case of First Nation reserves. Individuals living on-reserve have a far lower likelihood of attending and completing high school in comparison to their off-reserve Aboriginal or non-Aboriginal counterparts (Health Canada 2009; Mendelson 2006). Likewise, socioeconomic outcomes, in general, for Aboriginal peoples living on-reserve are very poor (Pendakur and Pendakur 2011; Feir 2013, 2016; Lamb 2013, 2014; O'Gorman and Pandey 2015; Rice 2017c).

This paper uses two datasets to perform the analysis. For the first, I construct a new dataset, which categorizes ESGAs by First Nation reserve and year of implementation.[3] For

1. The *Indian Act* regulates on-reserve property rights, taxation, agriculture, health, elections, and education, amongst other concerns.

2. Haldane, Lafond, and Krause (2012, p.9) suggest that, "The education 'system' for First Nation students on reserve is a far cry from any system that other Canadians would recognize in terms of its equivalency with the legislative provisions and structures supporting their respective provincial school systems, or the degree of input, accountability, and democratic governance most Canadians take for granted."

3. This is based on a broader set of governance arrangements, which was catalogued by Pendakur and Pendakur (forthcoming) with the assistance of Aboriginal Affairs and Northern Development Canada. The full

the second, I pool the confidential *Census of Canada* and confidential *National Household Survey* (NHS) master files from 1991 to 2011.[4]

Together, the census and the NHS provide a large number of observations covering a wide variety of socioeconomic characteristics for individuals. Having a large sample is of particular importance, as Aboriginal peoples residing on-reserve represented less than 3 per cent of the general population in Canada throughout the study period.

To understand the potential effects of ESGAs, I use a theoretical model with parents deciding on the level of investment in their child's education in response to school quality shocks.[5] Decisions are made within a context of credit constraints, a condition which mirrors the limited access to credit for many on-reserve households (Public Policy Forum 2016). The model does not offer clear empirical predictions, which is in keeping with much of the theoretical and empirical literature.

My empirical strategy employs a difference-in-differences (DID) approach that exploits the exogenous variation in ESGAs to identify the intention-to-treat (ITT) impact of education decentralization on high school attendance and completion. The fundamental DID assumption, i.e., parallel paths, is supported in a number of ways. Crucially, I observe common trends in the pre-treatment period of 1986 to 1991 for a variety of socioeconomic outcomes, including high school completion for young adults, between reserves that eventually implement an ESGA and reserves that do not.

My results suggest that ESGAs with a central focus on education, i.e., sectoral ESGAs, lead to economically and statistically significant improvements in the likelihood of teenagers attending high school. For the richest and most preferred specification, this improvement is of just over 5 percentage points. The analysis of treatment lags reveals that the impact

spectrum of arrangement forms include comprehensive land claim agreements without SGAs, comprehensive land claim agreements with SGAs, sectoral SGAs, multi-sectoral SGAs, fiscal management arrangements, land management arrangements, and combined fiscal and land management arrangements.

4. The confidential census and NHS master files derive from data collected using a long-form questionnaire. The voluntary long-form NHS questionnaire replaced the mandatory long-form census questionnaire in 2011.

5. This model was adapted from Del Rey and Estevan (2013), which in turn was adapted from the work of Baland and Robinson (2000).

strengthens to approximately 9 percentage points, eight or more years after the reform.[6] However, the effects on high school completion rates under multi-sectoral SGAs implemented together with CLCAs and for sectoral ESGAs differ dramatically for women and men. High school completion improves by 8 to 11 percentage points for women, but drops by a staggering 17 to 25 percentage points for men.

This paper is organized as follows. The next section, Section 1.2, describes the history, nature, and forms of ESGAs in Canada. Section 1.3 describes the literature on education decentralization, the literature on Aboriginal education attainment in Canada, and the empirical literature on First Nation governance arrangements in Canada. Section 1.4 provides the theoretical foundation for the analysis. Section 1.5 describes the data used for the empirical analysis. Section 1.6 details the identification strategy. Section 1.7 presents and discusses the results. Lastly, section 1.8 concludes.

1.2 Education Self-Government Agreements

ESGAs are legal structures that allow First Nations to reassert their authority over education.[7] In the absence of ESGAs, First Nation education matters are governed by the federal government under the authority of the *Indian Act*.

ESGAs have been negotiated through three different approaches. When education self-government is negotiated on its own, it is implemented and known as a sectoral ESGA (SECTESGA). The *Mi'kmaq Education Agreement* of 1999 is the only SECTESGA within the study period.[8] This agreement enabled a collective of 12 Nova Scotia Mi'kmaw First Nations, representing a total of 19 reserves, to assume control over primary and secondary education.

Many First Nations have taken multi-sectoral approaches to self-government. In gene-

6. These results are robust to choice of controls (see Section 7.2) and sample restrictions (see Section 7.3).

7. First Nations, which are cultural and political groupings of Aboriginal peoples, occasionally comprise more than one reserve.

8. An additional framework for the negotiation of SECTESGAs in British Columbia, known as the *First Nations Jurisdiction over Education in British Columbia Act*, was implemented in 2012.

ral, multi-sectoral SGAs cover broad policy domains, potentially including property rights, health, justice, child welfare, housing, safety, land management, natural resource rights, harvesting rights, and taxation. As a result, they may enable First Nations to achieve powers that exceed those of typical Canadian municipalities. When they are negotiated with education self-government, they are denoted here as MULTESGAs. Thus far, all standalone multi-sectoral SGAs have included an ESGA component.[9]

ESGAs have also been implemented through the negotiation of multi-sectoral SGAs in conjunction with CLCAs. CLCAs are legal agreements primarily aimed at reasserting land rights and title. Generally, CLCAs are negotiated in conjunction with financial compensation for land surrenders.[10] Multi-sectoral self-government that is implemented with education self-government within the broader context of land claims are denoted here as CLCAESGAs.

It is important to note that while SGAs, including ESGAs, embody the reassertion over jurisdiction, they do not enact local education laws and policy per se. At their core, ESGAs enable or set an intention to establish policies and legislation. There is substantial heterogeneity across the ESGA landscape, as a result. For instance, several First Nations in the Yukon that implemented an ESGA had instituted community-level education programs, such as the provision of education counselling and school supplies, but had yet to establish their own schools by 2011 (Aboriginal Affairs and Northern Development Canada 2013c). In contrast, the *Mi'kmaq Education Agreement* of 1999 immediately established a central education service provider and authority under the *Mikmaw Kinamatnewey*. It additionally ensured ongoing education capital funding for schools from the federal government and tuition agreements with the province. As such, this paper examines the ITT effect of ESGAs on education outcomes.

9. The first multi-sectoral SGA was negotiated in 1986 by the Sechelt Band, the Province of British Columbia, and the federal government. It enabled the Sechelt Band to opt-out of many sections of the *Indian Act* and establish laws in the areas of education, private property rights, land use, building codes, taxation, social assistance, child welfare, health services, road maintenance, and policing. In addition, the reserve was transferred to the band as freehold land.

10. CLCAs occur only in areas of the country not previously bound by historic land-surrender treaties, which include the provinces of Newfoundland and Labrador, Quebec, and British Columbia, along with the Northwest Territories and the Yukon.

1.3 Related Literature

Understanding the potential impact of ESGAs on high school attendance and completion requires a grasp of disparate, but related, strands of previous inquiry. First, I present a general overview of the literature on decentralization. This is followed by a discussion of the arguments for school decentralization, which is shaped by the theory of school quality and education outcomes. Next, I describe Aboriginal achievement gaps and reserve school quality gaps. Lastly, I describe the small literature on the impacts of First Nation governance arrangements on socioeconomic outcomes in Canada.

1.3.1 Decentralization

Much of the theoretical literature on decentralization derives from the formulation of Oates (1972). His *decentralization theorem* states that decentralized fiscal authority is preferred to an optimal uniform policy prescribed by a benevolent centralized government in the absence of externalities between regions. Bardhan (2002) summarizes the potential of both fiscal and political decentralization, at least within the context of developing countries, as a means to achieving greater efficiencies in public goods production through the elevation of local preferences. These efficiencies are gained through decreased transaction costs deriving from improved information flows and greater political accountability embedded within local institutional arrangements. But inefficiencies may also arise from capture by local elites or the lack of economies of scale or scope. In this way, ESGAs may be seen as having the potential to reflect local preferences, such as the desire to adopt culturally-relevant curricula.

In the case of education, decentralization efforts seek to increase local autonomy around curriculum and delivery, while bolstering school resources. This is predicated on the argument that such actions will improve school quality and resources through efficiency gains, and the argument that quality and resource improvements lead ultimately to enhanced learning and attainment outcomes. In surveying the literature, Hanushek and Woessman (2007) sug-

gest conceptually that these effects are primarily transmitted through greater performance incentives.

The empirical literature shows mixed results. In the case of Nicaragua, King and Özler (2000) find a positive association between test scores and primary school autonomy over pedagogical matters and administrative decisions. Exploiting school-level variation in Argentina, Eskeland and Filmer (2007) observe a complementary relationship between school autonomy and parental participation and enhanced test scores. Paes de Barros and Medonça (1998), however, find little support for fiscal autonomy and local school councils in improving education performance in Brazil.[11] Still, Estevan (2015) identifies a positive impact of increased local education budgets on net school attendance in Brazil. After controlling for student ability and achievement, Hanushek, Lavy, and Hitomi (2008) provide evidence that lower quality schools decrease the likelihood of grade completion. Although finding a net positive impact of a large school decentralization program in Argentina on test scores, Galiani, Gertler, and Schargrodsky (2008) decompose this aggregate result to reveal a divergence based on local socioeconomic context. In particular, the effect is positive in non-poor municipalities and negative in poor municipalities. Given the heterogeneity of economic output and income in reserves, ESGAs should not be assumed to necessarily lead to improved high school attendance and greater completion rates.

1.3.2 Aboriginal Achievement Gaps and On-Reserve School Quality Gaps

Compared with other demographic groups in Canada, education attainment for Aboriginal Canadians living on-reserve is quite low. In 2001, the on-reserve Aboriginal population aged 15 years or older was two times less likely to complete high school and nearly eight times less likely to hold a university degree than non-Aboriginal Canadians (Mendelson 2006). For the

11. Here, education performance is measured by repetition rates and the proportion of students out of school.

same time period, Health Canada (2009) reports that on-reserve Aboriginal youth less than 20 years old were only half as likely to have completed high school as their non-Aboriginal counterparts.

These education attainment statistics are unsurprising for two reasons. First, the difference between the on-reserve and provincially-based education systems are stark. While non-Aboriginal schools and students benefit from a comprehensive suite of legislation, regulation, standards, supports, and services, on-reserve schools are governed simply by a small number of sections of the *Indian Act* (Haldane, Lafond, and Krause 2012). Many advocates have also called for an end to the chronic underfunding of on-reserve education (Haldane, Lafond, and Krause 2012; Mendelson 2008). Second, on-reserve returns to education for Aboriginal identity groups were much smaller and grew substantially worse than both their off-reserve Aboriginal and non-Aboriginal counterparts between 1995 and 2005 (Feir 2013). ESGAs seek to increase educational quality as one means of closing these gaps.

1.3.3 Empirical Literature on Self-Governance Agreements and Opt-In Arrangements

Aragón (2015) and Pendakur and Pendakur (forthcoming) appear to be the only research to assess the effects of First Nation governance arrangements. Aragón (2015) employs a DID approach to evaluate the (reduced-form) impact of CLCAs on on-reserve individual (real) income. He views CLCAs as a means of reducing confusion around property rights, which enable extractive activities to enhance local income. The results indicate that CLCAs increase individual (real) income by about 13 per cent. Despite corresponding increases in high school completion, he determines that the income effect is transmitted mainly through increased labour demand and real wages within resource-based industries. Additionally, he finds second-order effects in higher wages in non-affected industries and in industries in neighboring communities, along with increased on-reserve housing costs. His results are robust across specifications and to the use of a bias-corrected matching estimator.

With a focus on income for on-reserve households, Pendakur and Pendakur (forthcoming) adopts a similar approach to Aragón (2015) in order to evaluate the effects of CLCAs, SGAs and other opt-in governance arrangements. They find that arrangements generally increase income. At 15 per cent, the income gain for non-Aboriginal households is just above twice the 7 per cent experienced by Aboriginal households. In addition, they find heterogeneity in the size and type of income gains across governance forms. CLCAs, with or without multi-sectoral SGAs, provide the largest gains, while rises in labour income form the largest contribution.

The current study can be viewed as adding to the understanding of causal effects resulting from First Nation governance arrangements. Specifically, it seeks to assess whether high school attendance and completion similarly rise as a result of SGAs and CLCAs involving education decentralization.

1.4 Theoretical Model

In this section, I provide a simple theoretical model to understand ESGA impacts on school attendance. This model was adapted from the work of Del Rey and Estevan (2013).[12]

The economy is composed of a mass of households of size 1. Each household comprises a parent and child, with each living for two discrete time periods, $t = 1, 2$. The parent is endowed with a units of human capital and the child with 1 unit.

In the first period, parents decide on the level of investment in their child's schooling. This investment translates into greater human capital, which is supplied to the labour market by the child in the second period. Investment decisions occur within the dual contexts of imperfect credit markets and school quality shocks.

The other agents in the economy are a representative firm and a government. The firm produces a numeraire good using a constant returns to scale technology with labour as its

12. The original Del Rey and Estevan (2013) model, which is related to the work of Baland and Robinson (2000), presents a child labour and human capital formation tradeoff in order to understand the impacts of school quality improvements and cash transfers on time spent in school.

only input. As such, the firm yields no profits. The government provides an education through a public school, which is open to all households.

In the first period, the parent inelastically supplies human capital to the labour market and receives an exogenous unit wage $w > 0$. Parents additionally split their child's time between school e and other activities $1 - e$, along with allocating their income to household consumption of the numeraire good c_1 and savings s. Due to imperfect credit markets, parents can save, but not borrow, i.e., $s \geq 0$.

This credit constraint reflects the economic conditions experienced in many First Nations, both with or without an ESGA. Canada's Public Policy Forum (2016), for instance, reports that credit files and histories for on-reserve households often do not exist or are routinely incomplete, if they do.

Parents are not uniform in their endowment of human capital. A proportion λ of households are endowed with a low level of human capital a_c, such that they are credit constrained. Importantly, these households cannot borrow from second-period income to obtain optimal first-period choices, nor can they draw from first-period savings to fund second-period consumption, i.e., $s = 0$. The remaining $1 - \lambda$ proportion of households are endowed with a_u units of human capital. a_u is sufficiently large enough that the savings decision for these households is unconstrained. Thus, the parent's labour income is given by wa_i, where $i = \{c, u\}$.

In the second period, each household consumes an amount c_2 based on savings and the labour income of the child, who is now an adult. The child's labour income is determined by the time spent in school, the quality of the school, and the wage.

The public school uses q units of the numeraire good to yield one unit of education of quality q. The cost of tuition is covered by the government. Thus, the government budget constraint, which is exogenously funded, is given by:

$$B = \lambda q e_c + (1 - \lambda) q e_u \tag{1.1}$$

where e_c and e_u denote the time in school for the child of a constrained and unconstrained household, respectively.

By attending the school, the child obtains $h(e, q)$ units of human capital, which is inelastically supplied to the labour market in the second period. h is twice continuously differentiable, strictly increasing, and strictly concave in its arguments. Additionally, time in school and quality are assumed to be complements. Thus, $h_{eq}(e, q) > 0$. With the unit wage, the child obtains $wh(e, q)$ in labour income.

For households, per-period preferences for consumption are denoted by $U(c_{ti})$. For simplicity, there is no discounting of the future. Thus, household utility is given by:

$$U_i = U(c_{1i}) + U(c_{2i}). \tag{1.2}$$

In the first period, the household budget constraint is given by:

$$c_{1i} = wa_i - \kappa e_i - s, \tag{1.3}$$

where κ is the private marginal cost of schooling, which includes transportation, books, and clothing. In the second period, the household budget constraint is:

$$c_{2i} = s + wh(e_i, q). \tag{1.4}$$

For both budget constraints, we again have $i = \{c, u\}$.

The parental problem is to maximize (1.2) with respect to e and s, subject to (1.3), (1.4), and the credit constraint ($s \geq 0$). Assuming an interior solution, the optimal e is characterized by:

$$\kappa U'(c_{1i}) = wh_e(e_i, q)U'(c_{2i}) \text{ and } e_i > 0. \tag{1.5}$$

This indicates that households equate the marginal costs and benefits of time spent in school in terms of household utility. For unconstrained and constrained households, the optimal s

is characterized by:

$$U'(c_{2u}) = U'(c_{1u}) \text{ and } s_u > 0 \tag{1.6}$$

and

$$U'(c_{2c}) < U'(c_{1c}) \text{ and } s_c = 0, \tag{1.7}$$

respectively.[13]

The influence of an increase in school quality on time spent in school can be analyzed by applying the implicit function theorem to (1.5) with respect to q, when $s = 0$. This is given by:

$$\frac{de_c}{dq} = -\frac{wh_{eq}(e_c, q)U'(c_{2c}) + w^2 h_q(e_c, q)h_e(e_c, q)U''(c_{2c})}{\kappa^2 U''(c_{1c}) + (wh_e(e_c, q))^2 U''(c_{2c}) + wh_{ee}(e_c, q)U'(c_{2c})}. \tag{1.8}$$

By the concavity of $U()$ and $h()$, the denominator of (1.8) is unambiguously negative. Thus, the overall sign of the effect of q on e depends on the signs and relative sizes of the terms in the numerator.

The first term of the numerator represents the marginal utility of q. It is unambiguously positive, as a result of the complementarity of e and q and the concavity of $h()$ and $U()$. The second term describes the change in effort resulting from an increase in q. By concavity again, this is unambiguously negative.[14] Essentially, the second term characterizes a decrease in e due to the child obtaining the same second-period labour income due to the increase in q.

Since the level of initial school quality and the magnitude of the school quality shock are not observed within my sample, I cannot determine whether the absolute size of the first or second term of the numerator dominates. Parents in communities with schools of large initial quality will undoubtedly experience reinforcing attendance effects from positive school quality shocks. However, we cannot be certain that the effect on attendance will be positive for communities that start with lower-quality schools. As a result, the effect of school quality

13. These first-order conditions are sufficient for maximization since the second-order conditions are satisfied.

14. $h_q(e_c, q)$ and $h_e(e_c, q)$ are positive, but $U''(c_{2c})$ is negative.

shocks arising from ESGAs on the likelihood of parents increasing their child's time spent in school is ambiguous.[15]

1.5 Data

The main analysis relies on two datasets. The first is a listing of ESGAs by reserve and year of implementation, which is a subset of a broader listing of First Nation governance arrangements, which was compiled by Pendakur and Pendakur (forthcoming) in conjunction with the Program Evaluation Branch of Aboriginal Affairs and Northern Development Canada. I focus only on CLCAESGAs, MULTESGAs, and SECTESGAs with an implementation date between 1991 and 2011.[16] Table 1.1 provides a listing of these ESGAs by form, year of implementation, and number of affected reserves. It reveals that ESGAs are not evenly distributed amongst the provinces and territories. All ESGAs were implemented in British Columbia, the Northwest Territories, and the Yukon, with the exception of a SECTESGA in Nova Scotia.[17]

The second dataset, which provides the micro-level data for the main analysis, is based on a pooling of the 1991 to 2006 confidential census master files and the 2011 confidential NHS master file.[18] In each census year, most private households in Canada were mandatorily surveyed using a long-form questionnaire at a rate of 20 per cent. On-reserve households, however, were sampled with the same instrument at a rate approaching 100 per cent.[19] On-

15. Del Rey and Estevan (2013) use the same model to describe the influence of an increase in unconditional cash transfers on the parent's investment of their child's time spent in school. They indicate that transfers unambiguously increase the child's time spent in school.

16. The lower year limit excludes three ESGAs. The first two were implemented in Quebec in 1975. The third was implemented in British Columbia in 1986. The absence of a question on school attendance in 1986 precludes the analysis of these early ESGAs. The upper year limit excludes one ESGA and is based on data limitations along with the manner in which I define treatment status.

17. The sample is restricted to these provinces and territories for this reason.

18. The 1986 confidential census master file is used only for the assessment of common trends in the pre-treatment period.

19. Canvassers administered long-form questionnaires to on-reserve households. In 1991, 78 Indian reserves and Indian settlements were incompletely enumerated, and data on individuals living in these communities are not reflected in the 1991 census master file. Ram (2004) estimates that this excludes 37,620 from the data. Statistics Canada (2015a) reports that the number of unenumerated reserves was 30 in 2001, 22 in

reserve response rates in 2011 did not fall as dramatically as in other parts of the country, despite the voluntary nature of the NHS sampling design (Penney 2013). The average NHS response rate for reserves was nearly 80 per cent.[20] As a result, the dataset contains a large number of observations with rich details on a variety of background characteristics at individual, household, and reserve levels. This is critical to the analysis of high school attendance and completion for on-reserve teenagers and young adults, respectively, given that these groups form a small proportion of the general population.

Statistics Canada assigns each populated reserve with a unique census subdivision (CSD) identifier within each census or NHS year.[21] In the provinces and territories of interest, Statistics Canada treats the following CSD types as reserves: Indian reserves, Indian settlements, Indian government districts, Nisga'a lands, and Teslin lands.[22] CSD concordance tables provided by Statistic Canada were used to create a panel of CSDs.

The outcomes of interest are school attendance and high school completion.[23] School attendance data is derived from a census question asked of all persons 15 years or older on their attendance at a school of any type, e.g. elementary school, high school, college, trades, or university, in the nine months prior to the census (NHS) day, which is typically in May.[24] The high school completion data is derived from a question asked of all persons 15 years or older on their highest level of schooling as of the census (NHS) day.[25]

2006, and 31 in 2011, with similar estimates as Ram (2004) for the number of unenumerated individuals. The majority of incompletely enumerated reserves are located in Quebec and Ontario. None lie in the territories or Atlantic provinces. Only one lies in British Columbia.

20. The average (unweighted) NHS response rate for all census subdivisions in Canada was 62.10 per cent. For reserves, the average (unweighted) NHS response rate was 77.84 per cent. These were calculated by the author based on final response rates provided by Statistics Canada (2015b).

21. CSDs are defined as municipalities, as designated by provincial governments, or their equivalent.

22. Thirty three additional CSDs, which are administered as reserves but with different CSD type designations, are added to this list to form a full reserve CSD listing (Statistics Canada 2010b). The CSD for each observation in each census master file was concorded to 2011 CSD codes in order to accommodate changes in the geographic boundaries of CSDs over time resulting from dissolutions and incorporations.

23. On their face value, the first outcome is a measure of flow, while the second is a measure of stock.

24. This question was not included in the long-form questionnaire in 1986.

25. The question on individual highest level of schooling remained stable for each census between 1986 and 2001. Starting in 2006, the question no longer asked of primary and secondary grades completed. Variation below high school certificate cannot be examined without loss of consistency in the preparation across census and NHS master files.

Individual, household, and reserve background characteristics are important for the analysis. Of these, gender, age, ethnicity, language status, Indian registration status, marital status, household income, band housing status, household size, and home major repair status are included for each observation within each census/NHS master file.

Additional household-level and reserve-level characteristics were constructed by using census/NHS household identifiers and CSD identifiers. These additional characteristics include the number of household members, the highest level of schooling amongst all other household members, reserve labour force participation rates, and reserve employment rates.[26]

The agreements and census/NHS datasets are linked by CSD identifiers, which yields one combined dataset with micro-level data associated with ESGAs by form and year of implementation. This combined dataset is initially restricted to Canadian-born individuals aged 15 years or older that resided in non-collective dwellings located on a reserve in British Columbia, the Northwest Territories, Nova Scotia, and the Yukon between 1991 and 2011. I further restrict the sample to include only individuals that resided on the same reserve 5 years prior. This mobility restriction primarily aids in ensuring that the individuals included in the analysis were exposed to on-reserve social and economic conditions, regardless of treatment status.[27]

Separate sample restrictions are required for the analysis of each outcome to ensure that the individuals in the treatment group have the highest likelihood of being influenced by the ESGA and that individuals in the control group are comparable. The sample for the analysis of school attendance includes only individuals aged 15 to 18 years with high school or less. The lower age limit is determined by the attendance question on the long-form questionnaire

26. I calculate the labour force participation rate in the same manner as Statistics Canada by dividing the number of individuals within the reserve that were active in the labour force in the reference week by the population that is 15 years or older. Similarly, I calculate the employment rate by dividing the number of individuals within the reserve that were employed in the reference week by the population that is 15 years or older. Additionally, I ensured that no reserve CSDs were concorded back to a non-reserve CSDs, in the case of incorporation of new reserve lands.

