The Long Term Effects of Forcible Assimilation Policy: The Case of Indian Boarding Schools

October 31, 2013

Abstract

For decades in North America and Australia, indigenous children were forcibly removed from their homes and placed in boarding schools. These schools often had the stated goal of cultural assimilation and are generally perceived to have been an educational failure. I offer the first causal evidence on the long run effects of these schools using the interaction of changes in Canadian national policy and the incentives of the Catholic Church. I find that on average boarding schools had substantial effects on both cultural and economic assimilation. However, I find suggestive evidence that highly abusive schools only resulted in cultural loss.

1   Introduction

There are 370 million indigenous people throughout the world (UN 2009) and despite their diversity they often live in more difficult economic and social circumstances than the average people in their countries. In the United States, for example, American Indians on reservation make 39 percent less than the average American (Cornell and Kalt 2010), while in Canada registered Indians earn 45 percent less the average Canadian (MacDonald and Wilson 2010). Similar disparities exists in Australia (Altman, Biddle and Hunter 2008), New Zealand (Maani 2004), Latin America (Hall and Patrinos 2006), the Arctic and Northern Europe (Andersen, Kruse and Poppel 2002) and in Asia and Africa (Hall and Patrinos 2012). Yet, only a handful of economists have contributed to the discussion on the causes of this disparity.[1]   This paper examines the long run consequences of a policy often attributed

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[1]The literature that exists includes the work by Cornell and Kalt (2000); Evans and Topoleski (2002); Dippel (2012); Sunde, Jorgensen, and Akee (2012); Akee (2009); and Kuhn and Sweetman (2002).

with devastating consequences for Indigenous people across the world: the forcible removal of children from their homes and their placement in Indian boarding (residential) schools. These institutions are now illegal under international law (United Nations Declaration of the Rights of Indigenous people 2007) and have captured international attention (BBC News 2008; Smith 2009; The Economist 2000).

For decades, numerous governments throughout the world implemented residential schooling policies with the help of various religious organizations. These policies aimed not only to educate Indigenous children, but to immerse them in a European way of life.[2] Hundreds of thousands of children in the United States, Canada and Australia have been affected by child removal and residential schools and in all three countries there have been calls for compensation and federal government apologies.[3] In Canada and Australia these policies have been subject to scathing public inquiries (RCAP 1991, Commonwealth of Australia 1997) and, in Canada, they have resulted in the largest class action settlement in Canadian history (Reimer 2010) and are notorious for physical and sexual abuse.[4] However, despite the wide spread nature of these institutions and the numerous individual accounts of the negative impact of residential schools (Haig-Brown 1991; Fournier and Crey 1997; Grant 1996), there does not exist any rigorous statistical research on the school's long run consequences.[5] I fill this gap and study residential schooling's long-run consequences for both economic and cultural assimilation using several novel sources of Canadian data.[6] Economic assimilation is measured by the probability of high school graduation, employment and the receiving social assistance while cultural assimilation is measured by the likelihood of leaving traditional communities, speaking an Aboriginal language at home and participating in traditional activities.

I overcome the fact that the Canadian federal government systematically selected children to attend residential schools by leveraging the conflicting objectives of the Catholic Church,

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[2]See Miller (1996), Milloy (1999), Smith (2009), Glenn (2011), Dawson (2012).

[3]See Rudd (2008), Harper (2008), Gover (2000), BSHP (2008-2011), and Cassidy (2009).

[4]The Economist (2000); Smith (2009); Miller (1996); Milloy (1999); Nuu-Chah-Nulth Tribal Council (1996), The Cariboo Tribal Council (1991); Claes and Cliffton (1998); The Truth and Reconciliation Commission of Canada. (2012); and Grant (1996).

[5]The few statistics that exist are compiled by Nuu-Chah-Nulth Tribal Council (1996), The Cariboo Tribal Council (1991); Commonwealth of Australia (1997).

[6]The Canadian experience is similar in many respects to the American one (Smith 2009; Glenn 2011). In fact the Canadian system was based off of the American one (Milloy 1999, Miller 1996). While examining the American case would be interesting, there is no equivalent data I am aware of to address it.

the government and the Aboriginal people. Specifically, when the federal government started to shut down the residential schooling system the Catholic Church differentially resisted the schools being closed based on the local availability of alternative religious infrastructure and competition. I take advantage of this variation within communities and cohorts by interacting the non-indigenous religious concentration surrounding an Aboriginal community in 1941 with the national trend in residential school enrollment. Consequentially, identification is based on the assumption that the interaction between the initial regional variation in the non-indigenous religious composition and national changes in residential school enrollment is not correlated with changes in outcomes within cohorts and Aboriginal communities.[7]