27. In addition, I ensured consistency in observing the same reserves over time, along with observing outcomes both before and after treatment for each ESGA-treated reserve, by restricting the sample to reserves with observations in each census/NHS year.

and the upper age limit is based on the assumption that individuals progressing in a typical manner through high school would have completed grade 12 before the age of 19.

The sample used for the analysis of high school completion includes only individuals that are 19 to 24 years of age for related reasons. The lower age limit is based on the assumption of a typical progression through schooling, while the upper age limit is based on the belief that most individuals have completed schooling at all levels by age 24.

Finally, the 1986 census master file supplements the main analysis. The 1986 data complements the 1991 data with an additional period of observation before the implementation of ESGAs. This proves useful in the examination of summary statistics and for the analysis of common trends between ESGA and non-ESGA groups in the pre-treatment period.[28]

1.5.1 Summary Statistics

Figures 1.1 through 1.5 display differential trends in means between ESGA and non-ESGA reserves for five socioeconomic outcomes. ESGA and non-ESGA groups are defined as follows: Reserves that implement an ESGA at some point between 1991 and 2011 are considered a member of the ESGA group, while those that do not are considered members of the non-ESGA group. This formulation implies that membership in each group remains unchanged over time. In addition, 1986 and 1991 can be interpreted as pre-treatment years for the ESGA reserves, as none of the reserves in the sample had implemented an ESGA in that period.

Figure 1.1 displays trends for high school attendance between 1991 and 2011.[29] A similar figure, but for high school completion, is presented in figure 1.2. Both show an increasing trend in attendance and high school completion for both the ESGA and non-ESGA groups. For example, the high school completion rate for both groups rose by nearly 20 percentage points between 1986 and 2011. However, one can observe systematic differences between the

28. Reserves and Indian government districts associated with the former Sechelt Indian Band located in British Columbia are excluded from all samples. This band cannot be categorized as a member of the treated or control groups, as this reserve's MULTESGA was implemented in 1986.

29. Data for school attendance in 1986 is not available.

ESGA and non-ESGA groups in the second half of the sample, i.e., the period when the ESGA agreements started to come into play. After 2001, school attendance for the ESGA group grows steadily from approximately 75 per cent in 2001 to approximately 87 per cent in 2011, whereas attendance growth for the non-ESGA group rose at a slower pace. As for high school completion, the ESGA group overtook the non-ESGA group starting in 2001. Both these findings are indicative of some ESGA impact on educational outcomes.

Figures 1.3, 1.4, and 1.5 similarly compare trends between the ESGA and non-ESGA groups for the 1986 to 2011 period for labour force participation, employment, and individual (nominal) income, respectively. Labour force participation and employment rates for the ESGA group appear slightly below the non-ESGA group in 1986 and 1991, but rise and remain above the non-ESGA group from 1996 to 2011. Nominal income for the ESGA group initially sits slightly below that of the non-ESGA group, but then rises and stays above from 2001 onward. Each of these graphs appear to be consistent with similar graphs presented by Aragón (2015).

1.6 Identification Strategy

The model that defines the impact of ESGAs on individual education outcomes is based on the following linear probability population regression model:

$$\begin{aligned} y_{ijt} = \alpha_0 + \alpha_1 CLCAESGA_{jt} + \alpha_2 MULTESGA_{jt} + \alpha_3 SECTESGA_{jt} \\ + X_{it}\gamma + W_{jt}\delta + \rho_t + \eta_j + \varepsilon_{ijt} \end{aligned} \tag{1.9}$$

where y_{ijt} is one of two outcomes of interest for individual i residing on reserve j, in period t. The first case, where the sample is restricted to teenagers, i.e., 15 to 18 years of age, has y_{ijt} equal to 1 if the individual attended any type of school in period t, and 0 otherwise. In the second case, where the sample is restricted to young adults, i.e., 19 to 24 years of age, y_{ijt} is equal to 1 if the individual's highest level of schooling is high school or greater, and 0

otherwise.

For the analysis of school attendance, $CLCAESGA_{jt}$, $MULTESGA_{jt}$, and $SECTESGA_{jt}$ are treatment dummy variables equal to 1 if the teenager resides on a reserve associated with a CLCAESGA, MULTESGA, or SECTESGA, respectively, that was implemented at least 1 year before, i.e., $t-1$, and 0 otherwise. For example, a teenager as of the 2001 census day will be considered having received treatment if an ESGA was implemented on his/her reserve as of 2000 or earlier. I define treatment status in this way based on the assumption that school quality improvements and education system changes cannot occur instantaneously upon implementation.

In the case of high school completion, consideration must be made for the individual's age in the period when an ESGA could have come into effect, i.e., in the span from 1 year after implementation and time t. Here, one of $CLCAESGA_{jt}$, $MULTESGA_{jt}$, and $SECTESGA_{jt}$ equals 1 if the individual was 18 years or less in the period starting 1 year after their reserve implemented a CLCAESGA, MULTESGA, or SECTESGA, respectively, and 0 otherwise. An example best illustrates the necessity of an alternate measure of treatment for high school completion. Assuming an ESGA was signed in 1998, a 20-year-old as of the 2001 census day will be considered to have received treatment because they would have been 18 as of 1999. That is, they met the age criteria at least 1 year after implementation. Those young adults that were 21 to 24 years of age as of the 2001 census day, however, would not be considered treated as they would have been 19 to 22, respectively, as of 1999.

X_{it} is a vector of individual and household characteristics. Gender, age, ethnicity, language status, Indian registration status, and marital status are included as individual characteristics. Gender is captured by a dummy variable equal to 1 for females, and 0 otherwise. Age is an integer variable. Ethnicity or cultural identity is represented by dummies for First Nations (North American Indian), Métis, or Inuit origins, with individuals of non-Aboriginal origins forming the left-out category.[30] For language status, I include three dummies for

30. Pendakur and Pendakur (2011) and Rice (2017c) find that ethnicity and identity are important correlates of on-reserve socioeconomic outcomes, including income and education attainment.

French only, bilingual, and allophone, with English only as the left-out category. Indian registration status is captured by a single dummy variable. Lastly, marital status consists of four dummies for now married/common-law, separated, divorced, and widowed, leaving never married/single as the left-out category.

Household characteristics include band housing, highest level of schooling amongst all other household members, household size, home major repair status, and household total income. Band housing is captured by a dummy equal to 1 if an individual lives in band-owned housing, and 0 otherwise. For the highest level of schooling amongst all other household members, I use four dummy variables corresponding with high school completion, trades, some post secondary, and bachelor's or higher, leaving less than high school completion as the left-out category. Household size is a count of all household members, less 1 for the individual. Home major repair status is captured by a dummy equal to 1 for a home identified as needing major repairs, and 0 otherwise. Finally, household total income is represented by a continuous variable of household real income.

W_{jt} is a vector of characteristics for reserve j, in period t, which includes the reserve labour force participation rate and the reserve employment rate.[31] Both rates are expressed as a proportion.

γ is a coefficient vector that captures the effects of individual and household characteristics, while δ is a coefficient vector that captures the effects of reserve characteristics. The model also includes year and reserve fixed effects, which are denoted by ρ_t and η_j, respectively.

Equation (1.9) uses a DID framework to gauge the relationship between the covariates and the outcomes of interest. Parameters α_1, α_2, and α_3 capture the ITT effects of each ESGA form on the outcomes of interest, after controlling for all other covariates and the counterfactual changes that would have occurred had reserves not had an ESGA.[32] Reserves

31. The labour force participation and employment rates are calculations based on the labour force status in the reference week of all individuals aged 15 years or older that reside within the reserve.

32. As a first step, I examine a single treatment dummy, $ESGA_{jt}$. In addition, I examine dynamic effects using flexible models which include treatment dummy variable lags consisting of 1 to 2, 3 to 7, and 8 or

without ESGAs form a comparison group to represent these counterfactual changes.

The DID approach rests on two fundamental assumptions. First, I assume that the implementation of any ESGA form does not impact the outcomes for individuals falling under other ESGA forms or within the comparison group. Second, I assume that there are parallel paths in the average outcomes of interest between the ESGA and non-ESGA groups in the absence of ESGAs. Under a linear probability framework, the estimates for the parameters of interest represent the change in the probability of attending high school or completing high school due to the implementation of each ESGA form, holding all else constant.

1.7 Results

1.7.1 Common Trends

One simple falsification test that supports the parallel paths assumption looks for the presence of common trends between treated and control groups in the pre-treatment period. Visual inspection of the slopes for the ESGA and non-ESGA groups between 1986 and 1991 in figures 1.2, 1.3, 1.4, and 1.5 clearly indicates that pre-treatment trends in high school completion, labour force participation, employment, and individual (nominal) income are quite similar for both groups, with high school completion being the most dissimilar.

Recall that school attendance in the pre-treatment period is only available for the 1991 census year. According to figure 1.1, the ESGA group's attendance rate declines slightly between 1991 and 2001, while the non-ESGA group's appears to rise slightly. Regardless, these paths do not appear to be vastly dissimilar, at least visually. Although not presented, a graph similar to figure 1.1, but which excluded reserves that had implemented an ESGA by 1996, was examined. In this case, the trends in 1991 and 1996 appear more similar than

more years, along with possibly one treatment dummy variable lead of 1 to 5 years. In all cases, the year of implementation is dummied out. Lastly, I estimate models with separate year fixed effects for the evertreated group.

in the original.[33]

Further evidence of common trends can be found in table 1.2. Here, means for key socioeconomic variables in the pre-treatment years of 1986 and 1991 are presented separately for the non-ESGA group and the ESGA group across columns (1) to (2) and (3) to (4), respectively. Again, the differences in trends are quite small, except for the case of high school completion.

Table 1.2 provides a statistical supplement to the visual inspection of pre-treatment trends and the comparison of pre-treatment means over time. This approach involves a statistical test of significance for a separate ESGA year fixed effect, i.e., a DID test, for 1991.[34] The p-values on the β_3 coefficient estimate using cluster-robust standard errors at the reserve level are presented in column (5). The p-values indicate that none of the trends in social and economic variables differ significantly between the ESGA and non-ESGA groups in the pre-treatment period, with the exception of age. Importantly, high school completion trends are not statistically different, even though they may have appeared as such in the visual inspection.

I employ two additional methods to support the parallel paths assumption. The first involves tests of joint significance for separate ESGA year fixed effects. These results are presented in column (5) of each of the main results tables. Each test provides a further

33. The visual analysis is supported by a DID test of significance for difference in trends under this adjusted attendance sample.

34. The DID test in the pre-treatment period is based on the following linear probability population regression model:

$$y_{ijt} = \beta_0 + \beta_1 EVER_{jt} + \beta_2 YEAR1991_t + \beta_3 EVER_{jt} \times YEAR1991_t + \epsilon_{ijt} \tag{1.10}$$

where, as in equation (1.9), y_{ijt} is an outcome of interest for individual i residing on reserve j, in period t. For Aboriginal identity, gender, labour force participation, and employment, where the sample is restricted to all individuals 15 years or older, y_{ijt} takes the form of a dummy variable. For age, household size, individual nominal income, or individual (real) income, which use the same sample restrictions, y_{ijt} takes the form of a continuous variable. In the case of high school completion, where the sample is restricted to young adults, i.e., 19 to 24 years of age, y_{ijt} is equal to 1 if the individual has a highest level of schooling of high school or greater, and 0 otherwise.

$EVER_{jt}$ is a dummy variable equal to 1 if the reserve implements an ESGA after 1991, and 0 otherwise. $YEAR1991_t$ is a dummy variable for observations in 1991. I cannot control for reserve fixed effects as they are collinear with $EVER_{jt}$.

robustness. As such, their discussion is left to the Robustness Checks subsection, i.e., Section 7.3.[35] These test results are discussed in the robustness checks section, below.

The second method involves tests of significance for treatment leads, which are examined only in the case of school attendance. The coefficient estimates for the leads, which are presented in tables below, are not statistically different from zero for CLCAESGAs and SECTESGAs.[36]

I additionally look to Rice (2017a) for additional support. That analysis breaks apart the SGA claim and implementation process and finds broad support for considering SGA treatment variable as exogenous.

Altogether, this preliminary analysis provides general support for the assumption of parallel paths between the ESGA and non-ESGA groups and the assumption of ESGA exogeneity. This supports the use of the DID approach. In turn, this provides the foundation for the causal interpretation of the main results.

1.7.2 Main Results

The results from the estimation of equation (1.9), but with a single ESGA treatment variable, are presented in table 1.3. Columns (1) through (4) present the estimates for the effects of ESGAs under different specifications. Column (1) is a parsimonious specification with single treatment variable and year fixed effects. Individual, reserve, and household controls are added sequentially and cumulatively to the parsimonious specification in columns (2), (3), and (4), respectively. The final specification, which is presented in column (5) allows for separate ESGA year fixed effects noted in the previous section. All specifications control for reserve fixed effects.

Three rows for standard errors are shown in this table. Robust standard errors, cluster-robust standard errors at the reserve-by-year level, and cluster-robust standard errors at

35. The exploration of separate year fixed effects is only possible because of the variation in implementation dates across and with ESGA forms.

36. As described below, the distribution of observations across leads and lags raise concerns over the reliability of the results in the case of MULTESGAs.

the reserve level are presented in parentheses, brackets, and braces, respectively. Each error model must be considered when interpreting the results.

Inference based on robust standard errors without clustering makes no adjustment for correlation across individuals within a reserve at a point in time and for correlation amongst individuals over time. Clustering at the reserve-by-year level allows for unobserved correlation within a reserve and within a year. Although this strategy has the advantage of adjusting for the Moulton (1990) effect, i.e., the potential for downward bias in standard errors resulting from the estimation of aggregate (ESGA treatment) and micro-level variables, it does not allow for serial correlation. Clustering at the reserve level, alone, is the preferred approach, as it accommodates for correlation occurring within a reserve and over time, along with the Moulton effect.

The results from table 1.3 indicate some increase in school attendance resulting from ESGAs. Ranging from 1.5 to almost 3 percentage points, the estimated effects are consistent across specifications and economically significant, but do not approach statistical significance.

Table 1.3 is additionally illustrative of the general pattern across each standard error form. Typically, robust standard errors are smallest, followed by clustering at the reserve-by-year level, and finally by clustering at the reserve level.

The possibility for differential effects across ESGA forms is explored in table 1.4. Here, the results derive from the estimation of equation (1.9), as originally specified, but with three separate treatment dummy variables.

SECTESGAs are found to have a consistently large and positive impact on school attendance of approximately 5 to 7 percentage points. The results are statistically significant for the robust standard errors and the reserve-by-year clustering cases, with the latter typically being significant at the 10 per cent level. The full specification estimates in column (4), however, only approach statistical significance when clustering at the reserve level. Nonetheless, it would appear that SECTESGAs are driving most of the impact from ESGAs found in table 1.3, given the economically small coefficient estimates for CLCAESGAs and

MULTESGAs.

The complexity involved and resources required to improve school quality and make education system changes implies some time for possible ESGA impacts to appear. Table 1.5 explores the possibility of dynamic effects such as this for each ESGA form. Within the table, each of the three treatment variables are specified with lags of 1 to 2, 3 to 7, and 8 or more years, with the exception of MULTESGAs. MULTESGAs cannot be lagged by 8 or more years, as the only MULTESGA falling within the study period was implemented in 2004, which is only 7 years prior to the last year of observation, i.e., 2011.

The results from table 1.5 provide additional support for the large and positive impact from SECTESGAs on attendance found in table 1.4. The coefficient estimates on the lags of 3 to 7 and 8 or more years range from 0.080 to 0.104. These findings are also statistically significant across all specifications and across all standard error forms, including the preferred form with clustering at the reserve level. For CLCAESGAs, the findings are less clear, and rarely statistically significant. The coefficient estimates of the MULTESGAs are economically large (and have different signs), but so are the standard errors. This is due to the small number of reserves with MULTESGAs and secondly due to the narrowing of the sample sizes after refining for lag groups. As such, the MULTESGAs results should be interpreted with caution.

Table 1.6 shifts the focus to the impacts of ESGAs on high school completion under differential and dynamic specifications.[37] Taken on their face value, the results indicate that CLCAESGAs lead to negligibly small medium-term increases followed by long-term decreases in the likelihood of completing high school or greater levels of education for young adults. The long-term effects are statistically significant at the 1 per cent level. MULTESGA dynamic effects follow a somewhat opposite pattern, with large and highly significant short-term decreases followed by small and insignificant medium-term increases in the likelihood

37. Note that the distribution of CLCAESGA observations caused lagged term for 1 to 2 years to be dropped from the regressions as a result of collinearity.

of completion.[38] Lastly, SECTESGA effects appear to become more positive over time, but without statistical significance. Tables 1.9 and 1.10 are provided for completeness, but not discussed.

I use tables 1.7 and 1.8 to examine the strong heterogeneous effects on completion of high school or greater levels of education that exist between women and men. The results suggest that the likelihood of attaining high school rising by between 8 and 11 percentage points for young women due to both CLCAESGAs and SECTESGAs. There is a strong and opposite effect for men, with the likelihood of attaining high school declining by a staggering 17 to 25 percentage points under both CLCAESGAs and SECTESGAs. These divergent effects, and their related statistical significance, help explain the lack of statistical significance found in table 1.6. Likely the two effects counter each other.

The results for women and men in part correspond with additional analysis (not shown) that examines the effects of ESGAs on employment and (real) wages. In particular, employment rates decline for teenage girls under CLCAESGAs and SECTESGAs, which I fully expect if attendance rises. Surprisingly, the results indicate similar declines in employment rates for teenage boys. Wage effects appear to be nil for teenage girls, but weekly positive for teenage boys, and only in the case of SECTESGAs.

1.7.3 Robustness Checks

As a further robustness check in support of the parallel paths assumption, I performed additional analysis of the full specifications from each of the models, but by further controlling for separate ESGA-year fixed effects. Table 1.11 present these results, but only for high school completion.

The F-statistic and p-value from the joint test of significance of the separate ESGA-year fixed effects, which are calculated using cluster-robust standard errors at the reserve level, are presented at the base of each table. In most cases, F-statistics are small (and the p-values

38. Again, some caution should be taken in relying on the MULTESGA results.

large).

Thus, I find little evidence to suggest a different background time trend for the ESGA group. Taken together with the common trends analysis, the pattern suggests that the common trends between the (eventual) ESGA and non-ESGA reserves persist beyond 1991. The consistency in the pattern of the estimates across columns (4) and (5) is immediately apparent, and are themselves reassuring. They additionally confirm the earlier findings that the results are robust to the choice of controls.

Additional robustness checks were performed to verify the sensitivity of the estimates to the choice of age groups. For school attendance, estimates of equation (1.9) were performed using 15- to 17-year-olds (instead of 15 to 18). For high school completion, the upper age limit was raised by 5 years, i.e. now 19 to 29, to account for the possibility that those living on-reserve take longer to complete all schooling. The pattern of results previously presented are essentially the same in both cases.[39]

A final robustness check involved the analysis of a treatment lead effect of 1 to 5 years for school attendance.[40] The results suggest that the likelihood of attending school differs from the control group in the pre-treatment period by approximately 2 percentage points for CLCAESGAs, and by approximately 4 percentage points for SECTESGAs, but neither lead coefficient estimate is statistically significant. Although the lead coefficient estimate in the case of MULTESGAs is both economically and statistically significant, caution should be taken in interpreting this estimate due to the very small number of treated individuals identified by the lead and lag terms.[41]

1.7.4 Interpretation and Discussion

A report by the Institute on Governance (2008) provides important details of the governance changes in SECTESGA signatory communities. Crucially, these details help explain the sub-

39. Results are available upon request.
40. Recall that a similar lead effect could not be modelled for high school completion.
41. These leads and lags results are available upon request.

stantial rise in attendance and completion indicated by the main results. The report states that the *Mi'kmaq Education Agreement* resulted in the establishment of a locally-governed education system with culturally-relevant curriculum. It also evidences the establishment of successive education funding agreements between signatory Mi'kmaw communities and the federal government. These dramatically exceed the funding arrangements of non-signatory Mi'kmaw communities in operational and capital replacement allocations. They additionally incorporated escalation factors which likely sustained this pattern for the medium term.[42] I conclude from this that SECTESGA communities experienced substantial improvements in primary and secondary school infrastructure and in the overarching education system.

The outcomes under CLCAESGAs similarly requires explanation. To understand the underperformance of CLCAESGAs in comparison to SECTESGAs, I examine potential alternative transmission mechanisms arising from the combination of multi-sectoral decentralization and CLCAs.

First, one can reasonably assume that simultaneously decentralizing multiple forms of governance likely involves some timed staging of implementation. An evaluation by Aboriginal Affairs and Northern Development Canada (2013a) supports this view. It suggests that some or many areas of jurisdiction, including education, have yet to be asserted by SGA signatories. This same report suggests further that funding arrangements and program standards may not have been clearly articulated within those areas of jurisdiction where self-governance has been asserted. An earlier Aboriginal Affairs and Northern Development Canada (2011) report suggests that even if education self-governance had been adopted, it was one of many competing First Nation government priorities. As such, it is possible that the impacts on attendance or completion from CLCAESGAs are unclear or even decline because education has yet to be decentralized or has not been decentralized fully.

The inclusion of CLCAs, though, add a second layer of complexity. By resolving uncertainty over land claims and natural resource rights, it is reasonable to expect that CLCAs

42. Signatory average annual increases are set at 6 per cent, which is 4 percentage points higher than the Atlantic region, in general.

positively impact local natural resource extraction activity. Aragón (2015) finds just that.[43] Potential second-order impacts on associated wages and employment levels should also be considered. Again, Aragón (2015) suggests that wages in extractive industries do rise, but they do so without any impact on either the labour force participation rate or the employment rate. For this reason, we cannot necessarily assume that the declining attendance rates under CLCAESGAs occur because students leave school early to take up low-skilled, but high-paying, jobs in the natural resource sector.

Future research should investigate alternative mechanisms for the differences in effects found between SECTESGAs and CLCAESGAs, as well as those found between women and men. For instance, while the CLCAESGA sample is included within the CLCA sample of Aragón (2015), systematic differences between the two may exist. As such, one potential avenue of exploration involves testing for employment effects from CLCAESGAs, alone.

Future research should additionally consider implementing further placebo tests, possibly based on different age classes. This could add further support to the causal interpretation.

1.8 Concluding Remarks

This paper identifies the causal ITT impacts on attendance and completion of high school resulting from ESGAs. The results offer robust evidence that SECTESGAs lead to substantial improvements in attendance of up to 10 percentage points, an effect that largely corresponds with the theoretical model.

However, the effects on high school completion rates under CLCAESGAs and SECTESGAs differ dramatically for women and men. High school completion improves by 8 to 11 percentage points for women, but drops by a staggering 17 to 25 percentage points for men.

By exploring the education effects of ESGAs, a previously unexamined education decentralization policy, the paper adds to the literature on decentralization policy, in general, and in particular to the education decentralization literature. It additionally contributes

43. He finds that the number of mining agreements in CLCA areas is 1.5 times the national average.

to the growing literature on the effects of First Nation governance arrangements. In doing so, it additionally yields important policy implications related to Aboriginal/non-Aboriginal education attainment inequalities.

Table 1.1: ESGAs by Province/Territory and Year of Implementation, 1991 to 2011

ESGA	Agreement Name, Prov/Terr	Year of Implementation	Number of Reserves (as of 2011)
CLCAESGA	Champagne and Aishihik, YK	1995	4
	Teslin Tlingit, YK	1995	3
	Nacho Nyak Dun, YK	1995	1
	Vuntut Gwitch'in, YK	1995	1
	Little Salmon/Carmacks, YK	1997	1
	Selkirk, YK	1997	1
	Tr'Ondek Hwech'In, YK	1998	1
	Nisga'a, BC	2000	1
	Ta'an Kwach'an, YK	2002	1
	Kluane, YK	2004	1
	Carcross Tagish, YK	2005	3
	Tlicho, NWT	2005	4
	Tsawwassen, BC	2009	1
MULTESGA	Westbank, BC	2004	2
SECTESGA	Mi'kmaq, NS	1999	16
	Mi'kmaq, NS	2005	3

Notes: Year of implementation matches the year that a final ESGA agreement was reached.
Source: Pendakur and Pendakur (forthcoming).

Table 1.2: Common Trends, 1986 to 1991, and DID Tests — OLS

	Non-ESGA Nevertreated		ESGA Evertreated		
	1986 (1)	1991 (2)	1986 (3)	1991 (4)	p-values (5)
High school or greater[a]	0.386	0.452	0.395	0.390	0.160
Labour force participation	0.516	0.553	0.461	0.512	0.473
Employed	0.338	0.380	0.325	0.352	0.397
Individual nominal income	9340.47	12497.47	8622.49	11973.80	0.758
Individual real income	13926.64	15073.06	12784.01	14378.61	0.977
Age	38.5	40.1	38.1	38.6	0.050*
Aboriginal	0.791	0.826	0.692	0.774	0.170
Female	0.473	0.470	0.480	0.473	0.447
Household size	4.4	4.2	4.7	4.6	0.467
Reserve clusters					207

Notes: High school or greater is a dummy variable for highest level of schooling of high school or greater. Labour force participation is a dummy variable for active labour force status. Employed is a dummy variable for employed status. Individual nominal and real income are continuous variables. Age is an integer variable. Aboriginal is a dummy variable if the individual identifies as North American Indian, Métis, or Inuit. Female is a dummy variable. Household size is an integer variable. Weighted means of these variables within the ESGA and non-ESGA by year are presented in columns (1) through (4). p-values associated with cluster-robust standard errors at the reserve level are presented in column (5).

[a]Matching the approach used in the main regressions, the sample used in the analysis of high school completion includes only 19- to 24-year-olds.

Table 1.3: Attendance (15- to 18-Year-Olds) — Linear Probability Models

	(1)	(2)	(3)	(4)
ESGA	0.026	0.023	0.019	0.015
	(0.018)	(0.018)	(0.018)	(0.018)
	[0.024]	[0.024]	[0.024]	[0.024]
	{0.029}	{0.027}	{0.027}	{0.028}
Individual controls	No	Yes	Yes	Yes
Reserve controls	No	No	Yes	Yes
Household controls	No	No	No	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Reserve fixed effects	Yes	Yes	Yes	Yes
Reserve clusters	207	207	207	207
Observations	17,935	17,935	17,935	17,935

Notes: The dependent variable is equal to 1 if an individual had at most a high school certificate as of census day and attended a school of any type at any point in the nine months prior, and 0 otherwise. The sample is restricted to non-mobile, Canadian-born, non-collective dwelling teenagers, i.e., 15 to 18 years, that resided on a reserve in British Columbia, the Northwest Territories, Nova Scotia, and the Yukon. Individual controls include gender, ethnic and cultural identity, Indian registration status, age, language status, and marital status. Household controls include band housing, highest level of schooling amongst all other household members, household size, home major repair status, and household (real) income. Reserve controls include reserve employment rate. All estimates are weighted and all frequencies are rounded to the nearest multiple of five. Robust standard errors in parentheses, cluster-robust standard errors at the reserve-by-year level in brackets, and cluster-robust standard errors at the reserve level in braces. The F-statistic and p-value presented are calculated using cluster-robust standard errors at the reserve level. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 1.4: Attendance (15- to 18-Year-Olds) — Differential Effects — Linear Probability Models

	(1)	(2)	(3)	(4)
CLCAESGA	-0.005	0.001	0.001	-0.013
	(0.021)	(0.020)	(0.020)	(0.020)
	[0.028]	[0.027]	[0.027]	[0.025]
	{0.038}	{0.035}	{0.035}	{0.031}
MULTESGA	-0.008	-0.026	-0.026	-0.022
	(0.073)	(0.070)	(0.070)	(0.070)
	[0.077]	[0.081]	[0.080]	[0.079]
	{0.037}	{0.038}	{0.037}	{0.032}
SECTESGA	0.064	0.058	0.051	0.052
	(0.020)***	(0.019)***	(0.020)***	(0.019)***
	[0.032]**	[0.031]*	[0.031]	[0.032]*
	{0.041}	{0.040}	{0.041}	{0.041}
Individual controls	No	Yes	Yes	Yes
Reserve controls	No	No	Yes	Yes
Household controls	No	No	No	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Reserve fixed effects	Yes	Yes	Yes	Yes
Reserve clusters	207	207	207	207
Observations	17,935	17,935	17,935	17,935

Notes: The dependent variable is equal to 1 if an individual had at most a high school certificate as of census day and attended a school of any type at any point in the nine months prior, and 0 otherwise. The sample is restricted to non-mobile, Canadian-born, non-collective dwelling teenagers, i.e., 15 to 18 years, that resided on a reserve in British Columbia, the Northwest Territories, Nova Scotia, and the Yukon. Individual controls include gender, ethnic and cultural identity, Indian registration status, age, language status, and marital status. Household controls include band housing, highest level of schooling amongst all other household members, household size, home major repair status, and household (real) income. Reserve controls include reserve employment rate. All estimates are weighted and all frequencies are rounded to the nearest multiple of five. Robust standard errors in parentheses, cluster-robust standard errors at the reserve-by-year level in brackets, and cluster-robust standard errors at the reserve level in braces. The F-statistic and p-value presented are calculated using cluster-robust standard errors at the reserve level. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 1.5: Attendance (15- to 18-Year-Olds) — Differential and Dynamic Effects — Linear Probability Models

	(1)	(2)	(3)	(4)
CLCAESGA 1-2 years	0.028	0.037	0.038	0.018
	[0.035]	[0.035]	[0.035]	[0.033]
	{0.045}	{0.045}	{0.044}	{0.041}
CLCAESGA 3-7 years	-0.036	-0.033	-0.034	-0.046
	[0.032]	[0.030]	[0.029]	[0.027]*
	{0.043}	{0.037}	{0.037}	{0.032}
CLCAESGA 8+ years	0.026	0.033	0.034	0.027
	[0.039]	[0.035]	[0.035]	[0.035]
	{0.050}	{0.042}	{0.043}	{0.043}
MULTESGA 1-2 years	-0.110	-0.116	-0.116	-0.111
	[0.067]*	[0.072]	[0.071]	[0.071]
	{0.054}**	{0.048}**	{0.048}**	{0.046}**
MULTESGA 3-7 years	0.100	0.072	0.072	0.076
	[0.055]*	[0.065]	[0.064]	[0.063]
	{0.033}***	{0.037}*	{0.036}**	{0.030}**
SECTESGA 1-2 years	-0.005	-0.013	-0.017	-0.017
	[0.047]	[0.046]	[0.046]	[0.046]
	{0.062}	{0.061}	{0.060}	{0.060}
SECTESGA 3-7 years	0.086	0.085	0.080	0.081
	[0.032]***	[0.031]***	[0.031]**	[0.031]***
	{0.042}**	{0.041}**	{0.042}*	{0.042}*
SECTESGA 8+ years	0.104	0.094	0.086	0.089
	[0.030]***	[0.029]***	[0.029]***	[0.030]***
	{0.040}**	{0.038}**	{0.039}**	{0.040}**
Individual controls	No	Yes	Yes	Yes
Reserve controls	No	No	Yes	Yes
Household controls	No	No	No	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Reserve fixed effects	Yes	Yes	Yes	Yes
Reserve clusters	207	207	207	207
Observations	17,935	17,935	17,935	17,935

Notes: The dependent variable is equal to 1 if an individual had at most a high school certificate as of census day and attended a school of any type at any point in the nine months prior, and 0 otherwise. The sample is restricted to non-mobile, Canadian-born, non-collective dwelling teenagers, i.e., 15 to 18 years, that resided on a reserve in British Columbia, the Northwest Territories, Nova Scotia, and the Yukon. Individual controls include gender, ethnic and cultural identity, Indian registration status, age, language status, and marital status. Household controls include band housing, highest level of schooling amongst all other household members, household size, home major repair status, and household (real) income. Reserve controls include reserve employment rate. All estimates are weighted and all frequencies are rounded to the nearest multiple of five. Robust standard errors are not presented. Cluster-robust standard errors at the reserve-by-year level are presented in brackets and cluster-robust standard errors at the reserve level in braces. The F-statistic and p-value presented are calculated using robust standard errors clustered at the reserve level. MULTESGAs cannot be lagged by 8 or more years due to data limitations. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 1.6: High School or Greater (19- to 24-Year-Olds) — Differential and Dynamic Effects — Linear Probability Models

	(1)	(2)	(3)	(4)
CLCAESGA 3-7 years	0.024	0.043	0.040	0.000
	[0.038]	[0.037]	[0.036]	[0.029]
	{0.041}	{0.039}	{0.039}	{0.029}
CLCAESGA 8+ years	-0.121	-0.110	-0.110	-0.111
	[0.038]***	[0.039]***	[0.039]***	[0.038]***
	{0.044}***	{0.042}***	{0.042}***	{0.037}***
MULTESGA 1-2 years	-0.235	-0.163	-0.163	-0.140
	[0.040]***	[0.034]***	[0.031]***	[0.038]***
	{0.020}***	{0.022}***	{0.023}***	{0.029}***
MULTESGA 3-7 years	0.029	0.033	0.034	0.022
	[0.038]	[0.035]	[0.031]	[0.038]
	{0.017}*	{0.015}**	{0.015}**	{0.019}
SECTESGA 1-2 years	-0.076	-0.010	-0.021	-0.017
	[0.053]	[0.048]	[0.048]	[0.049]
	{0.041}*	{0.040}	{0.042}	{0.042}
SECTESGA 3-7 years	0.012	0.022	0.010	0.030
	[0.046]	[0.045]	[0.049]	[0.045]
	{0.039}	{0.039}	{0.047}	{0.040}
SECTESGA 8+ years	0.047	0.051	0.030	0.045
	[0.043]	[0.041]	[0.041]	[0.040]
	{0.034}	{0.033}	{0.032}	{0.032}
Individual controls	No	Yes	Yes	Yes
Reserve controls	No	No	Yes	Yes
Household controls	No	No	No	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Reserve fixed effects	Yes	Yes	Yes	Yes
Reserve clusters	216	216	216	216
Observations	21,765	21,765	21,765	21,765

Notes: The dependent variable is equal to 1 if an individual had at least a high school certificate as of census day, and 0 otherwise. The sample is restricted to non-mobile, Canadian-born, non-collective dwelling young adults, i.e., 19 to 24 years, that resided on a reserve in British Columbia, the Northwest Territories, Nova Scotia, and the Yukon. Individual controls include gender, ethnic and cultural identity, Indian registration status, age, language status, and marital status. Household controls include band housing, highest level of schooling amongst all other household members, household size, home major repair status, and household (real) income. Reserve controls include reserve employment rate. All estimates are weighted and all frequencies are rounded to the nearest multiple of five. Robust standard errors are not presented. Cluster-robust standard errors at the reserve-by-year level are presented in brackets and cluster-robust standard errors at the reserve level in braces. The F-statistic and p-value presented are calculated using robust standard errors clustered at the reserve level. CLCAESGAs cannot be forwarded by 1 to 5 years due to data limitations. For similar reasons, MULTESGAs cannot be lagged by 8 or more years. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 1.7: High School or Greater (19- to 24-Year-Old Women) — Differential and Dynamic Effects — Linear Probability Models

	(1)	(2)	(3)	(4)
CLCAESGA 3-7 years	0.061	0.082	0.079	0.040
	[0.036]*	[0.036]**	[0.035]**	[0.039]
	{0.038}	{0.038}**	{0.036}**	{0.042}
CLCAESGA 8+ years	-0.035	-0.021	-0.020	-0.018
	[0.048]	[0.047]	[0.047]	[0.046]
	{0.041}	{0.037}	{0.036}	{0.031}
MULTESGA 1-2 years	-0.426	-0.337	-0.337	-0.314
	[0.123]***	[0.116]***	[0.115]***	[0.119]***
	{0.065}***	{0.062}***	{0.063}***	{0.076}***
MULTESGA 3-7 years	0.150	0.148	0.148	0.141
	[0.086]*	[0.085]*	[0.083]*	[0.079]*
	{0.021}***	{0.028}***	{0.026}***	{0.019}***
SECTESGA 1-2 years	0.041	0.110	0.104	0.104
	[0.058]	[0.059]*	[0.060]*	[0.050]**
	{0.072}	{0.076}	{0.077}	{0.064}
SECTESGA 3-7 years	0.101	0.111	0.104	0.110
	[0.051]**	[0.049]**	[0.051]**	[0.047]**
	{0.045}**	{0.043}**	{0.048}**	{0.037}***
SECTESGA 8+ years	0.080	0.079	0.065	0.079
	[0.043]*	[0.042]*	[0.043]	[0.043]*
	{0.031}**	{0.030}***	{0.031}**	{0.030}***
Individual controls	No	Yes	Yes	Yes
Reserve controls	No	No	Yes	Yes
Household controls	No	No	No	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Reserve fixed effects	Yes	Yes	Yes	Yes
Reserve clusters	216	216	216	216
Observations	11,020	11,020	11,020	11,020

Notes: The dependent variable is equal to 1 if an individual had at least a high school certificate as of census day, and 0 otherwise. The sample is restricted to non-mobile, Canadian-born, non-collective dwelling young women, i.e., 19 to 24 years, that resided on a reserve in British Columbia, the Northwest Territories, Nova Scotia, and the Yukon. Individual controls include gender, ethnic and cultural identity, Indian registration status, age, language status, and marital status. Household controls include band housing, highest level of schooling amongst all other household members, household size, home major repair status, and household (real) income. Reserve controls include reserve employment rate. All estimates are weighted and all frequencies are rounded to the nearest multiple of five. Robust standard errors are not presented. Cluster-robust standard errors at the reserve-by-year level are presented in brackets and cluster-robust standard errors at the reserve level in braces. The F-statistic and p-value presented are calculated using robust standard errors clustered at the reserve level. CLCAESGAs cannot be forwarded by 1 to 5 years due to data limitations. For similar reasons, MULTESGAs cannot be lagged by 8 or more years. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 1.8: High School or Greater (19- to 24-Year-Old Men) — Differential and Dynamic Effects — Linear Probability Models

	(1)	(2)	(3)	(4)
CLCAESGA 3-7 years	0.003	0.017	0.013	-0.025
	[0.065]	[0.061]	[0.061]	[0.052]
	{0.073}	{0.068}	{0.068}	{0.057}
CLCAESGA 8+ years	-0.200	-0.186	-0.188	-0.188
	[0.047]***	[0.047]***	[0.047]***	[0.050]***
	{0.056}***	{0.057}***	{0.056}***	{0.050}***
MULTESGA 1-2 years	-0.111	-0.056	-0.057	-0.008
	[0.045]**	[0.048]	[0.050]	[0.047]
	{0.013}***	{0.017}***	{0.017}***	{0.019}
MULTESGA 3-7 years	-0.064	-0.078	-0.079	-0.089
	[0.044]	[0.044]*	[0.046]*	[0.045]**
	{0.026}**	{0.022}***	{0.023}***	{0.030}***
SECTESGA 1-2 years	-0.245	-0.167	-0.185	-0.172
	[0.066]***	[0.063]***	[0.061]***	[0.055]***
	{0.041}***	{0.040}***	{0.041}***	{0.041}***
SECTESGA 3-7 years	-0.064	-0.057	-0.074	-0.057
	[0.044]	[0.044]	[0.048]	[0.045]
	{0.037}*	{0.040}	{0.048}	{0.046}
SECTESGA 8+ years	0.031	0.031	0.004	0.015
	[0.048]	[0.046]	[0.045]	[0.043]
	{0.042}	{0.042}	{0.040}	{0.041}
Individual controls	No	Yes	Yes	Yes
Reserve controls	No	No	Yes	Yes
Household controls	No	No	No	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Reserve fixed effects	Yes	Yes	Yes	Yes
Reserve clusters	216	216	216	216
Observations	12,710	12,710	12,710	12,710

Notes: The dependent variable is equal to 1 if an individual had at least a high school certificate as of census day, and 0 otherwise. The sample is restricted to non-mobile, Canadian-born, non-collective dwelling young men, i.e., 19 to 24 years, that resided on a reserve in British Columbia, the Northwest Territories, Nova Scotia, and the Yukon. Individual controls include gender, ethnic and cultural identity, Indian registration status, age, language status, and marital status. Household controls include band housing, highest level of schooling amongst all other household members, household size, home major repair status, and household (real) income. Reserve controls include reserve employment rate. All estimates are weighted and all frequencies are rounded to the nearest multiple of five. Robust standard errors are not presented. Cluster-robust standard errors at the reserve-by-year level are presented in brackets and cluster-robust standard errors at the reserve level in braces. The F-statistic and p-value presented are calculated using robust standard errors clustered at the reserve level. CLCAESGAs cannot be forwarded by 1 to 5 years due to data limitations. For similar reasons, MULTESGAs cannot be lagged by 8 or more years. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 1.9: High School or Greater (19- to 24-Year-Olds) — Linear Probability Models

	(1)	(2)	(3)	(4)
ESGA	-0.003	0.013	0.003	0.002
	(0.019)	(0.018)	(0.018)	(0.018)
	[0.029]	[0.026]	[0.026]	[0.025]
	{0.025}	{0.024}	{0.024}	{0.025}
Individual controls	No	Yes	Yes	Yes
Reserve controls	No	No	Yes	Yes
Household controls	No	No	No	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Reserve fixed effects	Yes	Yes	Yes	Yes
Reserve clusters	216	216	216	216
Observations	21,765	21,765	21,765	21,765

Notes: The dependent variable is equal to 1 if an individual had at least a high school certificate as of census day, and 0 otherwise. The sample is restricted to non-mobile, Canadian-born, non-collective dwelling young adults, i.e., 19 to 24 years, that resided on a reserve in British Columbia, the Northwest Territories, Nova Scotia, and the Yukon. Individual controls include gender, ethnic and cultural identity, Indian registration status, age, language status, and marital status. Household controls include band housing, highest level of schooling amongst all other household members, household size, home major repair status, and household (real) income. Reserve controls include reserve employment rate. All estimates are weighted and all frequencies are rounded to the nearest multiple of five. Robust standard errors in parentheses, cluster-robust standard errors at the reserve-by-year level in brackets, cluster-robust standard errors at the reserve level in braces. The F-statistic and p-value presented are calculated using cluster-robust standard errors at the reserve level. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 1.10: High School or Greater (19- to 24-Year-Olds) — Differential Effects — Linear Probability Models

	(1)	(2)	(3)	(4)
CLCAESGA	-0.028	-0.011	-0.012	-0.039
	(0.026)	(0.025)	(0.025)	(0.025)
	[0.034]	[0.033]	[0.033]	[0.024]
	{0.041}	{0.039}	{0.039}	{0.023}*
MULTESGA	-0.033	-0.013	-0.012	-0.016
	(0.078)	(0.073)	(0.073)	(0.071)
	[0.069]	[0.055]	[0.053]	[0.051]
	{0.024}	{0.017}	{0.019}	{0.025}
SECTESGA	0.022	0.034	0.018	0.034
	(0.020)	(0.020)*	(0.020)	(0.019)*
	[0.043]	[0.039]	[0.040]	[0.040]
	{0.028}	{0.029}	{0.032}	{0.030}
Individual controls	No	Yes	Yes	Yes
Reserve controls	No	No	Yes	Yes
Household controls	No	No	No	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Reserve fixed effects	Yes	Yes	Yes	Yes
Reserve clusters	216	216	216	216
Observations	21,765	21,765	21,765	21,765

Notes: The dependent variable is equal to 1 if an individual had at least a high school certificate as of census day, and 0 otherwise. The sample is restricted to non-mobile, Canadian-born, non-collective dwelling young adults, i.e., 19 to 24 years, that resided on a reserve in British Columbia, the Northwest Territories, Nova Scotia, and the Yukon. Individual controls include gender, ethnic and cultural identity, Indian registration status, age, language status, and marital status. Household controls include band housing, highest level of schooling amongst all other household members, household size, home major repair status, and household (real) income. Reserve controls include reserve employment rate. All estimates are weighted and all frequencies are rounded to the nearest multiple of five. Robust standard errors in parentheses, cluster-robust standard errors at the reserve-by-year level in brackets, cluster-robust standard errors at the reserve level in braces. The F-statistic and p-value presented are calculated using cluster-robust standard errors at the reserve level. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 1.11: High School or Greater (19- to 24-Year-Olds) — Differential and Dynamic Effects with ESGA-Year Fixed Effects — Linear Probability Models

	(1)
CLCAESGA 3-7 years	0.009
	[0.039]
	{0.041}
CLCAESGA 8+ years	-0.084
	[0.052]
	{0.051}*
MULTESGA 1-2 years	-0.132
	[0.042]***
	{0.035}***
MULTESGA 3-7 years	0.058
	[0.053]
	{0.047}
SECTESGA 1-2 years	-0.053
	[0.051]
	{0.046}
SECTESGA 3-7 years	0.032
	[0.048]
	{0.040}
SECTESGA 8+ years	0.075
	[0.054]
	{0.053}
F-statistic	0.790
p-value	0.533
Individual controls	Yes
Reserve controls	Yes
Household controls	Yes
ESGA-year fixed effects	Yes
Year fixed effects	Yes
Reserve fixed effects	Yes
Reserve clusters	216
Observations	21,765

Notes: The dependent variable is equal to 1 if an individual had at least a high school certificate as of census day, and 0 otherwise. The sample is restricted to non-mobile, Canadian-born, non-collective dwelling young adults, i.e., 19 to 24 years, that resided on a reserve in British Columbia, the Northwest Territories, Nova Scotia, and the Yukon. Individual controls include gender, ethnic and cultural identity, Indian registration status, age, language status, and marital status. Household controls include band housing, highest level of schooling amongst all other household members, household size, home major repair status, and household (real) income. Reserve controls include reserve employment rate. All estimates are weighted and all frequencies are rounded to the nearest multiple of five. Robust standard errors are not presented. Cluster-robust standard errors at the reserve-by-year level are presented in brackets and cluster-robust standard errors at the reserve level in braces. The F-statistic and p-value presented are calculated using robust standard errors clustered at the reserve level. CLCAESGAs cannot be forwarded by 1 to 5 years due to data limitations. For similar reasons, MULTESGAs cannot be lagged by 8 or more years. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Figure 1.1: Attendance in ESGA and Non-ESGA Reserves (15 to 18 Years), 1991 to 2011

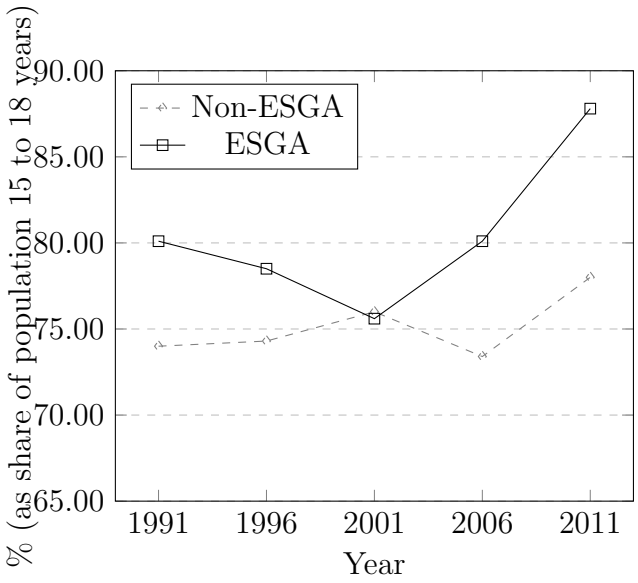


Figure 1.2: High School or Greater in ESGA and Non-ESGA Reserves (19- to 24-Year-Olds), 1986 to 2011

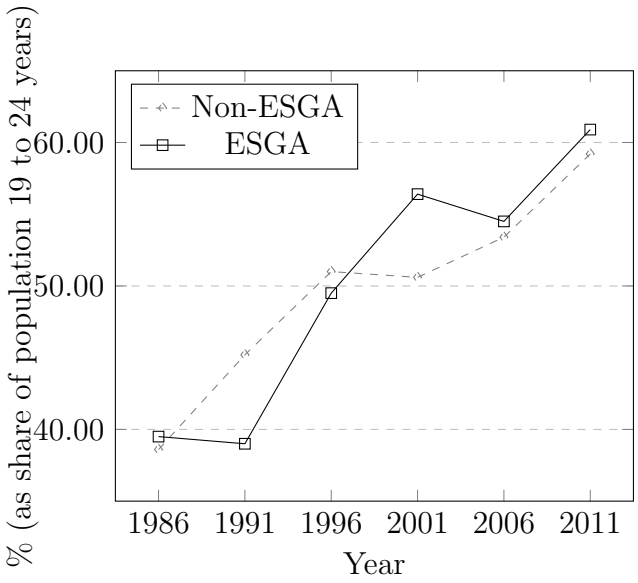


Figure 1.3: Labour Force Participation Rate in ESGA and Non-ESGA Reserves, 1986 to 2011