While most academics have argued that residential schooling produced a culturally stranded, uneducated and impoverished population, some believe the institutions generated a culturally connected, educated elite that spent their careers fighting for Indigenous rights.[8] Which depiction (if either) is correct has substantial implications for the economic development of Aboriginal communities. For example, a large body of literature suggests that accumulation of formal education is a driver of economic development,[9] and research on the economic conditions of American Indian reservations suggests that formal institutions which are rooted in traditional culture are the most successful (Dippel 2011; Cornell and Kalt 2000). The broader literature on the long term effects of historic trauma, such as the slave trade (Nunn 2008) and the holocaust (Acemoglu, Hassan, and Robinson 2011), would also suggest that residential schooling could have far reaching consequences.

I find evidence that attendance at a residential school results in both economic and cultural assimilation. Once selection into residential school attendance is accounted for, I find the increase in economic assimilation is substantial: even conditional on reaching high school, residential schooling increases the likelihood of graduation by 17 percent. Residential school-

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[7] This is not unlike the strategies used in the local labor market literature that interacts initial regional variation with national trends (Bartik (1993) and Blanchard and Katz (1992)). I also use opening, closure and proximity to school as identifying variation in additional specifications. This follows in the spirit of Duflo (2004), Card (1995), Tyler (1994), and Neal (1997).

[8] Those that argue the former include Milloy (1999), Miller (1996, 2001), RCAP (1996), AFN (2002), Nuu-chah-nulth Tribal Council (1996), Cariboo Tribal Council (1991), and Adams (1999). Those that argue the later include Glenn (2011), Gresko (1979), Szaz (2006), Miller (1996), and Reyhner and Eder (2004).

[9] This literature is extensive, but citations include Lucas (1988); Mankiw, Romer, and Weil (1992); Benhabib and Spiegel (1994); Hanushek and Kimko (2000); and Aghion et. al. (2005).

ing also reduces the likelihood of relying on government transfers by 16 percent and increases the probability of being employed in the labor market by approximately 15 percent and raises wages. The loss in traditional skills and cultural connection is also significant: individuals are 16 percent more likely to live outside Aboriginal communities, 10 percent less likely to participate in traditional activities and 8 percent less likely to speak an Aboriginal language in the home. These effects are substantial: for example less than 20 percent of Aboriginal people in the sample speak an Aboriginal language at home.[10]

I also find that even though residential schools actively, and at times aggressively, attempted to eliminate cultural connection the extreme assimilation policy *within* the schools did not drive cultural loss. Segregating indigenous children from non-indigenous children in residential schools may have actually preserved cultural connectedness into adulthood relative to alternatives that also removed them from the home. Those children that lived with and went to school with predominately non-indigenous people, were if anything are more economically and culturally assimilated than those that attended residential school with their indigenous peers. The results suggest culture is transmitted through knowledgeable reference groups rather than through force. This speaks to the broader notion that individuals are most naturally assimilated when they are removed from their traditional reference group, especially during youth. This assumption is embedded in the research on identity and assimilation and inherent in government policies that attempt to break up ethnic communities or restrict the locations of immigrant settlement.[11] As far as I am aware this is the first research demonstrating this empirically. My results also demonstrate that while externally attempting to impose culture without the full removal of a traditional reference group is not the most effective assimilation policy, partial removal can still have a substantial impact.

While residential schools are an extreme example, public educational institutions generally play some form of assimilative role and my results highlight the potential cultural

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[10] These findings are consistent with the work done by Curto and Fryer (2013), but unlike in their work on urban boarding schools for the poor, the results are not driven by females. It is also important to understand that residential schools attendance, unlike urban boarding schools removed children from their families and communities for most of the year and sometimes years at a time. In addition, attendance at the schools Curto and Fryer (2013) study is voluntary. Attendance at a residential school over the time period I investigate was not.

[11] See Austen-Smith and Fryer (2005), Fryer and Torelli (2005), Akerlof and Kraton (2000), and Fryer and Levitt (2004) for the literature on identity.

consequences of these policies. The cultural effects of public educational institutions are potentially fundamental in how parents make educational decisions for their children and should be accounted for in the evaluation of educational policy (Justman and Gradstein 2008). As far as I am aware, this is the first empirical effort to identify these costs.