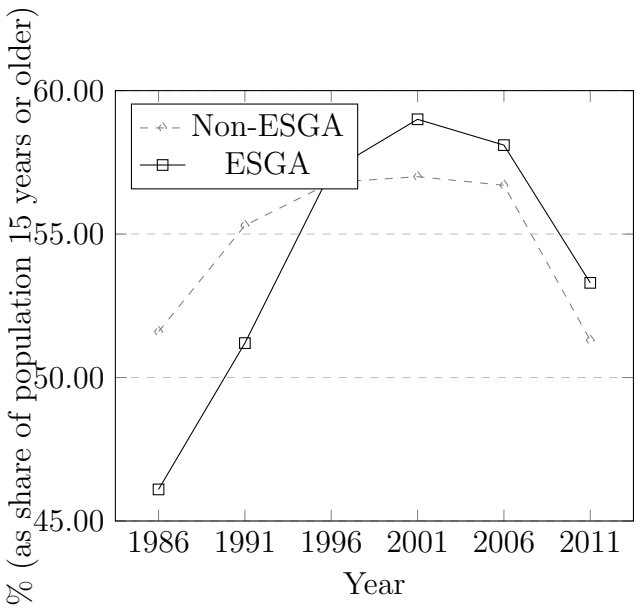


Figure 1.4: Employment Rate in ESGA and Non-ESGA Reserves, 1986 to 2011

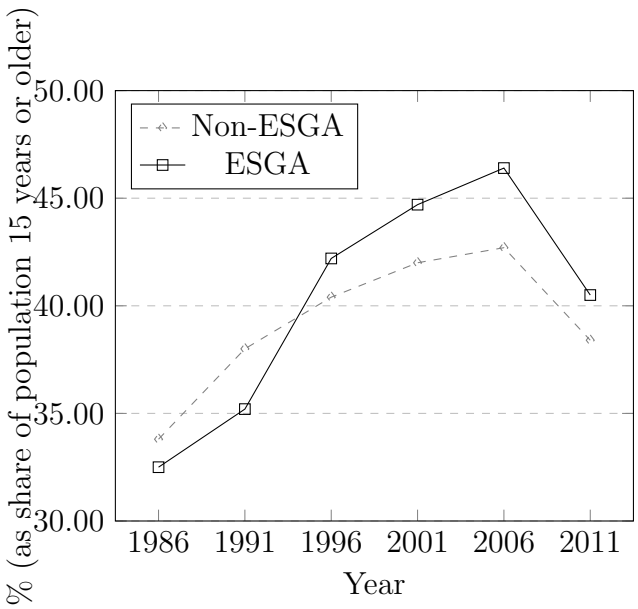
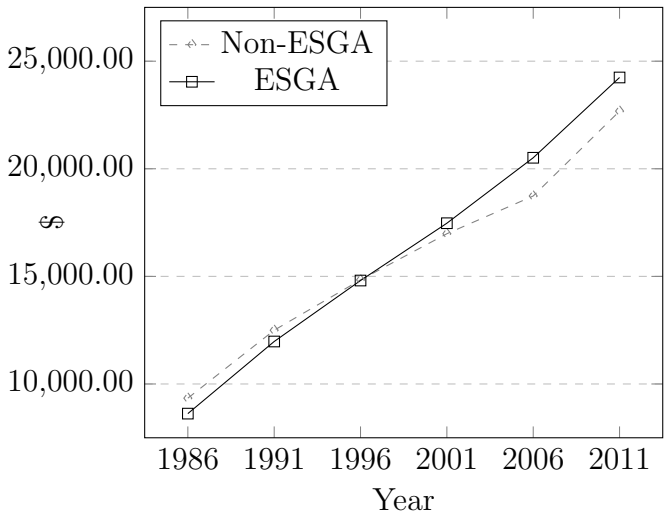


Figure 1.5: Individual (Nominal) Income in ESGA and Non-ESGA Reserves, 1986 to 2011



Chapter 2

Determinants of Governance Decentralization: Evidence from First Nation Self-Government Agreements in Canada

2.1 Introduction

For several decades, dramatic shifts in the degree of governance decentralization have inspired numerous contributions to the economics literature. This paper seeks to contribute to this literature by identifying the factors that drive communities to adopt decentralized governance by examining the case of First Nation self-government agreements (SGA) in Canada.[1]

By examining SGAs, this paper additionally relates to recent work by Aragón (2015), Pendakur and Pendakur (forthcoming), and Rice (2017b) that analyzes the impact of SGAs on various socioeconomic outcomes. Specifically, this paper seeks to answer the secondary

1. First Nations are representative governance bodies composed of one or more geographic communities of Aboriginal peoples known as reserves.

question of when to consider SGA treatment variables as exogenous.[2] To my knowledge, this is the first study to examine the determinants of First Nation SGAs within the economics literature.

Theorists have long debated the impacts of decentralization on the allocation of public goods (Musgrave 1959; Breton 2002; Besley and Coate 2003), governmental economies of scale (Oates 1972), public accountability and corruption (Seabright 1996; Bardhan and Mookherjee 2000), and the predatory state (Weingast 1995). Fittingly, empiricists have investigated the implications of decentralization theory by exploiting variation at both national and subnational scales (Wallis and Oates 1988; Panizza 1999; Strumpf and Oberholzer-Gee 2002; Arzhagi and Henderson 2005; Treisman 2006; Bodman and Hodge 2010).

A separate stream of empirical literature has exploited variation in decentralized governance to identify the causal impacts of decentralization on local government decision-making, fiscal matters, and social or economic outcomes (Strumpf and Oberholzer-Gee 2002; Faguet 2004; Galiani, Gertler, and Schargrodsky 2008). These studies are generally supported by claims or tests of exogeneity for key decentralization treatment instruments. However, the literature rarely explores the economic, demographic, education, geographic, and regional factors that drive regions or communities to adopt the locally-controlled fiscal and political systems that underlie these treatments.[3]

Many scholars identify Canada as a highly-decentralized country (Ebel 2006; Treisman 2006; Ahmad, Brosio, and Tanzi 2008; Jametti and Joanis 2014). As a mature federation, the country has displayed wide variation in political, policy, and fiscal decentralization across federal, provincial, territorial, regional, and municipal levels for over 150 years. However, this is contrasted by First Nations, which form some of Canada's least autonomous communities.

Prior to the last few decades, First Nations had no alternative other than to be governed under the federal *Indian Act*, a piece of legislation which constrains elections, property rights,

2. Each of Aragón (2015), Pendakur and Pendakur (2011), and Rice (2017b) use a difference-in-differences approach. In addition, each of these authors explore exogeneity within their specific contexts, specifically by testing common trends.

3. Strumpf and Oberholzer-Gee (2002) offers at least one exception.

agriculture, health, justice, taxation, and education, amongst other domains of governance.[4]

However, the constraints on First Nations began to shift with the rise of a self-government movement in the 1970s, along with important developments in Canadian jurisprudence (Aboriginal Affairs and Northern Development Canada 2015). Subsequent changes in federal government policy, including the recognition of self-government as an inherent Aboriginal right in 1993, formed the political and legal basis for the pursuit of self-government. Since that time, several self-government claims have been submitted and several SGAs have been negotiated and implemented. First Nations have exhibited wide variation across time and space in levels of decentralized governance, as a result.

First Nations in Canada make for an interesting case to study the determinants of governance decentralization for several reasons. For one, strict band membership codes largely preclude the interjurisdictional competition effects theorized by Tiebout (1956).[5] In other words, any decisions over decentralization claims or implementation do not require the consideration of future labour inflows. In addition, the wide geographic distribution of First Nations across Canada provides an opportunity to consider some of the subnational determinants of decentralized governance, which have received only a limited treatment in the economics literature (Arzhagi and Henderson 2005; Canavire-Bacarreza, Martinez-Vazquez, and Yedgenov, n.d.), such as social identity, language, and education attainment.

I built a custom panel of economic, demographic, education, geographic, and regional data on First Nations in Canada covering the period of 1986 to 2011 to perform the analysis. This panel is compiled from three different datasets. The first is composed of reserve-level socioeconomic data from the confidential long-form *Census of Canada* and *National Household Survey* (NHS) master files, with reserves being the geographic communities of First Nations. The socioeconomic data includes measures of employment, labour force participation, real income, age, Aboriginal language skills, *Indian* registration status, high school completion, and university-level or greater education. This dataset is linked to a dataset of

4. See Rice (2017b, 2017c) for additional details on the *Indian Act*.
5. Many important community services and rights are restricted to only band members.

reserve-level geographic factors, including land area, rural location, and province. Lastly, the socioeconomic and geographic data is linked to a dataset of SGAs by reserve, year of claim submission, and year of implementation, if applicable. The SGA dataset builds off the dataset used by Pendakur and Pendakur (forthcoming).

My results support the notion that we can treat SGA variables as exogenous, when controlling for reserve fixed effects. This is not an onerous condition to impose, as it is a common approach in the related literature (Aragón 2015; Pendakur and Pendakur, forthcoming; Rice 2017b). I do not find any factors of economic or statistical significance for claims for my richest and most-preferred specification, which includes controlling for reserve fixed effects. Contrary to the results for claims, I find that education and income are important factors for implementation, but only conditional on a reserve having previously made a claim. However, this significance disappears, once I relax this condition and compare the determinants of implementation against reserves that may or may not have made a claim.

This paper is organized as follows. The next section, section 2.2 describes the large literature on political decentralization and the small empirical literature on First Nation SGAs in Canada. Section 2.3 describes the history, nature, and types of SGAs in Canada. Section 2.4 describes the data used for the empirical analysis. Section 2.5 details the identification strategy. Section 2.6 presents and discusses the results. Lastly, section 2.7 concludes.

2.2 Related Literature

To my knowledge, the economic, demographic, education, geographic, and regional factors that drive First Nations to claim and implement SGAs have not been previously examined within the economics literature. However, an understanding of the potential dynamics can be obtained from disparate strands of prior inquiry. To get at this, I first provide a broad overview of the very large literature on decentralization theory (Tiebout 1956; Oates 1972; Weingast 1995; Seabright 1996; Bardhan and Mookherjee 2000; Lockwood 2002; Besley and

Coate 2003). Next, I turn to empirical findings of the literature exploring the determinants of decentralized governance and policy (Wallis and Oates 1988; Panizza 1999; Strumpf and Oberholzer-Gee 2002; Arzhagi and Henderson 2005; Treisman 2006; Bodman and Hodge 2010; Psycharis, Zoi, and Iliopoulou 2016; Canavire-Bacarreza, Martinez-Vazquez, and Yedgenov, n.d.). Lastly, I examine the small, but growing, literature related specifically to First Nation governance arrangements (Alcantara and Davidson 2015; Aragón 2015; Rice 2017b; Pendakur and Pendakur, forthcoming).

To begin, some clarification of the broad topic of decentralization is necessary, as it encompasses numerous subtopics. By decentralized governance, I am referring to the authority of subnational governments to develop local policy and to produce or allocate local public goods. Such authority may be granted or devolved by governments of a broader scale and scope, such as state, provincial, or national governments, or asserted through conflict.

Much of the early decentralization literature sought to understand the allocative efficiencies inherent in decentralized systems in terms of local public goods, given heterogeneous preferences. Tiebout (1956), for instance, posits that local governments may be Pareto optimal to central governments and private competitive markets in the provision of public goods and services. For Tiebout (1956) citizens solve the free-rider problem by moving to "that community whose local government best satisfy [their] set of preferences" (p. 418). Likewise, Oates (1972) suggests that an optimal allocation exists that weighs the benefits of a local provision of a public good against the costs generated by both a centralized and uniform provision of the same good, when in the presence of location externalities.

More recent analyses apply political economy approaches to the problem. At the same time, these later contributions discard some of the extreme assumptions of the early literature. Lockwood (2002) and Besley and Coate (2003), for instance, examine the costs of local preference mismatches by modelling the legislative behaviour of locally-elected representatives together with a relaxation of the unrealistic premise that central governments are incapable of tailoring policy to local contexts. Unsurprisingly, the optimality of decentrali-

zation no longer holds under all conditions.

The political economy approaches have further refined the theory by considering additional implications of decentralization, such as its effect on local accountability and corruption. Seabright (1996), finds that the accountability of governments to their citizens is not always guaranteed, when decentralized governance systems are modelled as incomplete contracts. Bardhan and Mookherjee (2000) suggest that decentralization risks the introduction of inefficiencies through regulatory capture by elites. Relatedly, Weingast (1995) argues that federalist systems provide the additional benefit of preserving markets through limits placed on government by a mix of both central and local structures.

Much of the literature on governance decentralization points to the fundamental need for local state capacity in order to adopt and administer self-governance. For examples, see Bardhan and Mookherjee (2000) and Bardhan (2002). Some recent literature puts this concern directly within the context of SGAs. For instance, Alcantara and Davidson (2015) and Pendakur and Pendakur (forthcoming) suggest the lack of institutional, negotiation, legal, political, and financial capacities as major hurdles in achieving self-governance.

Empiricists have fittingly tested the theoretical implications. Cross-country analyses provide somewhat mixed results. Using large samples, Panizza (1999), Arzhagi and Henderson (2005), Treisman (2006), and Bodman and Hodge (2010) observe positive relationships between income and decentralization across broad samples of countries. However, Bodman and Hodge (2010) find that the reverse holds for a restricted sample of lower- and medium-income countries. Likewise, the subnational analysis of Wallis and Oates (1988), which is based on a panel of state-local socioeconomic characteristics and expenditures, shows a slowing in the mid-1900's trend toward centralization in the United States as income grew.

Some empirical studies offer indirect support for the argument that decentralization should flourish under heterogeneous preferences. Oates (1972), Panizza (1999), and Bodman and Hodge (2010), for example, find a positive correlation between ethnic fractionalization, as a proxy for heterogeneous preferences, and decentralization. The subnational analysis

by Wallis and Oates (1988) relatedly suggests that centralization falls as urbanization rises. However, Treisman (2006) observes no correlation between ethnolinguistic divisions and decentralization. Strumpf and Oberholzer-Gee (2002), on the other hand, appear to be the first to test the link between *ex-ante* preference heterogeneity and policy formulation.

Several empirical studies examine geographic factors as determinants of decentralization. Panizza (1999) and Bodman and Hodge (2010), for instance, analyze national land area and population density in their studies of fiscal decentralization. Canavire-Bacarreza, Martinez-Vazquez, and Yedgenov (n.d.) build off that earlier work by investigating the influence of a richer set of country-wide geographic characteristics on fiscal decentralization.

However, Psycharis, Zoi, and Iliopoulou (2016) appear to be one of the only authors to study subnational geographic factors in relation to subnational decentralization. Their study, which focuses on the degree of fiscal decentralization across Greece, examines subnational physical landscapes (e.g., island, lowland, and mountainous regions) and population density, along with other labour-related, economic, and political factors, as determinants of municipal fiscal autonomy.

This paper secondarily relates to a small, but growing, literature on First Nation decentralization decisions. Recent empirical work by Aragón (2015) examines the income effects from the implementation of First Nation comprehensive land claims agreements (CLCA). Similarly, Pendakur and Pendakur (forthcoming) investigate the income effects from a broader set of First Nation governance arrangements. Lastly, Rice (2017b) explores the impact of education SGAs on education outcomes.[6]

Nonetheless, the previous literature appears to have left the choice to decentralize as only

6. Alcantara and Davidson (2015), though, use the experience of the Inuvialuit in the Northwest Territories as a case study for understanding the successful negotiation of SGAs in Canada. The Inuvialuit, an Inuit group located in the northwestern, Arctic region of the Northwest Territories, initiated self-government negotiations with the federal government in 1995, after having successfully negotiated a CLCA in 1984. However, a finalized SGA has yet to be completed, despite ongoing negotiations. Alcantara and Davidson (2015) suggest that several political and contextual factors have prevented progress from being made. Specifically, the authors argue that the prior settlement of a CLCA left the Inuvialuit without substantial bargaining power in the SGA negotiations. In addition, they suggest that an overlapping claim to self-government by the Gwich'in, along with the rise in authority and involvement of the territorial government and municipalities, stalled the negotiations.

lightly explored. This paper seeks to contribute to the discussion by examining the influence of economic, social, and political factors in determining whether or not to decentralize. I use the case of First Nations proceeding to claim and implement an SGA to accomplish this goal.

Taken together, the previous literature suggests that communities weigh several factors in choosing to decentralize. These factors include the mismatch of centrally-produced goods against local preferences, the increased costs of local production in the absence of scale economies, and the need for local state capacity. As such, we should see a tendency to decentralize the greater that local preferences differ from those of dominant groups, the greater is local income, and the greater is local education attainment.

In addition, the empirical literature on economic geography suggests that geographic factors are likely to be highly influential in determining the degree of decentralization for First Nations. Moreover, we can anticipate the relevance of geographic factors to be particularly relevant in the case of First Nation self-governance, given the distribution of reserves both across and within the Canadian provinces and territories.

2.3 Self-Government Policy

2.3.1 Self-Government Agreements

This paper focuses on SGAs that reassert a First Nation's control and responsibility over their own affairs. There are three types of SGA, including sectoral SGAs (SECTSGA), multi-sectoral SGAs (MULTSGA), and MULTSGAs negotiated together with a CLCAs.[7] These SGAs establish ongoing institutional arrangements for local decision-making, law, and policy over single or multiple sectors of governance. These sectors include, but are

7. CLCAs are legal agreements that reassert a First Nation's title to land. CLCAs occur only in areas of the country not previously bound by historic land-surrender treaties, which include the provinces of Newfoundland and Labrador, Quebec, and British Columbia, along with the Northwest Territories and Yukon.

not limited to, elections, property rights, land rights, natural resources, agriculture, health, justice, taxation, and education. I do not consider SGAs that involve the delegation of authority from the federal government or from provincial governments.

The *Mi'kmaq Education Agreement* of 1999 is the only SECTSGA that was implemented within the study period. This tripartite arrangement between the federal government, the Government of Nova Scotia, and several First Nation councils established local control over primary and secondary education, in addition to an enhanced funding envelope for training, operations, and capital expenditures. The signatory First Nations implemented a local education authority to develop and deliver culturally-relevant curriculum. The agreement initially covered 16 reserves. Another three joined in 2005.

The *Westbank First Nation Self-Government Agreement*, which was implemented in British Columbia in 2005, was the only MULTSGA within the study period.[8] This agreement established self-governance over education, economic development, social development, and housing for the Okanagan Syilx people of the Westbank First Nation (Aboriginal Affairs and Northern Development Canada 2015).

Several CLCASGAs were negotiated in British Columbia, the Northwest Territories, and Yukon throughout the study period. For instance, beyond the establishment of multi-sectoral self-governance, the *Tlicho Agreement* of 2005 additionally transferred approximately 39,000 square kilometers of land title to four First Nations in the Northwest Territories (Aboriginal Affairs and Northern Development Canada 2015).

8. The first MULTSGA was negotiated in 1986 by the Sechelt Indian Band in British Columbia. It enabled the Sechelt Band to opt-out of many sections of the *Indian Act* and establish laws in the areas of education, private property rights, land use, building codes, taxation, social assistance, child welfare, health services, road maintenance, and policing. In addition, Sechelt's reserve land was transferred to the band in freehold. It did not involve a CLCA.

2.3.2 Historical Developments and the Development of Federal Self-Government Negotiation Policy

Aside from providing a description of the rise of the self-government movement and a description of the policy environment, the following discussion is useful in tackling concerns over endogeneity and self-selection into treatment. Certainly, First Nations were largely restricted from implementing self-government in the early years of the study period. Nevertheless, a subsequent recognition of the inherent right to self-government did not allow First Nations to implement self-government unilaterally. Specifically, many stages of the process require collaboration with the federal government, and possibly provincial or territorial governments, especially as negotiations proceed toward implementation.

The reassertion of self-governance is a relatively recent development within the relationship of First Nations with other governments in Canada. Up until the latter half of the twentieth century, First Nation governments possessed very limited local control under the authority of the centrally-administered and highly-paternalistic *Indian Act*.

The balance began to shift in the late 1960s. At that time, a broad-based Aboriginal sovereignty movement formed in response to the introduction of federal policy aimed at imposing private property rights within First Nations and transferring responsibilities over Aboriginal affairs to the provincial governments (Indian Affairs and Northern Development 1969). The movement grew further still, when land claim negotiations intensified in the wake of a Supreme Court of Canada ruling in 1973. This ruling established Aboriginal title to land that is rooted in historic "occupation, possession and use" and independent of any legislation, treaty, or proclamation.[9] Soon after, the vague, but important, notion of Aboriginal rights became established in Canadian law through the enactment of the *Constitution Act* of 1982.[10]

The formulation of federal self-government policy lagged behind these developments. The first attempt at policy formulation did not occur until after the release of the recommenda-

9. See *Calder et al. v. Attorney-General of British Columbia* (1973).

10. The scope and content of these rights were left absent from the constitution, despite their recognition and affirmation.

tions of the *Special Committee on Indian Self-Government* in 1983 (*Indian Self-Government in Canada* 1983). As a result of what came to be known as the Penner Report, the federal government adopted a new community-oriented self-government negotiation policy in 1985 (Wherrett 1999).

Although one agreement was implemented soon afterward, being the *Sechelt Indian Band Self-Government Agreement* of 1986, many First Nation proponents demanded more from the federal policy. The main concern centered on the fact that the policy constrained the federal government to offer only delegated authorities that did not fall under the constitutional protection of Aboriginal rights (Indian and Northern Affairs Canada 2011).

Debate over the definition of Aboriginal rights continued to simmer throughout the late 1980s and early 1990s with little change in legislation or policy. However, the legal track showed incremental progress. Key Supreme Court of Canada decisions, including *R. v. Sparrow* (1990) laid the basis for clarifying the scope and content of Aboriginal rights, especially in reference to the inherent right to self-government.

The major shift in the political and legal landscape, though, came with the election of a Liberal government in 1993. Upon forming government, the Chrétien Liberals made good on their campaign promise to recognize the inherent right of self-government protected by the constitution (Indian and Northern Affairs Canada 1995). Several First Nations seized upon the opportunity to initiate self-government claims.

The recognition of the inherent right to self-government was subsequently expanded upon and formalized in federal self-government negotiation policy in 1995, at the conclusion of a two-year consultation process (Indian and Northern Affairs Canada 1995). The implementation of this policy met the conditions that many First Nations had sought, and has remained in place to the present day (Aboriginal Affairs and Northern Development Canada 2010). Numerous self-government claims were initiated and implemented throughout the study period, as a result.

The path toward self-government is quite flexible. Nonetheless, there are some com-

mon conditions that must be met and some important milestones that must be passed for negotiation to proceed to implementation.

The federal government only accepts submissions of claim intent from duly-mandated Aboriginal representatives (Indian and Northern Affairs Canada 1995; Aboriginal Affairs and Northern Development Canada 2010). For the purposes of this paper, representation should be understand as a mandate of First Nation, nation, or tribal officials.

In addition, the federal government strongly encourages tripartite negotiations between Aboriginal representatives, the federal government, and the relevant provincial or territorial government(s). Some provinces have well-defined self-government negotiation processes, which were established largely in response to numerous land claims and treaty disputes. For instance, British Columbia formalized its self-government and land claims policy through the implementation of the *British Columbia Treaty Commission* in 1993 (British Columbia 1994).

Each self-government negotiation flows through six stages beginning with the submission of claim and ending in implementation. Within the intervening period, the claim is assessed, a framework agreement is negotiated to establish scope, an agreement-in-principle is negotiated to establish content, and a final agreement is ratified. The entire process, or any one stage, could last several years depending on the legal and political complexity of the negotiations and the number of parties involved, e.g., federal and provincial governments, departments, and ministries. In addition, in order to proceed toward implementation both agreements-in-principle and final agreements require federal cabinet approval, while enabling legislation requires parliamentary or legislative approval.

2.4 Data

The analysis relies on three main datasets. The first, which I refer to as the agreements dataset, is a listing of years that SGAs were claimed or implemented, if applicable, by First

Nation. This dataset is based on a broader set of First Nation governance arrangements compiled by Pendakur and Pendakur (forthcoming) in conjunction with the Program Evaluation Branch of Aboriginal Affairs and Northern Development Canada. However, the agreements dataset is restricted to only CLCASGAs, MULTSGAs, and SECTSGAs that were claimed or implemented between 1989 and 2011.[11]

Table 2.1 lists SGAs by type, year of claim submission, year of implementation, if applicable, and number of populated reserves. This table reveals that several SGAs were submitted but not implemented by 2011.[12] Table 2.1 additionally reveals that there is great variation in SGA claim submission and implementation within the study period and across the country.

The table additionally reveals that several SGAs were claimed, but only one was implemented, before the federal government formally recognized the inherent right to self-government in 1995 (Indian and Northern Affairs Canada 1995).[13] Several other SGAs were claimed soon after the policy change, while others were claimed much later in the study period.

For those SGAs that were implemented by 2011, the span between claim and implementation ranged from as little as two years to as long as 23 years. The span irregularity applies even to those SGAs in the Yukon that were claimed together under an umbrella framework agreement in 1993.

Each First Nation in the agreements dataset is identified by a unique band number, which is assigned by Indigenous and Northern Affairs Canada (INAC). These band numbers serve useful for links to the other datasets.

The second dataset, which I use to aggregate a large number of rich micro-level observations at the reserve level, is based on a pooling of the 1986 to 2006 confidential census master

11. The lower year limit excludes two SGAs that were implemented in the province of Quebec in 1975 and an SGA that was implemented in British Columbia in 1986. The broader dataset of Pendakur and Pendakur (forthcoming) includes governance arrangements that involve delegated powers, which are not self-determined by the First Nation.

12. Table 2.1 does not reference the Inuvialuit SGA, as the Inuvialuit are an Inuit group and not a First Nation.

13. See section 2.3.2.

files and the 2011 confidential NHS master file. The earliest year in this range precedes the majority of SGA claim and implementation years, while 2011 provides the latest confidential microdata in the series.

For each census, Statistics Canada mandatorily survey 20 per cent of private households in Canada using a long-form questionnaire. However, Statistics Canada mandatorily surveyed on-reserve households at a rate of 100 per cent. On-reserve response rates for the NHS did not grow as dramatically as one would expect, despite the NHS's voluntary design (Penney 2013).[14]

Statistics Canada assigns each populated reserve with a unique census subdivision (CSD) code in each census and NHS year. CSDs are defined as municipalities, as designated by provincial governments, or their equivalent.[15] Statistics Canada additionally assigns each CSD a type, which provides a simple means of restricting the dataset to reserves alone.[16]

I use a set of measures based on the pooled census/NHS data to yield a rich set of reserve-level demographic, economic, and social characteristics. These include averages or proportions of real income, labour force participation, employment, high school completion, university or greater education, Aboriginal identity, Indian registration, age, allophones, and females.[17]

14. See Rice (2017c) for a description of the on-reserve administration of the long-form questionnaire, as well as a description of census and NHS caveats.

15. CSD codes were concorded to 2011 CSD codes across each census and NHS year in order to accommodate changes in CSD codes and geographic boundaries over time. Geographic boundaries change, as a result of CSD dissolutions and incorporations.

16. Statistics Canada treats the following CSD types as reserves: Indian reserves, Indian settlements, Indian government districts, Nisga'a lands, Self-government, Terres rserves aux Cris, Terres rserves aux Naskapis, Teslin lands, Village cri, and Village naskapi. A small number of other CSDs were additionally identified as reserves, as they are administered, but not coded, as such. INAC works closely with Statistics Canada to ensure that the 'on-reserve' population is properly identified (Statistics Canada 2003, 2010a, 2010b). When concording CSD identifiers, I used CSD types to ensure that no reserve CSDs were concorded back to non-reserve CSDs, especially as this would be a concern in cases where reserves incorporated new reserve lands. Restricting the sample to reserves alone additionally serves to drop all observations in Nunavut from the dataset, as no reserves are located in that region of the country.

17. All of the socioeconomic measures, with the exception of income, are observed as of the census day. Income, on the other hand, is based on the full calendar year prior to the census day. This is commonly accepted in lieu of contemporaneous measure for income by those who work with census/NHS data. I calculate the labour force participation rate in the same manner as Statistics Canada by dividing the number of individuals within the reserve that were active in the labour force in the reference week by the population that is 15 years or older. Similarly, I calculate the employment rate by dividing the number of individuals

I further supplement the aggregated census data with two Statistics Canada geographic datasets and an INAC dataset. Statistics Canada's Geosuite 2006 (Statistics Canada 2007b) and Geosuite 2011 (Statistics Canada 2012) datasets associate geographic characteristics with each reserve CSD, including land area in square kilometres. INAC's First Nations Profiles dataset (Indigenous and Northern Affairs Canada 2017) associates each reserve CSD with a band number.[18]

Ultimately, I link all datasets by either reserve CSD or band number. This yields a combined dataset with a rich set reserve-level economic, demographic, education, geographic, and regional characteristics, along with information on SGA type, year of claim submission, and year of implementation, if applicable, for each census/NHS year between 1986 and 2011,

2.5 Identification Strategy

Taking a step back from the data, I consider the following stylized facts. First, all implemented SGAs required a preceding claim. Second, some communities implemented SGAs soon after submitting a claim, while others took several years to reach implementation, or had yet to reach implementation by 2011. On the surface, this suggests that the factors that drive the claims process likely differ from those that drive implementation.

The related literature and policy environment support this notion. As described in section 2.2, the burden placed on state capacity is considerably less in claiming self-government than it is in reaching implementation. This is due in part to the policy environment, where First Nations need only file a claim with the federal government, but must negotiate with several levels of government before implementation can occur.

Geographic or regional factors likely play an additional role, and not only because some governments differ by province. For instance, the negotiation of SGAs together with modern treaties, or CLCAs, crucially depends on the existence of pre-existing historic treaties, and

within the reserve that were employed in the reference week by the population that is 15 years or older.

18. Recall that each First Nation contains one or more reserves.

these are not evenly distributed across the country or within the provinces or territories.

As a result of these considerations, I proceed in several stages to identify the determinants of SGAs. I first consider the claims process, and then consider the implementation process. However, I additionally consider the influence of several other factors within each stage.

2.5.1 Claims

For claims, my first approach asks the question: What are the important differences, *ex-ante*, in characteristics between reserves that do and do not claim an SGA? Such a model could be based on the following cross-sectional linear probability population regression model:

$$Pr(Claim_j = 1|\cdot) = \alpha_0 + W_{j91}\alpha_1 + X_j\alpha_2 \tag{2.1}$$

where $Claim_j$ is equal to 1 if reserve j ever submitted a claim in the period from 1992 to 2011, inclusively. Reserves that never submit an SGA claim during the period are denoted by $Claim_j$ equal to 0.

W_{j91} is a vector of time-varying reserve characteristics, including proportions for registration status, allophones, females, high school completion, university-level education, employment, and labour force participation, along with average age, and the log of average real individual income. These characteristics are measured in 1991, which is the first census year prior to the change in the federal self-government policy. X_j is a vector of time-invariant reserve characteristics, including a measure of remoteness and province fixed effects.[19] Lastly, α_1 and α_2 are the parameters of interest, as they capture the effects of W_{j91} and X_j, respectively.[20]

This model requires the construction of a sample that excludes observations for reserves with a claim on or before 1991. The intention is to eliminate the risk of identifying reverse

19. I use a dummy equal to 1 for rural CSDs, which is otherwise 0, as my measure of remoteness.

20. The model assumes that the error term, which is not shown, is normally distributed, with mean 0, and independent of the explanatory variables.

causality between a claim and reserve-level socioeconomic conditions included in W_{j91}. For example, if skilled labour flows into a community in order to expand state capacity for self-governance, then local education attainment could rise, all else being equal.[21]

However, one concern with the cross-sectional approach is that it may not be as informative of claims submitted in later periods. For instance, reserve characteristics from 1991 might be relevant in determining claims submitted in the early 1990s, but not in the 2000s. To overcome this concern, I consider a finite distributed lag model, which uses characteristics from the most recent prior period. Here, the determinants of a claim are based on the following linear probability population regression equation:

$$Pr(Claim_{jt} = 1|\cdot) = \beta_0 + W_{jt-1}\beta_1 + X_j\beta_2 + \rho_t \tag{2.2}$$

where $Claim_{jt}$ is equal to 1 if reserve j submits a claim strictly after period $t-1$ and up to period t, inclusively, and 0 otherwise. W_{jt-1} contains the same time-varying characteristics as in W_{j91} from equation (2.1), but measured in the period immediately prior to t.[22] X_j follows from equation (2.1). The model additionally includes time fixed effects, denoted by ρ_t.

This model requires the construction of a sample that excludes observations for reserves in the periods following a claim. This is meant to mitigate concerns of reverse causality, as discussed previously.

One critique is that equation (2.2) may not adequately capture the influence of state capacity. The approach may suffer from omitted variable bias, as a result. To overcome this, I consider a model with reserve fixed effects. This approach has the additional benefit of matching related literature in the field. For instance, Aragón (2015), Pendakur and Pendakur (forthcoming), and Rice (2017b) all use this approach. Of course, one trade-off to

21. Of course, state capacity expansion may not necessarily lead to a rise in education attainment, nor is it the only means for such a rise to occur.

22. Alternatively, one could include other lagged terms.

using reserve fixed effects is that I am no longer able to consider the differential influence of time-invariant characteristics.

2.5.2 Implementation Conditional on a Claim

The first approach for implementation considers a model conditional upon having previously made a claim in the most recent prior period. This model uses an unbalanced panel based on the following linear probability population regression equation:

$$Pr(SGA_{jt} = 1|Claim_{jt-1} = 1, \cdot) = \gamma_0 + W_{jt-1}\gamma_1 + X_j\gamma_2 + \rho_t \tag{2.3}$$

where SGA_{jt} is equal to 1 if reserve j implemented an SGA by period t, and 0 otherwise. W_{jt-1}, X_j, and ρ_t follow from above.[23]

This model requires the construction of a sample that excludes observations for reserves until they make a claim in order to address the conditionality restriction. It additionally requires a sample that excludes observations for reserves in all periods following the implementation of an SGA in order to mitigate concerns about reverse causality, as discussed previously.

One concern here is that this approach is most informative of First Nations that proceed quickly from claims to implementation. As a result, it may not capture barriers that prolong implementation.

23. One alternative to equation (2.3) would be to consider additional lags, as in:

$$Pr(SGA_{jt} = 1|Claim_{jt-1} = 1, \cdot) = \phi_0 + \sum_{k=1}^{K} W_{jt-k}\phi_1 + X_j\phi_2 + \rho_t$$

where K specifies the number of lagged periods.

2.5.3 Implementation Without Conditioning on Claims

The second approach for implementation derives from the following linear probability population regression equation:

$$Pr(SGA_{jt} = 1|\cdot) = \phi_0 + W_{jt-1}\phi_1 + X_j\phi_2 + \rho_t \tag{2.4}$$

where, again, SGA_{jt} is equal to 1 if reserve j implemented an SGA by period t, and 0 otherwise. Again, W_{jt-1}, X_j, and ρ_t follow from above.

This second model for implementation offers some very useful features. For one, it overcomes some of the concerns raised about equation (2.3), in that it allows me to look at the full sample of communities transitioning from claim to implementation. In this way, I suggest that this model examines the full joint probability of claiming and implementing an SGA. Correspondingly, the approach allows for comparison with equation (2.2), as the sample is more closely matched.

Lastly, and most importantly, this approach relates directly to how other researchers, such as Aragón (2015), Pendakur and Pendakur (forthcoming), and Rice (2017b), handle SGA treatment variables within their econometric specifications. As such, this model helps answer the primary research question of when to consider SGA treatment variables as exogenous.

2.6 Results

Recall from the concluding discussion on related literature that I intuitively expect SGAs to prosper where local preferences differ strongly from the mainstream and where incomes and state capacity are sufficient to fund and administer the local production of public goods. Several local factors could act as a proxy for preference heterogeneity, including social identity, language, education attainment, and rurality. Similarly, several factors influence local income, including labour force participation and employment. Lastly, education attainment

and other reserve-level factors proxy for state capacity.

2.6.1 SGA Claim Submission

Recall that the analysis of claims is undertaken in order to identify important factors at different stages along the SGA process. Table 2.2 presents the results from the estimation of equation (2.1) with controls observed in 1991. For this and all other results tables, column (1) displays coefficient estimates from a parsimonious specification, which includes only demographic controls. Columns (2), (3), and (4), respectively, display the results from the sequential and cumulative addition of education, economic, geographic, and regional controls.

The results in columns (1) through (3) suggest that local demographic and education characteristics, such registration status, gender, and high school completion, are economically and statistically important. However, significance for these variables disappear once I add geographic (i.e., log of area and a dummy for rural CSDs) and regional characteristics (i.e., province fixed effects) to the specification in column (4).

Allophone is one demographic exception. For the richest specification, which includes geographic and regional controls, a 10 percentage point increase in the presence of allophones relates to a 4.27 percentage point decrease in the likelihood of a reserve making a claim for an SGA. This effect is economically and statistically significant.

Economic characteristics appear to matter both individually and jointly, as well. Increased income leads to a significantly greater likelihood of making a claim. Looking beyond income, the results for labour-related controls appear to match the *a priori* assumption that reserves with poorer employment conditions will seek out self-government arrangements. A 10 percentage point increase in employment leads to a 3.0 percentage point decrease in claims, while a 10 percentage point increase in labour force participation leads to a 2.0 percentage point increase in claims. However, these results are not jointly significant.

These labour-related estimates are consistent with each other, despite being opposite in

sign. Any increase in employment must come from the existing labour force because labour force participation is held constant in the model. Correspondingly, any increase in labour force participation must come from an increase in those looking for work.[24]

Additionally, geographic and regional characteristics are both individually and broadly influential on the results.[25] Log of area is statistically, although not economically, significant. Although, economically large, being a rural reserve is not statistically significant. However, province fixed effects are both individually and jointly significant. For example, reserves located in Nova Scotia have over a 50 percentage point greater likelihood of making a claim.

One challenge to the cross-sectional results, as previously suggested in section 2.5, is that the use of controls observed in 1991 may not be as informative of determinants of claims submitted later in the study period. Recall that the identification strategy suggests a panel approach to overcome this challenge.

Table 2.3 displays the results for claim submission from the estimation of equation (2.2), which is based on a panel approach. With two exceptions, the same column structure applies, as in table 2.2. First, I add year fixed effects to all specifications. Second, I add a fifth specification that includes reserve fixed effects, instead of other time-invariant reserve characteristics, such as area, rural CSD, and province.[26]

The same socio-demographic characteristics remain statistically significant in the parsimonious specifications, as compared to table 2.2, but they lose their economic significance.[27] These characteristics include registered, gender, and high school completion.

Likewise, I see a similar pattern with the previous results in column (4), when geographic and regional controls are added to the specification. Allophones and income continue to be statistically significant, although with smaller magnitudes than those found in the cross-

24. Recall that the employment rate is measured by taking the proportion of the population 15 years or older that is employed. The labour force participation rate is measured by taking the proportion of the same population that is employed or actively seeking work.

25. I additionally estimate separate specifications that controlled for latitude and longitude, instead of rural. This change had little effect on the overall flavour of the results.

26. I could not include reserve fixed effects in table 2.2, as this adopted a cross-sectional approach.

27. For example, the coefficient estimate for female decreased from 0.441 to 0.084.

sectional results. However, the corresponding labour market effects lose both economic and statistical significance.

The results in column (5) are most important. Taken together, these results strongly indicate that idiosyncratic features at the reserve level drive claims. No characteristics are statistically significant, as compared with column (4), once I include reserve fixed effects in the specification. Recall that I take this approach in order to deal with concerns for omitted variable bias, potentially arising from an inadequate proxying for state capacity in column (4).

2.6.2 SGA Implementation Conditional on Claim Submission

Next, I consider the results for implementation conditional on claim submission in the most-recent prior period. This is a first step in detecting differences in reserves that move quickly to implementation after a claim from those reserves that take longer periods of time. Table 2.4 presents the results from the estimation of equation (2.3), which models this approach. The same column structure applies, as in table 2.3.

Contrary to the results for claims, I find two important determinants of implementation for the richest specification with reserve fixed effects. Specifically, I find that a 10 percentage point increase in high school completion leads to a 4.85 percentage point increase in implementation, but a 10 per cent increase in income leads to a 2.22 percentage point decrease in implementation. High school completion is statistically significant at the 1 per cent level, while income is significant at only the 10 per cent level. These were neither economically nor statistically significant in the corresponding specifications of the previous two sets of results for claims.

On a surface level these results suggest that education, or capacity, is very important in overcoming the burden of implementation. At the same time, it is possible that higher levels of income might act as a disincentive to implementation. That is, there is less of a need for self-governance, as some local economic conditions improve.

Next, I turn to a model that allows me to consider differences in all reserves in my sample. This is without concern for the speed at which a reserve moves from claim to implementation, unlike equation (2.3).

2.6.3 Implementation Without Conditioning on Claims

Table 2.5 displays the results from the estimation of equation (2.4), which does not condition for a claim in the most-recent prior period. This model has the advantage of incorporating a larger sample than in the case of equation (2.3).

What appeared to be important for one step in the process no longer seems to matter, after considering all steps involved. High school completion and income are now economically and statistically insignificant, once I no longer condition on a reserve having a claim. This is in contrast to table 2.4. Such a finding is not surprising when factoring in the average length of time it takes to progress to a claim and then to implementation.

I recognize that two factors are statistically significant. Specifically, the proportion of allophones is significant at the 5 per cent level, while labour force participation is significant at only the 10 per cent level. Regardless, neither of these effects are economically significant.

2.6.4 Robustness Checks

Province fixed effects are the primary driver of the differences between the estimates in column (4) and the estimates in columns (1) through (3) of the main results tables. This likely relates to the substantial variation in historic treaty implementation and institutional arrangement across provinces.

I base this conclusion on results from alternate specifications of equations (2.1), (2.2), (2.3), and (2.4) with varying combinations of log of area, a dummy for rural CSDs, and province fixed effects. These are not shown. Generally, the results for specifications with geographic controls but without province fixed effects mirror columns (1) through (3) of

tables 2.2, 2.3, 2.4, and 2.5.[28]

2.7 Concluding Remarks

This paper examines the factors that drive communities to adopt decentralized governance by using the case of First Nation SGAs in Canada. Specifically, the paper investigates the determinants underlying the claim submission and implementation processes for SGAs. My results indicate that varying combinations of economic, demographic, education, geographic, and regional factors, although with some overlap, are at play in each process.

Most importantly, my results support the notion that we can treat SGA variables as exogenous, when controlling for reserve fixed effects. This is not an onerous condition to impose, as is shown in the related literature (Aragón 2015; Pendakur and Pendakur, forthcoming; Rice 2017b). Specifically, I do not find any factors of economic or statistical significance for claims for my richest and most-preferred specification, which includes controlling for reserve fixed effects. Contrary to the results for claims, I find that education and income are important factors for implementation, but only conditional on a reserve having previously made a claim. However, this significance disappears, once I relax this condition and compare the determinants of implementation against reserves that may or may not have made a claim.

28. As an additional robustness check, I re-estimated equations (2.2), (2.3), and (2.4) with reserve fixed effects for both parsimonious and richer specifications. Clearly, reserve fixed effects drive the results in column (4).

Table 2.1: SGAs by Province/Territory and Year of Implementation, 1986 to 2011

Type	Agreement Name, Prov/Terr	Year of Claim Submission	Year of Implementation	Number of Reserves (as of 2011)
CLCASGA	Nisga'a, BC	1989	2000	1
	Innu, NL	1991	—	2
	Champagne and Aishihik, YK	1993	1995	4
	Teslin Tlingit, YK	1993	1995	3
	Nacho Nyak Dun, YK	1993	1995	1
	Vuntut Gwitch'in, YK	1993	1995	1
	Little Salmon/Carmacks, YK	1993	1997	1
	Selkirk, YK	1993	1997	1
	Tr'Ondek Hwech'In, YK	1993	1998	1
	Ta'an Kwach'an, YK	1993	2002	1
	Kluane, YK	1993	2004	1
	Carcross Tagish, YK	1993	2005	3
	Tlicho, NT	1996	2005	4
	Tsawwassen, BC	1997	2009	1
MULTSGA	Meadow Lake, SK	1991	—	16
	Sioux Valley Dakota, MB	1991	2014	1
	Anishinawbek, ON	1995	—	42
	Maa-Nulth, BC	1996	2011	9
	Deline-Sahtu, NT	1996	—	1
	Gwich'in, NT	1996	—	4
	Westbank, BC	1996	2005	2
	Yale, BC	1997	—	4
	Akwesasne, ON & QC	1999	—	1
	Mamuitun Mak Nutashkuan, QC	2000	—	7
	Mi'kmaq & Maliseet, NB & NS	2000	—	34
	Mi'kmaq & Maliseet, PE & QC	2003	—	5
	Aitkamekw Tribal, QC	2003	—	3
	Blood, AB	2003	—	2
	Mi'kmaq & Maliseet, PE & QC	2003	—	5
	Miawpukek, NL	2004	—	1
	Cree, QC	2008	—	9
	Whitecap Dakota, SK	2009	—	1
SECTSGA	Mi'kmaq Education, NS	1992	1999	16
	Mi'kmaq Education, NS	1992	2005	3
	Fort Frances Tribal, ON	1995	—	14
	Blood, AB	2000	—	2

Notes: Year of implementation matches the year that a final SGA agreement was reached.
Source: Pendakur and Pendakur (forthcoming).

Table 2.2: SGA Claim Submission — Linear Probability Models Conditional on 1991 Characteristics

	(1)	(2)	(3)	(4)
Registered	-0.218	-0.156	-0.065	-0.103
	(0.114)*	(0.114)	(0.118)	(0.090)
Age	-0.000	0.000	-0.002	-0.003
	(0.002)	(0.002)	(0.002)	(0.002)
Allophone	-0.127	0.101	0.104	-0.427
	(0.244)	(0.269)	(0.269)	(0.238)*
Female	0.441	0.439	0.434	0.052
	(0.150)***	(0.152)***	(0.142)***	(0.099)
High School Completion		0.193	0.137	-0.072
		(0.081)**	(0.094)	(0.071)
BA or greater		0.049	0.045	0.025
		(0.299)	(0.270)	(0.147)
Log of Average Real Total Income			0.157	0.107
			(0.046)***	(0.039)***
Employment			-0.185	-0.299
			(0.181)	(0.146)**
Labour Force Participation			-0.011	0.211
			(0.148)	(0.111)*
Log of Area				-0.018
				(0.007)**
Rural				0.168
				(0.181)
F-statistic Education		3.068	1.174	0.522
p-value		0.0473	0.310	0.594
F-statistic Labour			1.314	2.158
p-value			0.270	0.117
F-statistic Province Fixed Effects				237.9
p-value				6.52e-189
Observations	555	555	555	555

Notes: The dependent variable is equal to 1 if a reserve submitted an SGA claim between 1992 and 2011, inclusively, and 0 otherwise. The sample includes populated reserves in any province or territory, except Nunavut. Demographic controls include proportions for registration status, allophones, and females, along with average age. Education controls include proportions of the adult population for high school completion and university-level education. Economic controls include proportions of the adult population that is employed and that is participating in the labour force, along with the log of average real total income. Geographic and regional controls include log of area, a dummy for rural CSDs, and dummies for provinces. All frequencies are rounded to the nearest multiple of five. Robust standard errors in parentheses. $*p < 0.10$, $**p < 0.05$, $***p < 0.01$.