Residential schools are notorious for the abuses children suffered while attending. I address this by examining whether the effects of attending a residential school differ based on the abusiveness of the environment. To measure the abusiveness of the environment, I construct a ratio of filed abuse claims to the number of children that attended a given residential school over a given decade. I also examine whether the effect of residential schooling differs by the religion of the school. While I find the religion of the school matters little, relatively extreme ratios of abuse claims to enrollments are negatively related to economic and social outcomes.
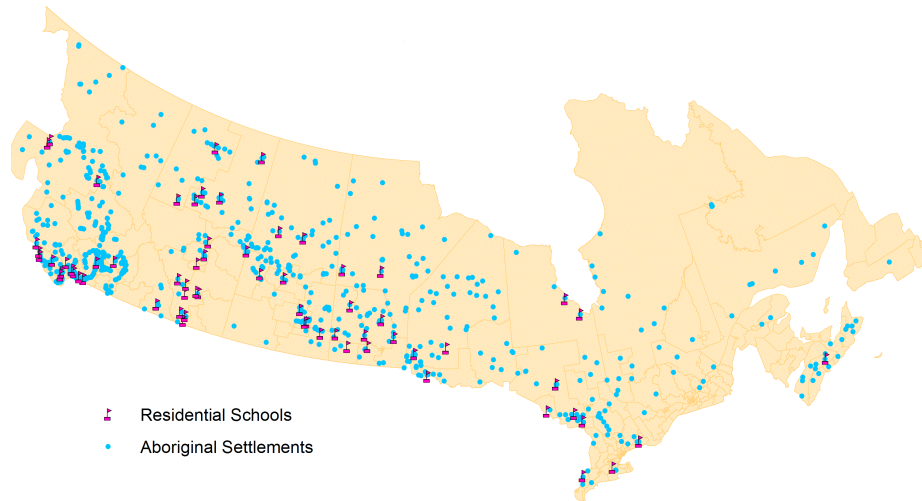
Section 2 gives a brief description of residential schooling, its alternatives and the main actors in the system in order to put it into context. Section 3 discusses the main data sources used, the basic patterns in the data and explains how the selective process on the part of the federal government results in an identification problem. Section 4 formalizes the intuition given in Section 3 by laying out an empirical model of the residential schooling system in order to be precise about the nature of the identification problem. This section also clarifies how leveraging the disjoint objectives of the church, the federal government and the Aboriginal people provides a solution to the identification problem. Section 5 describes the additional data used to estimate the model presented in Section 4 and Section 6 presents the main results and extensions.

2   Brief Background

A total of 139 residential schools existed and operated in every province and territory except Newfoundland and Prince Edward Island. Approximately 150,000 Aboriginal children attended these schools with more than half of these former students still living today (TRC

2012).[12] Figure 1 shows the distribution of residential schools across the country during the peak of the system in 1930. The flags represent the locations of residential schools and the dots indicate the centroid of Aboriginal communities included in the 1991 Census.

Figure 1: Location of Residential Schools in 1930 and Aboriginal Settlements

Residential schools were located both within Aboriginal communities and as far as hundreds of kilometers away. Although children were permitted to return home for summer vacation, children were often taken extraordinary distances to attend a residential school and many didn't see their family for years (Miller 1996, 311-312; Aboriginal Healing Foundation, 2002; McFarlane 1999). Unlike schools attended only during the day (day schools) the residential schooling system operated on a half day system officially until 1951. Half the day was spent in academics and religion and the other half in skills such as shoe-making and other trades (Milloy 1999; Miller 1996). However, by 1910, the half day system involved more manual labour than education in trades (Gresko 1986). Regimes at these schools tended to be much more regulated than a student's life at home and also involved cultural learning

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[12]The history of residential schooling in Canada is it is often intertwined with broader and sensitive issues. I discuss here only the elements of the system necessary for understanding what follows for the sake of briefty. For a more detailed summary on the details of the Canadian system see The Truth and Reconciliation Commission of Canada (2012). A more substantial historical summary is available from the author at request.

such as ethics, differences between white and Indian ways of life, and gender roles (Gresko 1986; Barman 1986; Miller 1996; Milloy 1999). Children were only permitted to speak English and were either punished for speaking their native language or rewarded for not. Some of these punishments were severe. Examples of severe punishment include beatings to the point of permanent scarring (Crey and Fournier 1998, 62) and the insertion of needles into tongues (Aboriginal Healing Foundation 2002, 6). Parental visits were restricted (Barman 1986) and parents are frequently described as resistant to the residential schooling system and attempted to prevent their children from attending these schools both indirectly and overtly (Furniss 1995). Not until the late 1960s and early 1970s did Aboriginal parents have any active choice in the education of their children. Before then, "Indians took no part in the processes of education," (Hawthorn 1967, 40). If Aboriginal parents did not have their children sent to a residential school, they attended a federal (often religious) day school (Hamilton 1986,17-18; The Department of Citizenship and Immigration 1965).

The system involved three main actors: religious organizations (who opened, closed and operated the schools for most of their history); the federal government (who funded, regulated and enforced attendance); and the Aboriginal families (whose children could be compelled to attend these schools). The federal government's formal involvement began shortly after confederation in 1867 and was inspired by a complementary report on the Indian boarding schools in the United States (The Davin Report 1879). For most of the system's history, the federal government had very little direct involvement in the operation of the residential schools and relied on Church participation. The federal government provided per capita grants and funds to establish schools, but the religious organizations were the ones to propose the construction of a school and its location. This religious involvement with residential schooling would continue until 1969 when the government and various religious denominations would end their partnership (Milloy 1999).
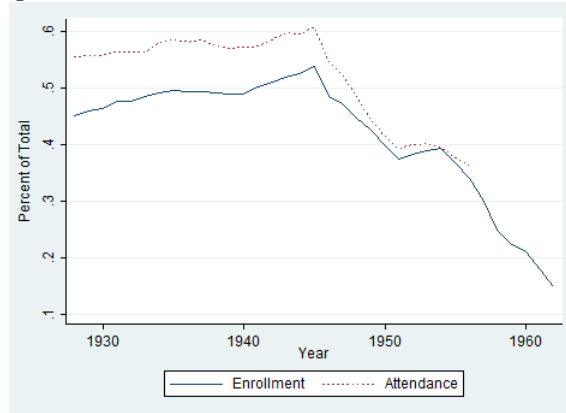
In addition to providing funding, and eventually regulations, for the residential schooling system, the federal government also enforced attendance at residential schools. In 1920, an amendment to the Indian Act made school attendance mandatory for all Indian children

between the ages of seven and fifteen. Section A10(1) of the 1920 Indian Act states that "every Indian child between the ages of seven and fifteen years who is physically able shall attend such day, industrial or boarding school as may be designated by the Superintendent General...Provided, however, that such school shall be the nearest available school *of the kind required*," (Indian Act 1920, Emphasis added). The Act did not clearly define what determined the type of school that was "of the kind required" and left a substantial amount of discretion to the Superintendent General for student selection. This discretion resulted in residential schools being operated for "orphan children, children from broken homes and those who because of isolation or the migratory way of life of their families, are unable to attend day schools," (The Administration of Indian Affairs 1964, 44). A series of confidential reports by Indian Affairs suggests that from the 1950s to mid-1960s 40 to 75 percent of children in residential schools were deemed to be neglected (Milloy 1999). It should be noted that many children that were perceived to be neglected may actually have been well cared for and their removal was a consequence of cultural misunderstanding (Johnston 1983; Jacobs and White 1992; Milloy 1999).

How strictly the Indian Act was enforced came down to the discretion of the government agent on reserve (the Indian Agent). If the Indian Agent desired to enforce the law to its full extent, children could be forcefully removed from their home by truancy officers and their parents subject to fines or imprisonment (Indian Act 1920). Some parents attempted to fight the system but were punished or threatened into submission (Haig-Brown 1991, 95-96; Haig-Brown 1991, 109). After 1945 parents could also loose a substantial monthly income supplement if they did not comply legislation (Milloy 1999, 205).

Figure 2 shows a sharp change in government enforcement of attendance at residential schools in 1945 system after harsh critiques were presented by Aboriginal peoples and members of the Indian Affairs department during Canada's review of its affairs after the Second World War (Leslie 2002). They began to favor the integration of Aboriginal and non-aboriginal children into provincially funded public schools. Aboriginal children were only to be segerated in day schools only when their integration into provincial public school

Figure 2: The Percentage of Enrollment and Attendance Accounted for By Residential Schools

was geographically prohibited (Hawthorn 1967; Milloy 1999). While residential schools accounted for over 50 percent of enrollments in schools in 1945, they accounted for less than 20 percent by 1965. This notable decline in government enforcement at the national level will be used as part of the variation in identification.