Table 2.3: SGA Claim Submission — Linear Probability Models Conditional on Characteristics in Most-Recent Prior Period — Panel — 1991 to 2011

	(1)	(2)	(3)	(4)	(5)
Registered	-0.060	-0.041	-0.025	-0.000	0.004
	(0.028)**	(0.028)	(0.029)	(0.025)	(0.018)
Age	-0.000	-0.000	-0.001	-0.000	-0.001
	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)
Allophone	-0.068	0.023	0.016	-0.232	-0.020
	(0.093)	(0.098)	(0.097)	(0.091)**	(0.121)
Female	0.084	0.096	0.094	0.033	-0.001
	(0.037)**	(0.038)**	(0.037)**	(0.031)	(0.026)
High School Completion		0.066	0.059	0.016	-0.001
		(0.020)***	(0.022)***	(0.018)	(0.017)
BA or Greater		-0.000	-0.002	0.028	0.040
		(0.043)	(0.043)	(0.034)	(0.044)
Log of Average Real Total Income			0.032	0.019	0.002
			(0.012)***	(0.010)**	(0.008)
Employment			-0.067	-0.044	0.024
			(0.049)	(0.042)	(0.028)
Labour Force Participation			0.019	0.007	-0.010
			(0.043)	(0.038)	(0.023)
Log of Area				-0.004	
				(0.002)*	
Rural				-0.013	
				(0.011)	
F-statistic Education		5.662	3.790	0.960	0.423
p-value		0.00352	0.0227	0.383	0.655
F-statistic Labour			1.606	1.304	0.349
p-value			0.201	0.272	0.706
F-statistic Year	30.29	30.69	30.15	11.79	11.01
p-value	3.21e-19	1.81e-19	3.90e-19	0.000000115	0.000000373
F-statistic Province Fixed Effects				577.2	
p-value				0	
Observations	2,445	2,445	2,445	2,445	2,445

Notes: The dependent variable is equal to 1 if a reserve submitted an SGA claim between 1992 and 2011, inclusively, and 0 otherwise. The sample includes populated reserves in any province or territory, except Nunavut. Demographic controls include proportions for registration status, allophones, and females, along with average age. Education controls include proportions of the adult population for high school completion and university-level education. Economic controls include proportions of the adult population that is employed and that is participating in the labour force, along with the log of average real total income. Geographic and regional controls include log of area, a dummy for rural CSDs, and dummies for provinces. All specifications include year fixed effects. All frequencies are rounded to the nearest multiple of five. Robust standard errors in parentheses. *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.

Table 2.4: SGA Implementation — Linear Probability Models Conditional on Claim Submission and Characteristics in Most-Recent Prior Period — Panel — 1991 to 2011

	(1)	(2)	(3)	(4)	(5)
Registered	-0.293	-0.255	-0.329	-0.056	-0.440
	(0.162)*	(0.166)	(0.165)**	(0.155)	(0.479)
Age	-0.002	-0.001	0.005	-0.003	0.010
	(0.003)	(0.003)	(0.004)	(0.004)	(0.011)
Allophone	-0.255	-0.198	-0.036	0.325	0.341
	(0.131)*	(0.196)	(0.211)	(0.161)**	(0.300)
Female	0.060	0.041	-0.041	0.184	0.138
	(0.350)	(0.353)	(0.336)	(0.297)	(0.428)
High School Completion		0.035	0.133	0.147	0.485
		(0.084)	(0.124)	(0.111)	(0.216)**
BA or Greater		0.366	0.659	0.363	-0.092
		(0.485)	(0.513)	(0.484)	(0.576)
Log of Average Real Total Income			-0.182	-0.067	-0.222
			(0.094)*	(0.078)	(0.131)*
Employment			-0.362	-0.070	0.062
			(0.283)	(0.246)	(0.401)
Labour Force Participation			0.377	0.110	0.001
			(0.240)	(0.216)	(0.387)
Log of Area				0.008	
				(0.006)	
Rural				0.034	
				(0.040)	
F-statistic Education		0.494	1.479	1.219	2.554
p-value		0.611	0.229	0.297	0.0811
F-statistic Labour			1.232	0.144	0.0510
p-value			0.293	0.866	0.950
F-statistic Year	3.259	2.816	3.389	0.298	1.734
p-value	0.0219	0.0394	0.0185	0.827	0.162
F-statistic Province Fixed Effects				7.033	
p-value				7.37e-10	
Observations	305	305	305	305	305

Notes: The dependent variable is equal to 1 if a reserve implemented an SGA between 1995 and 2011, inclusively, and 0 otherwise. The sample includes populated reserves in any province or territory, except Nunavut. Demographic controls include proportions for registration status, allophones, and females, along with average age. Education controls include proportions of the adult population for high school completion and university-level education. Economic controls include proportions of the adult population that is employed and that is participating in the labour force, along with the log of average real total income. Geographic and regional controls include log of area, a dummy for rural CSDs, and dummies for provinces. All specifications include year fixed effects. All frequencies are rounded to the nearest multiple of five. Robust standard errors in parentheses. *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.

Table 2.5: SGA Implementation — Linear Probability Models Conditional on Characteristics in Most-Recent Prior Period — Panel — 1991 to 2011

	(1)	(2)	(3)	(4)	(5)
Registered	-0.054	-0.048	-0.051	-0.016	0.003
	(0.020)***	(0.020)**	(0.020)**	(0.017)	(0.020)
Age	-0.000	-0.000	-0.000	-0.000	0.000
	(0.000)*	(0.000)	(0.000)	(0.000)	(0.000)
Allophone	-0.047	-0.025	-0.016	0.027	0.058
	(0.015)***	(0.016)	(0.016)	(0.014)*	(0.030)**
Female	0.005	0.007	0.009	0.000	0.021
	(0.014)	(0.014)	(0.014)	(0.013)	(0.018)
High School Completion		0.016	0.015	-0.002	0.016
		(0.008)**	(0.009)	(0.008)	(0.016)
BA or Greater		0.023	0.031	0.022	0.030
		(0.032)	(0.032)	(0.030)	(0.043)
Log of Average Real Total Income			-0.003	-0.001	-0.005
			(0.005)	(0.004)	(0.006)
Employment			-0.031	0.004	-0.004
			(0.021)	(0.017)	(0.024)
Labour Force Participation			0.035	0.018	0.032
			(0.018)**	(0.013)	(0.019)*
Log of Area				0.001	
				(0.001)	
Rural				0.001	
				(0.005)	
F-statistic Education		2.519	1.715	0.282	0.875
p-value		0.0807	0.180	0.755	0.417
F-statistic Labour			2.028	2.292	2.204
p-value			0.132	0.101	0.111
F-statistic Year	2.180	1.959	1.957	3.206	6.833
p-value	0.0883	0.118	0.118	0.0222	0.000141
F-statistic Province Fixed Effects				3.835	
p-value				0.0000166	
Observations	2,750	2,750	2,750	2,750	2750

Notes: The dependent variable is equal to 1 if a reserve implemented an SGA between 1995 and 2011, inclusively, and 0 otherwise. The sample includes populated reserves in any province or territory, except Nunavut. Demographic controls include proportions for registration status, allophones, and females, along with average age. Education controls include proportions of the adult population for high school completion and university-level education. Economic controls include proportions of the adult population that is employed and that is participating in the labour force, along with the log of average real total income. Geographic and regional controls include log of area, a dummy for rural CSDs, and dummies for provinces. All specifications include year fixed effects. All frequencies are rounded to the nearest multiple of five. Robust standard errors in parentheses. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Chapter 3

The Impact of Targeted Tuition and Living Expense Subsidies on Post-Secondary Education Attainment: Evidence from the Reform of Canada's Indian Registration Policy in 1985

3.1 Introduction

Post-secondary education is a key factor in determining individual labour market outcomes and national productivity. Economists recognize the need to understand the sources of post-secondary education achievement gaps, especially for minority social groups. Likewise, economists seek to understand the effectiveness of programs that aim to close these gaps.

In this paper, I investigate the impact of targeted tuition and living expense subsidies on

post-secondary education attainment through an analysis of the reform of Canada's *Indian* registration policy. *Indian* registration provides a large number of Canadians with access to substantial rights and benefits, particularly including post-secondary tuition and living expense subsidies, as well as non-insured health supports and tax exemptions.[1] A reform in 1985 resulted in a nearly 20 per cent increase — about 74,000 new registrants — in the number of Canadians entitled to the policy's benefits by 1990 (Indian and Northern Affairs Canada 1990). I adopt a difference-in-differences (DID) approach that exploits these new registrations in order to identify the causal effects of the policy.

Broadly, this paper contributes to our understanding of the impacts of post-secondary financial aid on education attainment. Previous work examines the effects of merit-based financial aid (Dynarski 2004). Others focus on the effects of broad, non-merit-based financial aid (Turner and Bound 2003) and on geographically-targeted, non-merit-based financial aid (Bartik, Hershbein, and Lachowska 2015). Nonetheless, many explore the heterogeneous financial aid effects between non-minority and minority groups.

Moreover, the evaluation of post-secondary education achievement effects of the *Indian* registration policy has important implications for the particular case of Aboriginal education in Canada. A small but growing empirical literature uncovers large gaps in post-secondary education achievement for Aboriginal peoples in comparison with other demographic groups in Canada (Mendelson 2006; Jones 2017). Associated empirical literature correspondingly finds large and growing gaps in labour market outcomes (Drost 1994; George and Kuhn 1994; Ciceri and Scott 2006; Pendakur and Pendakur 2011; Feir 2013) that are not fully explained by differences in returns to education or other characteristics.

This previous research consistently reveals strong within-group heterogeneity amongst Aboriginal peoples. Post-secondary education achievement and labour market gaps vary by reserve residence, gender, and *Indian* registration status. For example, Mendelson (2006) finds an eight times lower likelihood of attaining a university level education for adults living

1. I describe the *Indian* registration policy in more detail in the following section.

on-reserve. George and Kuhn (1994) and Feir (2013) identify wage gaps that are larger for Aboriginal men than Aboriginal women, as well as for those with single origins over those with mixed Aboriginal or non-Aboriginal origins. A separate analysis by Pendakur and Pendakur (2011) indicates that the largest income and wage gaps are experienced by individuals that are legally registered as *Indians*.

I use a pooling of the 1981 and 1991 confidential long-form *Census of Canada* master files to perform the main analysis. This dataset provides a large number of observations for Aboriginal and non-Aboriginal Canadians. This dataset offers rich detail for each observation, including information on ethnic origin, labour market outcomes, education attainment, and other socioeconomic characteristics. This microdata is particularly useful, as Aboriginal peoples represent a very small proportion of Canada's general population throughout the study period.

I use a second dataset derived from the 1991 confidential *Aboriginal Peoples Survey* (APS) master file to complement the main analysis. Specifically, the analysis based on the APS reveals important differences between individuals that registered under pre-reform and post-reform criteria. The APS master file provides two crucial features to perform this secondary analysis. First, each APS observation includes the respondent's corresponding 1991 census information.[2] Second, the APS provides detail on which criteria — pre-reform or post-reform — under which each respondent registered.[3]

My results indicate that the 1985 reform lead to economically and statistically significant increases in the likelihood of post-secondary education attainment for single-origin North American Indian (NAI) women married to non-registered husbands, a group of women whose eligibility increased directly as a result of the reform, and by single-origin NAI women in general. These increases occurred regardless of reserve residence. The impacts range from about 4 to 7 percentage points, which are in line with the substantial tuition and living

2. The APS derives from a post-censal survey of a sample of respondents of Aboriginal origin or identity drawn from the 1991 long-form census.

3. The APS C-31 question reads as: "Have you been registered as a status Indian under Bill C-31?"

expense subsidies under the policy. The effects for men are positive, but much smaller and not significant. All of my results appear robust to alternative model specifications and samples.

This paper yields three contributions to the literature. Primarily, the paper assesses the causal effect of tuition and living expense subsidies by using the 1985 policy reform as a source of variation. Along this path, the paper contributes to the Canadian Aboriginal economic development literature by revealing reform registrants as an as yet unexamined unit of analysis. Lastly, the paper highlights the suitability of the APS for economic analysis.

This paper is organized as follows. The next section, Section 3.2, describes Canada's *Indian* registration policy, both before and after the 1985 reform. Section 3.3 describes the literature on targeted post-secondary scholarship programs and the empirical literature on education attainment, employment, and wages gaps for Aboriginal peoples in Canada. Section 3.3 describes the datasets used for the empirical analysis. Section 3.5 details the identification strategy. Section 3.6 presents and discusses the results. Lastly, section 3.7 concludes.

3.2 Background on Indian Registration Policy

Indian registration policy has existed in Canada since at least the time of Confederation.[4] To understand the *Indian* registration policy reform in 1985, it is first necessary to understand the historic rules by which individuals gained *Indian* status under the law, the differential treatment of women under these rules, and the rules that were implemented to eliminate status.

4. The earliest post-Confederation statutes include: *An Act providing for the organisation of the Department of the secretary of State of Canada, and for the management of Indian and Ordnance Lands*, S.C. 1868, c.42. (31 Victoria), *An Act for the gradual enfranchisement of Indians, the better management of Indian affairs, and to extend the provisions of the Act 31st Victoria, Chapter 42*, S.C. 1869, c.6 (32-33 Victoria), and the *Indian Act*, S.C. 1876, c.18 (39 Victoria).

3.2.1 Pre-Reform Indian Registration Policy

The earliest rules defined an *Indian* as any man of NAI origin — but not of Métis origin — belonging to or residing with a recognized band, along with his wife and children. Any person that met this criteria was registered as an *Indian* and was granted access to the rights and benefits of status.

Throughout most of its history, *Indian* registration policy involved differential treatment for men and women. First, under the basic definition, woman obtained status through fathers or husbands. Second, women were subject to a separate "marrying out" rule, which established that any *Indian* woman marrying a non-*Indian* man would lose her status as an *Indian*. In its earliest form, the "marrying out" rule did not disentitle women from the rights and benefits, although the women were no longer identified as *Indians*. However, it prevented all unmarried, minor children living with the woman at the time of her marriage from gaining status and from obtaining the rights and benefits of status. Likewise, future generations were ineligible.[5]

The early legislation additionally established a process known as enfranchisement, which allowed adults to voluntarily relinquish their status as *Indians*, along with the associated rights and benefits, in order to gain Canadian citizenship.[6] Enfranchisement was voluntary for men, but flowed involuntarily to the wives and unmarried, minor children of enfranchised men.

The federal government made enfranchisement compulsory between 1920 and 1922, and then for the more lengthy period between 1933 and 1961.[7] Compulsory enfranchisement de-

5. Loss of status under the "marrying out" rule was permanent, meaning it persisted through divorce, unless the woman subsequently married an *Indian* man. A separate rule established that any illegitimate child of an *Indian* woman would lose status within 12 months of birth, if it could be proven that the father of the child was not an *Indian* man. Similar rules were not in place for *Indian* men. In fact, prior to 1985, a non-*Indian* wife of an *Indian* man was entitled to registration, regardless of her origin.

6. Enfranchisement fit within the broader policy of assimilating *Indians* into mainstream society. *Indians* were not considered persons under the law until 1951 and were not considered citizens until 1960. In keeping with citizenship, enfranchisees were free to vote under the then-current voting provisions. Enfranchisees were additionally granted a one-time commutative payment of all future treaty annuity payments — if the enfranchisee's band had entered into a treaty — and could receive an allotment of freehold land.

7. By 1918, it became clear that the enfranchisement scheme had not achieved the goal of assimilation,

cisions were made at the discretion of Indian agents.[8] Again, the wives of enfranchised men, regardless of when their marriage occurred, and any unmarried, minor children of enfranchised men, regardless of the date of their birth(s), lost their rights and status.[9] Jamieson (1978) finds that over 4,000 people were compulsorily enfranchised by 1948.

In 1951, the federal government expanded the "marrying out" rule to include disentitlement to rights and benefits, in addition to the loss of status. Moreover, the federal government implemented a "double mother" rule that enfranchised any registered child at the age of 21, if that child descended from a marriage that was entered into after 1951 and neither the child's mother nor the child's paternal grandmother held status at their birth.[10]

After 1951, compulsory enfranchisements due to the expanded "marrying out" rule rose substantially. Jamieson (1978) reveals that 8,537 women — along with 1,947 of their unmarried, minor children — were enfranchised through marriage to non-*Indian* men between 1955 and 1975. The "double mother" rule, although still consequential, applied far less frequently (Jamieson 1978).

During the same period, Jamieson (1978) finds that 1,576 men and women — along with 1,090 of their unmarried, minor children — were enfranchised through other voluntary or compulsory measures. These other types of enfranchisements dropped off considerably, though, after compulsory enfranchisement was abolished in 1961.

3.2.2 1985 Policy Reform

In the early 1970s, enfranchised women began to formally oppose the gender imbalances within the *Indian* status entitlement criteria through appeals to the United Nations and

as only 102 individuals had become enfranchised.

8. The *Indian Act* of 1951 details the compulsory enfranchisement process as follows. Upon recommendation of an Indian Agent, the Superintendent General could make an application to the Governor in Council to enfranchise any *Indian* deemed "fit" to obtain the same rights of any other of Her Majesty's subjects. The enfranchised individual would lose their status and would lose all associated rights and benefits, after a successful two-year period of monitoring within which his conduct was assessed.

9. Exceptions were made in cases where the wife or children were living apart from the man for a lengthy period of time.

10. An individual would be affected by this rule if both their father and paternal grandfather had married non-*Indian* women.

court challenges.[11] Band councils largely opposed any changes to the policy, as they feared strained budgets from a surge in band membership rolls. Ultimately, the United Nations recognized human rights violations, but the court challenges were unsuccessful.

Nevertheless, change came about through the broader process of patriating the constitution. Specifically, the adoption of the *Charter of Rights and Freedoms* within *Constitution Act* of 1982 required the amendment of all pre-existing legislation and policy that were in contravention of universal rights and freedoms, including gender equality under the law. As a result, the federal government amended the *Indian* registration policy within a broader process of amending the *Indian Act* in 1985.[12] Known as *Bill C-31* (C-31), these amendments equalized many of the gender imbalances in the *Indian* registration entitlement criteria, among other changes.

The amended criteria repealed many of the discriminatory rules and re-entitled all enfranchised individuals, although reinstatement was not automatic.[13] Particularly, the C-31 reform re-entitled any woman that was enfranchised by way of marriage to a non-*Indian* man, along with any of her living children, as well as anyone that had been enfranchised due to the double mother rule.[14]

Indian and Northern Affairs Canada (1990) finds that the number of individuals on the

11. In 1971, Jeannette Vivian Corbiere Lavell, of the Wikwemikong Band, filed the first court challenge seeking to overturn her enfranchisement, which resulted from her marriage. Her case was later joined with that of Yvonne Bédard, a woman from the Six Nations Band. Their lower court successes were overturned by the Supreme Court of Canada in 1974, and the *Indian* registration entitlement criteria held.

12. The *Indian Act*, 1985, came into force on April 17, 1985.

13. As in the past, individuals had to apply to the Indian Registrar. Despite the amendments, not all discrimination was removed. The "double mother" rule was transformed into the less gender-discriminatory — but still restrictive — second-generation cutoff rule. Loosely, only those that could trace their origins back to at least a registered grandparent became entitled. In reality, the second-generation cutoff preserved some gender discrimination in the Indian registration entitlement criteria. Under the 1985 amendments, all currently registered *Indians* were registered under subsection 6(1) of the new *Indian Act*. Similarly, all reinstatees were registered under subsection 6(1). The children of women that had married out and become reinstated (i.e., children with only one 6(1)-registered parent) were registered under subsection 6(2). Subsection 6(2) registrants could not transmit status to their own children, unless they had children with a 6(1)-registered partner. So, the children of men who had married out prior to 1985 were registered under 6(1) while the children of women that had married out were registered under 6(2). Marrying-out men could transmit status for two generations, while marrying-out women could transmit status for only one.

14. Subsequent legislation enacted in 2010 repealed the remaining discriminatory rules. The *Gender Equity in Indian Registration Act*, S.C. 2010, c.18, lead to an estimated 45,000 new registration after 2010 (Aboriginal Affairs and Northern Development Canada 2013b).

Indian Register grew by 19 per cent from 1985 to 1990. In the same period, the number of non-registered NAI individuals by 15 per cent (Indian and Northern Affairs Canada 1990). Based on an analysis of the same administrative data, Clatworthy (2001) reveals that 139,782 individuals applied for reinstatement or new registration under the amended criteria between 1985 and 1990.[15] Indian and Northern Affairs Canada (1990) confirms that 73,554 of these individuals were successfully registered, with the majority of these registrations arising directly from the repeal of the "marrying out" rule. Specifically, 13,672 women re-registered after their enfranchisement due to marriage to non-registered husbands, and 44,367 children of these women registered anew (Indian and Northern Affairs Canada 1990).[16]

A survey of a representative sample of C-31 registrants in 1990 matches the administrative record by suggesting that 64 per cent of C-31 registrants were women (Indian and Northern Affairs Canada 1990). In addition, only 8 per cent of the C-31 registrants resided on-reserve at the time of the survey (Indian and Northern Affairs Canada 1990). Of those C-31 registrants that were living off-reserve, 62 per cent had never lived on-reserve (Indian and Northern Affairs Canada 1990).

The motivations for seeking reinstatement or for seeking new registration cited by Indian and Northern Affairs Canada (1990) include personal identity (41 per cent), cultural belonging (21 per cent), correcting injustice (17 per cent), education benefits (14 per cent), non-insured health benefits (12 per cent), and sales tax exemptions (6 per cent). However, for those under 25 years of age, post-secondary education support represents a strong motivating factor, with personal identity, cultural belonging, correcting injustice, non-insured health benefits, and sales tax exemptions representing weaker factors.[17]

15. 194,000 individuals applied for reinstatement or new registration under the amended criteria by 1995, resulting in 101,000 successful registrations by 1995 (Clatworthy 2001).

16. There were far fewer reinstatements due to enfranchisement under the "double mother" rule, primarily as a result of this rule's shorter duration of implementation (Indian and Northern Affairs Canada 1990).

17. Despite its low ranking as a motivating factor for reinstatement or registration, over half of C-31 registrants that had received a pharmaceutical prescription since registering, which amounted to 86 per cent of C-31 registrants, had used their newly-acquired benefits to recuperate the associated costs (Indian and Northern Affairs Canada 1990). Similarly, the proportion of post-secondary enrollees receiving financial assistance within the group of C-31 registrants rose from 24 per cent to 55 per cent between 1985 and 1990.

3.2.3 Rights and Benefits Under the Policy

Indian status grants individuals access to certain supports and protections under the law. These include post-secondary education subsidies, non-insured health benefits, and tax exemptions, among others.[18] If this same individual is a band member, they additionally receive rights to reserve lands, treaty payments, and other band monies, if applicable.[19] As such, these laws concomitantly established different classes within the broader NAI group (i.e., those with status and those without). For example, Quiñonez and Lavoie (2009) note that by the early 1900's registrants benefited from the free provision of health and dental services that were not freely available to other unregistered Aboriginal peoples or to other non-Aboriginal peoples.[20]

Newly-registered men, women, and children likely experienced large positive income shocks, as a result of their regained or new access to education benefits, non-insured health benefits, tax exemptions, treaty annuities, and band monies.

Registration status then formed the basis for a set of rights over reserve and treaty lands, along with establishing the rights and duties for bands and band administration.

3.3 Related Literature

This paper relates to previous empirical literature on post-secondary financial aid. The previous research falls into four broad categories that mirror the policy environment. Dynarski (2004) focuses on merit-based scholarship programs. Turner and Bound (2003) examine

18. The federal government funds post-secondary tuition and living expense subsidies, but band administration offices or Aboriginal organizations deliver these services. Registration exempts individuals from provincial and federal taxation on goods and services, both on-reserve and in several provinces, and from income tax levied on on-reserve employment earnings.

19. Prior to 1951, all *Indians* automatically held band membership. After 1951, those without band affiliation were registered on a *General List*. The *General List* was populated mostly by members of bands that had wholly enfranchised, but where the individuals themselves were not deemed "fit" to be enfranchised. Registration under the *General List* was a rare occurrence. By 1981, only 80 people were registered in this way (Beauregard 1981).

20. *Indians* registration grants individuals with access to federal non-insured health benefits through Health Canada. These benefits provide drug, dental, and vision care separate from provincial and territorial health plans.

non-merit-based scholarship programs. Bartik, Hershbein, and Lachowska (2015) consider geographically-targeted, non-merit-based scholarship programs. Importantly, all of these studies explore the heterogeneity of financial aid effects across non-minority and minority groups.

The empirical literature on merit-based programs displays mixed results. Dynarski (2004) finds that Georgia's Helping Outstanding Pupils Educationally (HOPE) Scholarship widened college attendance gaps for blacks and Hispanics, while other states' HOPE-like programs had the opposite effect. She attributes these heterogenous effects to important differences in the structure of the HOPE program and to differences in the upstream experiences of blacks and Hispanics in secondary and primary school.

Similarly, the literature on non-merit-based programs points to strong heterogenous effects between whites and blacks. Turner and Bound (2003) find that both groups benefitted substantially in post-secondary attainment from the G.I. Bill. However, the opposite effect was experienced by blacks living in the South, as local political opposition limited the effectiveness of the policy and discrimination limited college opportunities in the region.

However, the literature on geographically-targeted or place-based, non-merit financial aid programs is less conclusive about advantages to whites. Bartik, Hershbein, and Lachowska (2015) suggest that the effects from the Kalamazoo Promise scholarship benefit non-whites as much if not more than whites.

Jones (2017) appears to be the only other study within the economics literature to investigate the effects of the post-secondary education subsidies of the *Indian* registration policy. She exploits a decrease in the policy's per-student funding allotments in 1989 that was prompted by the increased demand from the rise in registrants. Using a cohort analysis based on the 2006 census, her results suggest that the funding change lead to no significant impact on post-secondary education completion rates for cohorts of individuals that reached typical high school graduation ages in 1989 and 1990. However, she finds significant negative effects on trade program completion and community college completion rates for cohorts

graduating between 1991 and 1995.

This paper additionally builds on previous literature that seeks to identify and explain large socioeconomic gaps for Aboriginal Canadians. The past literature consistently reveals post-secondary education gaps that increase from off-reserve to on-reserve (Mendelson 2006) and employment, wage, and income penalties that increase from off-reserve to on-reserve, non-registered and to registered groups, from multiple-origin to single-origin, and from women to men (Drost 1994; George and Kuhn 1994; Kuhn and Sweetman 2002; Pendakur and Pendakur 2011; Feir 2013). Decomposition methodologies indicate further that differences in returns to education — lower for registered men than registered women — and differences in other characteristics do not sufficiently explain the employment and wage gaps (Drost 1994; George and Kuhn 1994; Kuhn and Sweetman 2002; Feir 2013).

Taken together, the previous literature on financial aid suggests that increased access to the post-secondary subsidies through the 1985 *Indian* registration policy reform should reflect positively on post-secondary education attainment by 1991. The previous literature on labour market outcomes for Aboriginal Canadians tempers this implication slightly by suggesting that the effects should be stronger for women than men, due to a targeted increase in registration eligibility for women affected by the "marrying out" rule and as a result of important differences in the structure of the labour market and in returns to education.

3.4 Data

I use two datasets to perform the analysis. The first is a pooling of the 1981 and 1991 confidential long-form census master files. The long-form census master files provide a large number of observations with detail on a broad set of background characteristics and socioeconomic outcomes for Canadians. In both census years, most private households were sampled at a rate of 20 per cent. However, reserves and most northern areas were sampled

at a rate of 100 per cent.[21] This microdata design is crucial given that Aboriginal peoples form such a small proportion of the total population of Canada — less than 3 per cent — during the study period.[22]

An individual's ethnic origins and registration status are directly identifiable through responses to the long-form census questionnaire in both census years. The 1981 questionnaire uses a single question to inquire about an individual's ethnic origins and *Indian* registration status.[23] In processing the 1981 census, Statistics Canada reduced all responses indicating multiple Aboriginal origins to a single Aboriginal origin. This categorizes each Aboriginal individual into one of the four mutually-exclusive Aboriginal groups — Inuit, Métis, non-Status Indian, and Status Indian. Statistics Canada used a hierarchy of rules to re-categorize observations with multiple Aboriginal responses to a single Aboriginal response in the 1981 data. First, multiple responses that included Status Indian became Status Indian alone, if the individual lived on-reserve. Second, single Aboriginal mark-in responses were left unchanged, if recorded in combination with an Aboriginal write-in response, such as a band name or a First Nation. Last, the remaining observations with multiple Aboriginal mark-ins were randomly reduced to a single origin response. As a result of this processing, Statistics Canada derived a variable entitled *natpop* which categorizes each observation into five mutually-exclusive origin-group categories. Individuals without any Aboriginal origins were placed in a non-Aboriginal category, while individuals with any of the four Aboriginal origins, either singly or mixed with other non-Aboriginal origins, were categorized into the corresponding Aboriginal categories of Inuit, Métis, Non-Status Indian, and Status Indian. I take responses

21. Statistics Canada (1992) explains that a 1-in-5 sampling was impractical as an on-reserve methodology due to limitations in the mail service and due to the seasonal migratory hunting and fishing practices of many reserve communities, which lead to the absence of many household members on census day. Statistics Canada (2011) explains further that low sampling rates yield unrepresentative data in small communities.

22. In 1991, 78 Indian reserves and Indian settlements refused census enumeration outright or were incompletely enumerated. As a result, information on individuals living on these reserves are not reflected in the data. The population in these communities was estimated to be 37,620 individuals Ram (2004).

23. The questionnaire presents options for common non-Aboriginal origin mark-in boxes and a single write-in box, along with mark-in boxes for the four broad Aboriginal origin groups of Inuit, Métis, non-Status Indian, and Status Indian. The 1981 questionnaire asks, "To which ethnic or cultural group did you or your ancestors belong on first coming to this continent?"

for non-Status and Status Indian origins to form the broader NAI group.

Unlike the 1981 questionnaire, the 1991 long-form census questionnaire uses separate questions for ethnic origin and registration status. The 1991 questionnaire differs further by actively encouraging multiple responses for ethnic origin and by offering two write-in boxes.[24]

Separate dummy variables in the 1991 dataset indicate the most common non-Aboriginal origins, the three possible Aboriginal origins, and registration status. For comparability with the 1981 census, I eliminate observations with multiple Aboriginal origins from the 1991 census sample by applying the same rules used by Statistics Canada in 1981.[25]

The second dataset derives from the 1991 APS master file. The 1991 APS provides two key features that are relevant to the analysis. First, each APS observation includes the respondent's corresponding 1991 census information. In fact, the APS derives from a post-censal survey of a representative sample of census respondents indicating Aboriginal origin or identity on their 1991 questionnaire.[26]

Second, the APS provides detail on which criteria — pre-reform or post-reform — under which each respondent registered.[27] The APS is the only dataset distinguishing between these two groups during the study period, although it only offers this information as of 1991.[28]

24. The 1991 questionnaire asks, "To which ethnic or cultural group(s) did this person's ancestors belong? Mark or specify as many as applicable." Neither the 1981 questionnaire nor the 1981 questionnaire guide make any reference to multiple responses. Still, the data clearly indicates that many respondents provided multiple responses in 1981, although the number of multiple responses is larger and of greater variety in 1991.

25. Observations with *Indian* registration status, but without any of the three Aboriginal origins, are marked as NAI. Multiple Aboriginal origin responses for individuals living on-reserve, as indicated by the census subdivision type, are reduced to NAI, if the individual was also registered. All other multiple Aboriginal origin responses were randomly reduced to a single Aboriginal origin.

26. The APS questionnaire, which was administered by interview between June 1, 1991 and January 31, 1992, evolved in two stages. In the first stage, the questionnaire asked if the respondent identifies with their Aboriginal origins or is registered. The interview concluded if the response was negative to both of these questions. In the second stage, the questionnaire inquired about the respondent's languages, traditions, disabilities, health, lifestyle, mobility, schooling, work, expenses, income, housing, and other social concerns (Statistics Canada 2007a). Similar to the 1991 census, 181 reserves refused enumeration outright or were incompletely enumerated for the 1991 APS. The population count in these communities totals 58,000 (Statistics Canada 2007a).

27. The APS C-31 question reads as: "Have you been registered as a status Indian under Bill C-31?"

28. I observe three cases of registration in the APS: 1) non-C-31 registration as of census day, 2) C-31 registration as of census day, and 3) C-31 registration between census day and the APS interview day. Only

For both datasets, I initially restrict the sample to non-collective-dwelling, Canadian-born individuals of working age (25 to 64 years) that resided within one of the ten provinces or two territories.[29] This most closely matches the restrictions within the Aboriginal wage gaps literature of George and Kuhn (1994), Pendakur and Pendakur (2011), and Feir (2013). The restriction by age derives from the argument that those below 25 years are less likely to have completed their educations or to be married, while those over 64 years are more likely to be influenced by retirement decisions.

I restrict the sample further to individuals with single origins. The argument here is that individuals with single NAI origins have the highest likelihoods of being registered and of being impacted by the 1985 policy reform. However, this restriction offers the additional benefit of avoiding issues of ethnic mobility, which involves shifts in the reporting of ethnic origins by individuals over time.

Ethnic origin responses differ substantially between 1981 and 1991 resulting in significant distributional shifts in single- and mixed-origin responses for some Aboriginal groups. In particular, the single- and mixed-origin non-registered NAI group grew substantially between 1981 and 1991.[30]

3.4.1 Summary Statistics

Table 3.1 provides a selection of summary statistics for single-origin NAI individuals based on the census dataset. The upper panel displays means for any post-secondary education, labour force participation, and employment, while the lower panel displays means for real annual wages. Both panels separate these means by gender, reserve residence, registration

in case 2) is the C-31 variable equal to 1.

29. Nunavut was designated a territory separate from the Northwest Territories in 1999.

30. Demographic research by Guimond (2009) confirms that the higher birth rates and lower median ages amongst Aboriginal peoples do not provide a sufficient explanation for the large population shifts. Using record linkage techniques, his analysis instead finds that intra-generational ethnic mobility (i.e., differential self-reporting over time) and inter-generational ethnic mobility (i.e., differential reporting between parent and child) are the primary factors underlying the changes. As explained in the results section, compositional shifts within Aboriginal groups pose substantial challenges to the identification of causal effects under DID, when using the census dataset. However, compositional shifts are not a problem for the APS dataset, as a result of its cross-sectional design.

status, and year of observation.

A comparison of the number of observations between men and women reveals that women represent the majority (56 per cent) of C-31. This is in line with both the analysis of administrative data and the survey of C-31 registrants by Indian and Northern Affairs Canada (1990).

The summary statistics exhibit a consistent pattern of features for men and women across time, reserve residence, and registration status. First, we see post-secondary achievement disadvantages for those living on-reserve, which is consistent with previous literature (Mendelson 2006). The gap for registered men living on-reserve in 1981 is nearly 13 percentage points, as compared to registered men living off-reserve. The gap for men shrinks in 1991, but remains substantial at just below 10 percentage points. The corresponding gap for women grows from about 8 to 9 percentage points between 1981 and 1991.

Nonetheless, post-secondary education grows substantially for all groups over time. This growth consists of a 16 percentage point increase for registered women living on-reserve, a 15 percentage point increase for registered women living off-reserve, and a 14 percentage point increase for non-registered women living either on- or off-reserve. For men, the corresponding increases in post-secondary education are 11, 7, and 10, percentage points, respectively.

Intriguingly, table 3.1 points to post-secondary education achievement advantages for registered men and women living off-reserve in both 1981 and 1991, as compared to their non-registered counterparts. These advantages grow from 4 to 5 percentage points for women and shrink from 6 to 4 percentage points for men over time.

Turning to labour force participation, we see increases in labour force participation for all groups, except registered men living off-reserve. At the same time, employment increases for all groups of women, but decreases for all groups of men. Correspondingly, real annual wages grow for all groups of women and fall for all groups of men.

Table 3.1 additionally provides a strong indication of a compositional shift in the single-origin NAI group between 1981 and 1991. For instance, the number of registered men and

women living on-reserve grew by nearly 125 and 118 per cent, respectively, between 1981 and 1991. The non-registered NAI group grew substantially in this same period, although at a slower rate.

Table 3.2 provides the same set of summary statistics in table 3.1, again separated by gender, reserve residence, and registration status. However, these statistics derive from the APS dataset, and as such are limited to 1991. Further, table 3.2 decomposes the means into groups of individuals that were registered under non-C-31 and C-31 criteria.

Comparisons of the means across tables 3.1 and 3.2 suggest that the APS dataset is quite reliable. First, the proportions of registered men and women, along with the proportions of registered men and women living on- and off-reserve, are almost indistinguishable.[31] Likewise, means are quite similar across the two tables. For example, the simple weighted means for post-secondary education calculated from table 3.2 for on- and off-reserve registered men are 0.327 and 0.417.[32] For women, these means are 0.329 and 0.426. None differ substantially from the corresponding values in table 3.1.

Table 3.2 illustrates large and significant differences in the rates of post-secondary education attainment between the non-C-31 and C-31 registered groups. Some highlights include a 9 percentage point difference for men living on-reserve, a 5 percentage point difference for men living off-reserve, a 5 percentage point difference for women living on-reserve, and 2 percentage point difference for women living off-reserve.

The means additionally indicate that the rates of post-secondary education attainment are lower for all C-31 groups, as compared to corresponding non-C31 groups, with the exception of off-reserve women. This feature of the data suggests that the growth in the rates of post-secondary education attainment for all registered groups between 1981 and 1991 noted above may not evolve from an inflow of C-31 registrants.

I provide two additional tables of summary statistics in the appendix for further compa-

31. For example, both tables 3.1 and 3.2 suggest that registered men represent 92 per cent of all single-origin NAI men and registered women represent 92 per cent of all single-origin NAI women in 1991.

32. For example, $(9450 \times 0.339 + 1350 \times 0.245)/(9450 + 1350) = 0.327$.

risons between the C-31 and non-C-31 groups. One highlight from these comparisons is that C-31 registrants have slightly lower median ages than their non-C-31 counterparts.

Before proceeding to the description of the identification strategy, I perform an additional check for consistency of the data across the census and APS datasets as additional support of the preceding statements. To perform this check, I use OLS to estimate the following population regression model:

$$Y_i = \alpha_0 + \alpha_1 Registered_i + \alpha_2 Reserve_i + X_i\delta + W_i\gamma + \epsilon_i \tag{3.1}$$

where Y_i is the outcome of interest (e.g., any post-secondary education) for individual i. For any post-secondary, the dependent variable is equal to 1 if the individual has a highest level of schooling of at least some college or trades, and 0 otherwise.

When examining labour force participation, the dependent variable is equal to 1 if the individual is employed or actively looking for work, and 0 otherwise. The dependent variable for employed is equal to 1 if the individual is employed, and 0 otherwise.[33] The log of real annual wages is the log-transformation of nominal annual wages and salary information after adjustment by the 2002 national consumer price index.

$Registered_i$ is a dummy variable equal to 1 if the individual is registered, and 0 otherwise. $Reserve_i$ is a dummy variable equal to 1 if the individual resides on-reserve, and 0 otherwise. X_i is a vector of background characteristics, including age and age-squared as proxies for experience, three dummies for knowledge of official languages (Allophone, French-alone, and bilingual, with English-alone as the left-out category), and a dummy for part-time work (with full-time work as the left-out category). W_i is a vector of geographic characteristics, including eleven dummies for province or territory of residence (with Ontario as the left-out category), and a dummy for non-census metropolitan area (CMA) residence (with CMA residence as the left-out category).

33. I use labour force activity information to generate indicators of labour force participation and employment.

For all other outcomes of interest other than any post-secondary education, I include seven dummies for level of education as proxies for ability (no schooling, grade 9 to 10, grade 11 to 13, high school certificate, some post-secondary, trades, and undergraduate/masters/PhD combined, with grade 1 to 8 as the left-out category). I only include weeks worked for (log) real annual wage regressions.[34]

Equation (3.1) gauges the relationship between the covariates and each outcomes of interest. In particular, α_1 captures the effect of registration and α_2 captures the effect of on-reserve residence on the outcomes of interest, after controlling for all other covariates.

Table 3.3 reports registration and reserve gaps from the OLS regression of equation (3.1) for the pooled 1981 and 1991 census sample, for the 1991 census sample, and for the 1991 APS sample. Columns (1)–(4) and (5)–(8) detail these gaps for men and women, respectively, across the six outcomes of interest. I restrict the samples for the regressions underlying columns (4) and (8) to paid workers.

The strong consistency of results between the census and APS datasets provides additional comfort for the use of the APS dataset, especially given the APS issues involving a smaller sample size, voluntary survey design, and unenumerated reserves. All APS registration and reserve gaps are of the same sign and similar magnitude as those found in the census samples with the exception of (log) annual. Table 3.3 provides additional comfort due to the fact that the labour market gaps presented are consistent with the previous literature (Ciceri and Scott 2006; George and Kuhn 1994; Feir 2013; Pendakur and Pendakur 2011).

However, the most important result of table 3.3 is the indication of post-secondary education advantages to the registered group. In particular, registered men and women have an approximately 6 percentage point higher likelihood of obtaining any post-secondary education over their non-registered counterparts, which is consistent with the preceding discussion of summary statistics and consistent with the provision of tuition and living expense sub-

34. Wage equation regressions are further restricted to paid workers with at least 100 dollars in real annual wages, with zero dollars in self-employment income, and whose main source of earnings was derived from wages and salaries. The census categorizes these individuals as a paid worker working for wages, salary, tips, or commission. The derived class of worker census variable is used here.

sidies through the *Indian* registration policy. To my knowledge, this is the first paper to suggest a positive achievement gap.

3.5 Identification Strategy

The model that defines the impact of the 1985 policy reform on individual post-secondary education attainment is based on the following DID linear probability population regression model:

$$Y_{it} = \beta_0 + \beta_1 NAI_i + \beta_2 T_{it} + \beta_3 (NAI_i \cdot T_{it}) + \beta_4 Reserve_i + X_{it}\psi + W_i\phi + \eta_{it} \qquad (3.2)$$

where NAI_i is a dummy variable equal to 1 for individuals with NAI origin, and 0 otherwise. T_{it} is a dummy variable equal to 1 for observations in 1991, and 0 otherwise. $NAI_i \cdot T_{it}$ is an interaction term equal to 1 if an individual of NAI origin is observed in 1991, and 0 otherwise.

$Reserve_i$ is a dummy variable equal to 1 if the individual resides on-reserve, and 0 otherwise. X_{it} includes the same (time-varying) background characteristics as described for X_i in equation (3.1), including age and age-squared as proxies for experience, three dummies for knowledge of official languages (Allophone, French-alone, and bilingual, with English-alone as the left-out category), and a dummy for part-time work (with full-time work as the left-out category). W_i includes the same vector of geographic characteristics as described in equation (3.1), including eleven dummies for province or territory of residence (with Ontario as the left-out category), and a dummy for non-CMA residence (with CMA residence as the left-out category).

My DID approach compares changes in any post-secondary education for the single-origin NAI group across a time period that spans the 1985 policy reform and controls for counterfactual changes that would have occurred to this group had the *Indian* registration policy remained unchanged. I use single-origin Métis or single-origin British groups to control

for the changes that would have occurred to the single-origin NAI group in the absence of the policy reform.

Under the following strong assumptions, β_3 characterizes the causal effect of the 1985 policy reform and is, therefore, the parameter of interest. To identify the causal effect, I assume that a common trend exists between the single-origin NAI group and the reference group in the absence of registration. In addition, I assume that the take-up of registration by individuals in the single-origin NAI group does not affect the potential outcomes of individuals in either reference group.

Future research should investigate the plausibility of these assumptions. I could accomplish this by performing a cohort analysis based on the 1981 census data. For example, I could compare characteristics between the single-origin NAI group and the reference groups for different age classes.[35] Other supportive research should investigate how the likelihood of identifying as NAI changes over time.

3.6 Results

Recall from the concluding discussion on related literature that I intuitively expect that the increased access to the post-secondary subsidies of the *Indian* registration policy arising from the 1985 reform should reflect positively on post-secondary attainment by 1991. However, I further anticipate that these effects will largely depend on gender and reserve residence.

Table 3.4 presents the results for any post-secondary education from the estimation of equation (3.2). The reference group is composed of individuals of Métis origin only. Columns (1) and (2) are for samples of individuals living either off- or on-reserve, while columns (3) and (4) are for individuals living only off-reserve. The results are separated further by gender.

The most striking feature of the table is the difference in the coefficient estimates between

35. Preliminary analysis suggests that a common trend exists between the single-origin NAI group and the single-origin Métis group for women and men. I use a cohort analysis based on age classes in 1981 to perform this analysis. However, the results (not shown) suggest that common trends only exist for younger age classes, e.g., 25- to 29-year-old men and 25- to 44-year-old women.

men and women both on- and off-reserve. The results indicate that the 1985 reform lead to an economically significant increase in the likelihood of single-origin NAI women attaining any post-secondary education of 5.3 percentage points. This estimate is statistically significant at the one per cent level. For off-reserve single-origin NAI women the corresponding estimate is 4.4 percentage points, which is again statistically significant at the one per cent level and is consistent with the reserve penalty of 1.1 percentage points from the on- and off-reserve sample.

On the other hand, the reform does not lead to any change for men. The estimates for men are small in magnitude and of opposite signs between the off- and on-reserve sample and the off-reserve sample. Neither is statistically different from zero.

Recall that the 1985 reform did not target men's eligibility in particular. In addition, there is no evidence of systematic changes in the labour market structure or to returns to education for men over the study period. As such, a nil effect appears to be in line with the policy environment and prevailing economic conditions.

Table 3.5 displays results from the estimation of equation (3.2) with a reference group composed of individuals of British origins only. Table 3.5 takes the same structure as the preceding table.

For women, the results from table 3.5 point to a 6.6 percentage point increase in post-secondary education attainment for single-origin NAI women as a result of the reform. For single-origin NAI women living off-reserve, this effect drops marginally to 6.2 percentage points, suggesting some consistency of estimates with table 3.4.

However, the results from table 3.5 additionally point to a correspondingly large and positive effect for men, which differs dramatically in sign, size, and significance from the preceding results. This discrepancy may provide some additional and valuable information. However, it is more likely that the discrepancy arises from the use of a reference group that does not suitably capture the changes to the single-origin NAI group in the absence of the policy reform.

Next, I narrow the focus to women who were most likely to have lost registration status and become eligible for reinstatement because of the application and abolishment of the "marrying out" rule. Any effects found for this group are of particular interest, as they were particularly targeted by the reform.

This analysis relies on a sample of single-origin NAI women married to non-registered husbands and a reference group of single-origin Métis women married to non-registered husbands or a reference group of women of only British origins married to non-registered husbands.

Table 3.6 presents the results for any post-secondary education from the estimation of equation (3.2) for the restricted sample. Columns (1) and (2) are for samples of women living either off- or on-reserve, while columns (3) and (4) are for women living only off-reserve.

Again, the results indicate economically large increases in the likelihood of single-origin NAI women attaining any post-secondary education, with coefficient estimates that match in sign, size, and significance those for women in tables 3.4 and 3.5. The reserve penalty disappears against the Métis-origin reference group, but holds for the British-origin reference group.

As a robustness check, I estimate various specifications of equation (3.2) based on a sample of single-origin NAI individuals aged 25 to 44 and single-origin Métis individuals forming the reference group. Table 3.7 presents these results. I add controls sequentially and cumulatively across columns (1) through (5) for men and across columns (6) through (10) for women. The first specification controls for reserve residence, provinces, and non-CMA residence. Next, I additionally control for age and age-squared. I add language controls in the third specification. The fourth specification additionally controls for four dummies for highest level of education amongst all members of the household other than the individual (high school certificate, some post-secondary, trades, and BA or greater). Lastly, the fifth specification adds a dummy for married (with divorced, separated, and never-married as the left-out group) and a continuous variable for real household income.

For men, the sign and significance of the coefficient estimates for the reform are the same as in table 3.4, but are considerably smaller in magnitude. However, the coefficient estimates for women are of the same sign and similar size and significance of those found in table 3.4.

3.7 Concluding Remarks

This paper examines the substantial impacts on post-secondary education resulting from the *Indian* registration policy. These effects are important to understand as the policy's reform in 1985 resulted in a large increase in the number of Canadians with access to tuition and living expense subsidies for post-secondary education. My results indicate that the reform lead to economically and statistically significant increases in post-secondary education attainment that range from 4 to 6 per cent for single-origin NAI women married to non-registered husbands. This group of women were most likely to lose and regain registration status due to the policy's "marrying out" rule. Corresponding increases for single-origin NAI women more generally range from about 4 to 7 percentage points, regardless of reserve residence. The effects for men are positive, but much smaller and not significant. All results appear robust to alternative model specifications and sample restrictions.

Table 3.1: Census Summary Statistics – Single-Origin NAI Individuals

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Men						Women					
	On-Reserve Registered		Off-Reserve Registered		Off- & On-Reserve Non-Registered		On-Reserve Registered		Off-Reserve Registered		Off- & On-Reserve Non-Registered	
	1981	1991	1981	1991	1981	1991	1981	1991	1981	1991	1981	1991
Any post-secondary	0.220	0.326	0.347	0.422	0.285	0.384	0.181	0.341	0.278	0.428	0.239	0.376
	(0.415)	(0.469)	(0.476)	(0.494)	(0.452)	(0.487)	(0.385)	(0.474)	(0.448)	(0.495)	(0.427)	(0.484)
Labour force participation	0.661	0.686	0.794	0.760	0.818	0.830	0.335	0.471	0.452	0.552	0.478	0.635
	(0.473)	(0.464)	(0.405)	(0.427)	(0.386)	(0.376)	(0.472)	(0.499)	(0.498)	(0.497)	(0.500)	(0.482)
Employment	0.557	0.474	0.695	0.551	0.698	0.674	0.287	0.366	0.384	0.422	0.409	0.537
	(0.497)	(0.499)	(0.460)	(0.497)	(0.459)	(0.469)	(0.452)	(0.482)	(0.486)	(0.494)	(0.492)	(0.499)
Observations	13,785	34,700	4,960	7,325	2,220	3,760	12,080	31,195	6,650	9,790	2,670	3,760
	Paid Workers											
Real annual wages	24,056	19,045	31,567	27,887	33,814	32,962	16,109	16,398	17,622	19,490	18,090	22,437
	(19,124)	(16,781)	(23,946)	(22,467)	(23,409)	(21,879)	(13,417)	(13,548)	(14,314)	(16,288)	(15,190)	(19,754)
Observations	8,450	20,840	3,430	4,860	1,500	2,540	3,670	13,560	2,780	4,970	1,135	2,055

Notes: The sample is restricted to Canadian-born, working-aged individuals of only NAI origin that reside in non-collective dwellings. Means are weighted and all frequencies are rounded to the nearest multiple of five. Standard deviations in parentheses.

Table 3.2: APS Summary Statistics – Single-Origin NAI Individuals

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Men					Women				
	On-Reserve		Off-Reserve		Off- & On-Reserve	On-Reserve		Off-Reserve		Off- & On-Reserve
	Registered Non-C-31	Registered C-31	Registered Non-C-31	Registered C-31	Non-Registered	Registered Non-C-31	Registered C-31	Registered Non-C-31	Registered C-31	Non-Registered
Any post-secondary	0.339	0.245	0.433	0.378	0.388	0.336	0.290	0.421	0.437	0.406
	(0.473)	(0.430)	(0.496)	(0.485)	(0.488)	(0.472)	(0.454)	(0.494)	(0.496)	(0.491)
Labour force participation	0.677	0.696	0.780	0.753	0.826	0.449	0.457	0.525	0.604	0.631
	(0.467)	(0.460)	(0.414)	(0.432)	(0.380)	(0.497)	(0.498)	(0.499)	(0.489)	(0.483)
Employment	0.471	0.466	0.534	0.567	0.676	0.350	0.339	0.394	0.471	0.532
	(0.499)	(0.499)	(0.499)	(0.496)	(0.468)	(0.477)	(0.474)	(0.489)	(0.499)	(0.499)
Observations	9,450	1,350	1,690	690	1,110	8,940	1,540	2,230	1,100	1,200
	Paid Workers									
Real annual wages	18,545	18,369	28,921	28,906	32,802	16,307	15,412	18,261	19,775	22,026
	(16,240)	(15,630)	(22,131)	(20,266)	(22,325)	(13,894)	(13,263)	(16,005)	(15,691)	(16,909)
Observations	5,750	840	1,130	440	750	3,920	700	1,120	600	660

Notes: The sample is restricted to Canadian-born, working-aged individuals of only NAI origin that reside in non-collective dwellings. Means are weighted and all frequencies are rounded to the nearest multiple of ten. Standard deviations in parentheses.

Table 3.3: Any Post-Secondary, Labour, and Wages — Linear Models

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Any Post-Secondary	Active in Labour Force	Employed	(Log) Annual Wages	Any Post-Secondary	Active in Labour Force	Employed	(Log) Annual Wages
	Pooled 1981 & 1991 Census							
	Men				Women			
Registered	0.060	-0.042	-0.059	-0.056	0.047	-0.045	-0.059	-0.029
	(0.009)***	(0.007)***	(0.009)***	(0.020)***	(0.008)***	(0.008)***	(0.009)***	(0.022)
Reserve	-0.049	-0.059	-0.074	-0.172	-0.021	-0.027	-0.018	-0.063
	(0.007)***	(0.006)***	(0.007)***	(0.016)***	(0.006)***	(0.006)***	(0.006)***	(0.019)***
Observations	66,745	66,745	66,745	41,620	66,140	66,140	66,140	28,165
	1991 Census							
	Men				Women			
Registered	0.057	-0.054	-0.086	-0.065	0.059	-0.051	-0.073	-0.069
	(0.013)***	(0.010)***	(0.012)***	(0.029)**	(0.012)***	(0.011)***	(0.012)***	(0.029)**
Reserve	-0.026	-0.043	-0.058	-0.199	-0.007	-0.028	-0.015	-0.049
	(0.009)***	(0.008)***	(0.009)***	(0.022)***	(0.008)	(0.008)***	(0.008)*	(0.023)**
Observations	45,780	45,780	45,780	28,240	44,745	44,745	44,745	20,585
	1991 APS							
	Men				Women			
Registered	0.055	-0.041	-0.085	-0.012	0.025	-0.043	-0.060	-0.062
	(0.028)*	(0.020)**	(0.027)***	(0.054)	(0.026)	(0.024)*	(0.026)**	(0.056)
Reserve	-0.046	-0.052	-0.034	-0.268	-0.040	-0.039	-0.015	-0.015
	(0.020)**	(0.016)***	(0.020)*	(0.046)***	(0.017)**	(0.017)**	(0.016)	(0.043)
Observations	14,280	14,280	14,280	8,910	15,010	15,010	15,010	6,990

Notes: For any post-secondary, the dependent variable is equal to 1 if the individual has a highest level of schooling of at least some college or trades, and 0 otherwise. For active in the labour force, the dependent variable is equal to 1 if the individual is employed or actively looking for work, and 0 otherwise. For labour force participation, the dependent variable is equal to 1 if the individual is employed, and 0 otherwise. The sample is restricted to Canadian-born, working-aged individuals of only NAI origin that reside in non-collective dwellings. Wage regression samples are further restricted to paid workers with at least 100 dollars in real annual wages, with zero dollars in self-employment income, and whose main source of earnings derive from wages and salaries. In addition to registration and on-reserve residence, I control for age, age-squared, marriage, official languages (French-alone, bilingual, and allophone), non-CMA residence, and eleven provinces/territories of residence. Except in the case of any post-secondary regressions, I control for seven levels of education (no schooling, grade 9 to 10, grade 11 to 13, high school certificate, some post-secondary, trades, and undergraduate/masters/PhD combined) for all outcomes of interest, except any post-secondary education. For wage and weeks worked regressions, I control for part-time. For annual wage regressions, I additionally control for weeks worked. All estimates are weighted and all frequencies are rounded to the nearest multiple of five for the census and the nearest multiple of ten for the APS. Robust standard errors in parentheses. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 3.4: Any Post-Secondary (Single-Origin NAI Individuals with Single-Origin Métis Reference Group) — DID Linear Probability Models

	(1)	(2)	(3)	(4)
	Off- and On-Reserve		Off-Reserve	
	Men	Women	Men	Women
NAI ·T	0.010	0.053	-0.016	0.044
	(0.013)	(0.013)***	(0.015)	(0.014)***
Reserve	-0.024	-0.011		
	(0.006)***	(0.006)**		
Observations	76,440	75,665	26,965	31,545

Notes: The dependent variable is equal to 1 if the individual has a highest level of schooling of at least some college or trades, and 0 otherwise. The sample is restricted to Canadian-born, working-aged individuals of either single NAI or Métis origins that reside in non-collective dwellings. In addition to on-reserve residence, I control for age, age-squared, marriage, official languages (French-alone, bilingual, and allophone), non-CMA residence, and eleven provinces/territories of residence. All estimates are weighted and all frequencies are rounded to the nearest multiple of five. Robust standard errors in parentheses. $*p < 0.10$, $**p < 0.05$, $***p < 0.01$.

Table 3.5: Any Post-Secondary (Single-Origin NAI Individuals with Single-Origin British Reference Group) — DID Linear Probability Models

	(1)	(2)	(3)	(4)
	Off- and On-Reserve		Off-Reserve	
	Men	Women	Men	Women
NAI ·T	0.046	0.066	0.025	0.062
	(0.005)***	(0.005)***	(0.009)***	(0.008)***
Reserve	-0.017	-0.011		
	(0.005)***	(0.005)**		
Observations	1,353,355	1,381,235	1,302,430	1,335,635

Notes: The dependent variable is equal to 1 if the individual has a highest level of schooling of at least some college or trades, and 0 otherwise. The sample is restricted to Canadian-born, working-aged individuals of either single NAI or British origins that reside in non-collective dwellings. In addition to on-reserve residence, I control for age, age-squared, marriage, official languages (French-alone, bilingual, and allophone), non-CMA residence, and eleven provinces/territories of residence. All estimates are weighted and all frequencies are rounded to the nearest multiple of five. Robust standard errors in parentheses. $*p < 0.10$, $**p < 0.05$, $***p < 0.01$.

Table 3.6: Any Post-Secondary (Single-Origin NAI Women with Non-Registered Husbands) — DID Linear Probability Models

	(1)	(2)	(3)	(4)
	Off- and On-Reserve		Off-Reserve	
	Métis-Origin Reference Group	British-Origin Reference Group	Métis-Origin Reference Group	British-Origin Reference Group
NAI ·T	0.043	0.062	0.040	0.059
	(0.013)***	(0.007)***	(0.015)***	(0.008)***
Reserve	-0.004	-0.013		
	(0.007)	(0.006)**		
Observations	47,845	1,352,380	27,485	1,330,830

Notes: The dependent variable is equal to 1 if the individual has a highest level of schooling of at least some college or trades, and 0 otherwise. The sample is restricted to Canadian-born, working-aged women of either single NAI, Métis, or British origins that reside in non-collective dwellings and are married to non-registered husbands. In addition to on-reserve residence, I control for age, age-squared, marriage, official languages (French-alone, bilingual, and allophone), non-CMA residence, and eleven provinces/territories of residence. All estimates are weighted and all frequencies are rounded to the nearest multiple of five. Robust standard errors in parentheses. $*p < 0.10$, $**p < 0.05$, $***p < 0.01$.

Table 3.7: Any Post-Secondary (Single-Origin NAI Individuals Aged 25 to 44 with Single-Origin Métis Reference Group) — DID Linear Probability Models

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Off- and On-Reserve									
	Men					Women				
NAI ·T	0.007	0.006	0.004	0.004	0.001	0.063	0.060	0.060	0.041	0.042
	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.016)***	(0.016)***	(0.016)***	(0.016)***	(0.016)***
Reserve	-0.031	-0.030	-0.024	-0.017	-0.015	-0.025	-0.026	-0.016	-0.016	-0.005
	(0.008)***	(0.008)***	(0.008)***	(0.007)**	(0.007)**	(0.007)***	(0.007)***	(0.007)**	(0.007)**	(0.007)
Age	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Language	No	No	Yes	Yes	Yes	No	No	Yes	Yes	Yes
Household Education	No	No	No	Yes	Yes	No	No	No	Yes	Yes
Married	No	No	No	No	Yes	No	No	No	No	Yes
Income	No	No	No	No	Yes	No	No	No	No	Yes
Observations	52,795	52,795	52,795	52,795	52,795	53,080	53,080	53,080	53,080	53,080
	Off-Reserve									
	Men					Women				
NAI ·T	-0.031	-0.031	-0.033	-0.026	-0.028	0.048	0.044	0.044	0.033	0.033
	(0.019)	(0.019)	(0.019)*	(0.018)	(0.018)	(0.018)***	(0.018)**	(0.018)**	(0.017)*	(0.017)*
Age	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Language	No	No	Yes	Yes	Yes	No	No	Yes	Yes	Yes
Household Education	No	No	No	Yes	Yes	No	No	No	Yes	Yes
Married	No	No	No	No	Yes	No	No	No	No	Yes
Income	No	No	No	No	Yes	No	No	No	No	Yes
Observations	18,925	18,925	18,925	18,925	18,925	22,660	22,660	22,660	22,660	22,660

Notes: The dependent variable is equal to 1 if the individual has a highest level of schooling of at least some college or trades, and 0 otherwise. The sample is restricted to Canadian-born individuals of either single NAI or Métis origins between the ages of 25 and 44, inclusively, and that reside in non-collective dwellings. I control for reserve residence, non-CMA residence, and eleven provinces/territories of residence for all specifications. I variously control for age, age-squared, marriage, official languages (French-alone, bilingual, and allophone), four dummies for highest level of education amongst all members of the household other than the individual (high school certificate, some post-secondary, trades, and BA or greater), and real household total income. All estimates are weighted and all frequencies are rounded to the nearest multiple of five. Robust standard errors in parentheses. $*p < 0.10$, $**p < 0.05$, $***p < 0.01$.

Table 3.8: Census Other Summary Statistics – Single-Origin NAI Individuals

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Men						Women					
	On-Reserve Registered		Off-Reserve Registered		Off- & On-Reserve Non-Registered		On-Reserve Registered		Off-Reserve Registered		Off- & On-Reserve Non-Registered	
	1981	1991	1981	1991	1981	1991	1981	1991	1981	1991	1981	1991
25 to 29 years	0.217	0.217	0.252	0.245	0.261	0.205	0.229	0.226	0.244	0.231	0.244	0.207
	(0.412)	(0.412)	(0.434)	(0.430)	(0.439)	(0.404)	(0.420)	(0.419)	(0.430)	(0.421)	(0.430)	(0.406)
30 to 34 years	0.182	0.194	0.207	0.211	0.212	0.210	0.175	0.200	0.215	0.196	0.204	0.216
	(0.386)	(0.395)	(0.405)	(0.408)	(0.409)	(0.407)	(0.380)	(0.400)	(0.411)	(0.397)	(0.403)	(0.412)
35 to 39 years	0.143	0.153	0.158	0.160	0.140	0.177	0.141	0.150	0.162	0.180	0.144	0.191
	(0.350)	(0.360)	(0.365)	(0.366)	(0.347)	(0.382)	(0.348)	(0.357)	(0.369)	(0.384)	(0.351)	(0.393)
40 to 44 years	0.123	0.129	0.113	0.131	0.117	0.141	0.121	0.120	0.133	0.127	0.134	0.127
	(0.328)	(0.335)	(0.317)	(0.337)	(0.322)	(0.348)	(0.326)	(0.325)	(0.339)	(0.333)	(0.340)	(0.333)
45 to 49 years	0.108	0.102	0.102	0.100	0.086	0.103	0.106	0.098	0.091	0.091	0.101	0.097
	(0.310)	(0.302)	(0.303)	(0.299)	(0.281)	(0.305)	(0.308)	(0.297)	(0.287)	(0.287)	(0.301)	(0.296)
50 to 54 years	0.091	0.081	0.075	0.069	0.068	0.069	0.091	0.080	0.069	0.081	0.075	0.065
	(0.287)	(0.273)	(0.264)	(0.253)	(0.251)	(0.253)	(0.288)	(0.271)	(0.254)	(0.273)	(0.263)	(0.247)
55 to 59 years	0.075	0.070	0.054	0.049	0.065	0.053	0.074	0.069	0.052	0.056	0.060	0.053
	(0.264)	(0.255)	(0.226)	(0.215)	(0.247)	(0.224)	(0.262)	(0.253)	(0.221)	(0.230)	(0.238)	(0.225)
60 to 64 years	0.061	0.054	0.039	0.036	0.051	0.042	0.063	0.057	0.034	0.039	0.038	0.043
	(0.240)	(0.227)	(0.194)	(0.188)	(0.220)	(0.201)	(0.242)	(0.232)	(0.182)	(0.194)	(0.192)	(0.203)
English	0.878	0.892	0.869	0.911	0.803	0.517	0.859	0.879	0.891	0.913	0.858	0.494
	(0.327)	(0.311)	(0.337)	(0.285)	(0.398)	(0.500)	(0.348)	(0.326)	(0.311)	(0.281)	(0.349)	(0.500)
French or Allophone	0.097	0.086	0.055	0.040	0.085	0.223	0.126	0.103	0.057	0.040	0.070	0.282
	(0.296)	(0.280)	(0.228)	(0.197)	(0.280)	(0.417)	(0.331)	(0.304)	(0.232)	(0.197)	(0.255)	(0.450)
Bilingual	0.025	0.022	0.075	0.049	0.111	0.260	0.016	0.019	0.052	0.046	0.072	0.224
	(0.156)	(0.148)	(0.264)	(0.216)	(0.315)	(0.439)	(0.124)	(0.135)	(0.221)	(0.210)	(0.259)	(0.417)
Quebec, Ontario,	0.449	0.330	0.362	0.312	0.472	0.691	0.468	0.341	0.346	0.310	0.451	0.708
& Atlantic Provinces	(0.497)	(0.470)	(0.481)	(0.464)	(0.499)	(0.462)	(0.499)	(0.474)	(0.476)	(0.462)	(0.498)	(0.455)
Manitoba	0.137	0.177	0.128	0.116	0.079	0.043	0.132	0.178	0.137	0.130	0.093	0.042
	(0.343)	(0.382)	(0.334)	(0.320)	(0.270)	(0.202)	(0.338)	(0.383)	(0.344)	(0.337)	(0.290)	(0.199)
Saskatchewan	0.121	0.141	0.090	0.132	0.057	0.042	0.121	0.139	0.108	0.123	0.063	0.040
	(0.326)	(0.348)	(0.286)	(0.338)	(0.233)	(0.201)	(0.326)	(0.346)	(0.311)	(0.328)	(0.243)	(0.197)
Alberta	0.113	0.119	0.101	0.125	0.105	0.078	0.111	0.123	0.119	0.141	0.114	0.077
	(0.317)	(0.324)	(0.302)	(0.331)	(0.306)	(0.269)	(0.315)	(0.328)	(0.324)	(0.348)	(0.318)	(0.267)
British Columbia	0.180	0.228	0.205	0.220	0.248	0.129	0.168	0.217	0.215	0.224	0.237	0.117
	(0.384)	(0.420)	(0.404)	(0.414)	(0.432)	(0.336)	(0.374)	(0.412)	(0.411)	(0.417)	(0.425)	(0.322)
Territories	0.000	0.003	0.114	0.094	0.039	0.017	0.000	0.003	0.075	0.072	0.042	0.015
	(0.000)	(0.056)	(0.318)	(0.292)	(0.194)	(0.130)	(0.000)	(0.054)	(0.263)	(0.259)	(0.201)	(0.123)
Non-CMA	0.846	0.859	0.490	0.312	0.487	0.307	0.841	0.855	0.453	0.286	0.461	0.272
	(0.361)	(0.348)	(0.500)	(0.463)	(0.500)	(0.461)	(0.366)	(0.352)	(0.498)	(0.452)	(0.499)	(0.445)
Observations	13,785	34,700	4,960	7,325	2,220	3,760	12,080	31,195	6,650	9,790	2,670	3,760

Notes: The sample is restricted to Canadian-born, working-aged individuals of only NAI origin that reside in non-collective dwellings. Means are weighted and all frequencies are rounded to the nearest multiple of five. Standard deviations in parentheses.

Table 3.9: APS Other Summary Statistics – Single-Origin NAI Individuals

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Men					Women				
	On-Reserve		Off-Reserve		Off- & On-Reserve	On-Reserve		Off-Reserve		Off- & On-Reserve
	Registered Non-C-31	Registered C-31	Registered Non-C-31	Registered C-31	Non-Registered	Registered Non-C-31	Registered C-31	Registered Non-C-31	Registered C-31	Non-Registered
25 to 29 years	0.209	0.237	0.211	0.196	0.200	0.231	0.201	0.265	0.180	0.190
	(0.407)	(0.425)	(0.408)	(0.398)	(0.400)	(0.422)	(0.401)	(0.442)	(0.384)	(0.392)
30 to 34 years	0.198	0.208	0.263	0.243	0.233	0.203	0.188	0.206	0.150	0.214
	(0.398)	(0.406)	(0.440)	(0.429)	(0.423)	(0.402)	(0.391)	(0.404)	(0.357)	(0.411)
35 to 39 years	0.156	0.151	0.156	0.172	0.150	0.146	0.151	0.174	0.176	0.197
	(0.363)	(0.358)	(0.363)	(0.378)	(0.357)	(0.353)	(0.358)	(0.379)	(0.381)	(0.398)
40 to 44 years	0.124	0.115	0.124	0.112	0.145	0.114	0.123	0.115	0.148	0.135
	(0.329)	(0.319)	(0.329)	(0.316)	(0.352)	(0.318)	(0.328)	(0.319)	(0.355)	(0.342)
45 to 49 years	0.103	0.092	0.098	0.088	0.102	0.093	0.117	0.087	0.127	0.102
	(0.304)	(0.289)	(0.297)	(0.284)	(0.303)	(0.290)	(0.321)	(0.282)	(0.333)	(0.302)
50 to 54 years	0.083	0.090	0.065	0.073	0.065	0.084	0.097	0.075	0.084	0.065
	(0.276)	(0.287)	(0.246)	(0.260)	(0.246)	(0.277)	(0.296)	(0.264)	(0.278)	(0.246)
55 to 59 years	0.072	0.066	0.050	0.058	0.061	0.073	0.060	0.040	0.085	0.055
	(0.259)	(0.248)	(0.219)	(0.234)	(0.240)	(0.260)	(0.237)	(0.195)	(0.279)	(0.227)
60 to 64 years	0.056	0.041	0.033	0.057	0.043	0.056	0.064	0.038	0.050	0.042
	(0.229)	(0.199)	(0.179)	(0.232)	(0.204)	(0.229)	(0.245)	(0.192)	(0.218)	(0.202)
English	0.883	0.861	0.904	0.906	0.461	0.869	0.834	0.915	0.920	0.486
	(0.322)	(0.346)	(0.295)	(0.292)	(0.499)	(0.337)	(0.372)	(0.279)	(0.271)	(0.500)
French or Allophone	0.093	0.104	0.039	0.049	0.250	0.115	0.138	0.040	0.038	0.283
	(0.291)	(0.306)	(0.194)	(0.215)	(0.433)	(0.319)	(0.345)	(0.196)	(0.192)	(0.450)
Bilingual	0.024	0.035	0.057	0.046	0.289	0.016	0.028	0.045	0.041	0.232
	(0.153)	(0.183)	(0.233)	(0.209)	(0.454)	(0.126)	(0.166)	(0.208)	(0.199)	(0.422)
Quebec, Ontario	0.305	0.444	0.282	0.342	0.717	0.315	0.426	0.300	0.331	0.689
& Atlantic Provinces	(0.460)	(0.497)	(0.450)	(0.475)	(0.451)	(0.465)	(0.495)	(0.458)	(0.471)	(0.463)
Manitoba	0.196	0.154	0.104	0.139	0.040	0.190	0.175	0.152	0.134	0.043
	(0.397)	(0.361)	(0.305)	(0.346)	(0.197)	(0.392)	(0.380)	(0.360)	(0.341)	(0.203)
Saskatchewan	0.169	0.056	0.158	0.077	0.043	0.169	0.068	0.144	0.070	0.039
	(0.375)	(0.230)	(0.365)	(0.267)	(0.204)	(0.375)	(0.252)	(0.351)	(0.255)	(0.193)
Alberta	0.125	0.083	0.104	0.109	0.091	0.131	0.076	0.140	0.136	0.105
	(0.330)	(0.276)	(0.306)	(0.312)	(0.287)	(0.338)	(0.265)	(0.347)	(0.343)	(0.307)
British Columbia	0.203	0.256	0.257	0.221	0.098	0.192	0.250	0.189	0.264	0.118
	(0.402)	(0.437)	(0.437)	(0.415)	(0.298)	(0.394)	(0.433)	(0.392)	(0.441)	(0.323)
Territories	0.003	0.007	0.094	0.112	0.010	0.002	0.005	0.074	0.065	0.006
	(0.051)	(0.081)	(0.292)	(0.315)	(0.101)	(0.050)	(0.070)	(0.262)	(0.247)	(0.074)
Non-CMA	0.968	0.953	0.524	0.590	0.484	0.964	0.942	0.477	0.560	0.487
	(0.177)	(0.211)	(0.500)	(0.492)	(0.500)	(0.186)	(0.233)	(0.500)	(0.497)	(0.500)
Observations	9,450	1,350	1,690	690	1,110	8,940	1,540	2,230	1,100	1,200

Notes: The sample is restricted to Canadian-born, working-aged individuals of only NAI origin that reside in non-collective dwellings. Means are weighted and all frequencies are rounded to the nearest multiple of ten. Standard deviations in parentheses.

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