By 1967, approximately 50 percent of Indian children attended integrated provincial public schools (Hawthorn 1967). Figure 3 demonstates that if a child were to attend high school, they would either attend a provincial public school or a residential school. Whether public schools offered a better learning environment than residential schools is not obvious. Socioeconomic and cultural misunderstandings between parents and teachers were prevalent. Children were often sent home because they were "dirty" or "improperly dressed." This was often difficult to remedy due to the lack of bathing facilities in many Aboriginal homes. In addition, many Aboriginal students did not speak English or French as their first language and this resulted in communication barriers with their teachers at public schools (Hawthorn 1967). In addition, those children that could attend a public school from home could face bus commutes as long as two hours each way (Educational Task Force 1975, 33). Some children were simply too far from public schools to commute, so they would had to leave their homes to attend high school. If they did not stay in a residential school with other Aboriginal children, they stayed in private, predominately white boarding homes. These became a prevailing option after the closure of residential schools (Educational Task Force

Figure 3: Composition of Enrollment
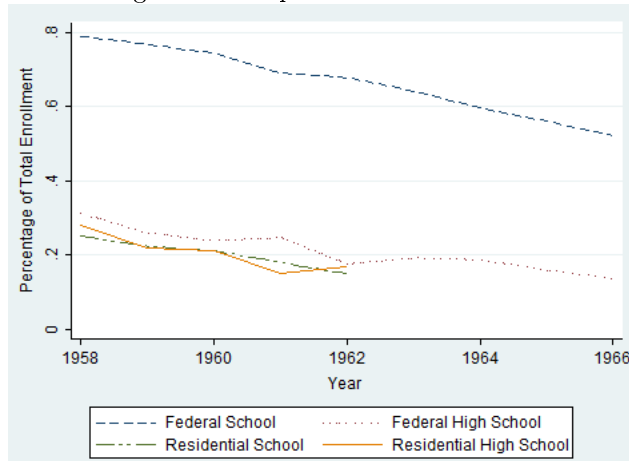
1975). This source of variation will be explored further in the empirical section to examine the mechanisms that affect long term assimilation.

Of the total denominational residential schools approximately 60 percent were Catholic, 30 percent were Anglican and the remainder divided between various other Protestant groups (AANDC 2012). Missionaries had been setting up residential schools as part of an education and conversion effort since the 1600s in New France, but the schools only started to establish longevity with the help of the federal government in British Canada in the 1830s (Miller 1996). The churches' perceptions were often paternalistic: some seemed to believe that they were more capable of determine an Aboriginal community's needs than the community itself. For example, the Anglican Church believed that "the Church represents in many of these developing areas the appropriate voice of peoples slowly emerging into community consciousness," (Anglican Church of Canada, Joint Committee, 1960, 796). These sorts of attitudes, the lack of involvement and control of Aboriginal people, and the explicit requests for day schools during treaty negotiations (Carr-Stewart 2001) suggest that the existence of residential schools was due to supply, rather than demand concerns. The government showed surprising lack of direction and control in the construction and location of residential schools and rarely ever rejected a Church's request for school funding (Milloy 1999, 56-58). The "battle for the souls" between various religious denominations often led to the quick

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establishment of residential schools and played a pivotal role in the operation of the system (Miller 2001). In fact, church political influence and passion extended the system far past the date the government believed it was optimal policy. The federal government at times faced fierce religious opposition to residential school closure, most notably on the part of the Catholic Church in Western Canada (Hawthorn 1967, Milloy 1999). This opposition to school closure is part of the reason the system took so long to shut down since the government inital change in policy depicted in Figure 2. Perhaps this view is best expressed in one of the most extensive reviews of Aboriginal affairs in Canadian history: "An examination of the attitudes of the denominational groups throws a light on the opposition experienced by the Indian Affairs Branch in its search for viable solutions. These attitudes act as a brake on the development of Indian education through the stress they place on their own privileges and on the dangers which school integration presents to faith and morals," (Hawthorn 1967, 62).

Certain areas in western Canada were "hives of evangelism" – fractionalized amongst various religious groups and were political hot spots where religious control of education was particularly contentious and arguably there was an incentive for the Catholic church to hold as much ground as possible with the Aboriginal population (Miller 2001, 143; (Milloy 1990, 229). After extensively reviewing Indian Affairs department files acquired through the Freedom of Information Act, the preeminent historian on residential schooling in Canada concluded that "it was not study, nor quiet rational consideration and discussion, that dominated the discourse on the western schools over the next decade but political struggles over the fate of each school...the Department saw the church's hand behind every incident of opposition" and the fight took on a greater character of "who would control Indian communities"; there was even a suspicion in the Indian Affairs department that the various religious denominations and sympathetic officials were admitting children to residential schools who were not even perceived to be neglected in any sense in order to simply to keep the schools open (Milloy 1999, 231, 219).

In section 4 I argue that this struggle and the conflicting goals of the Church, the federal

government, and Aboriginal families allows for identification of the impact of residential schooling on long term outcomes. Specifically, we can use the fact that the opening and closing of schools was not strategically driven by the federal government who controlled the selection process. In addition, even if one aruges that school opening and closure was not fully exogenous, we can exploit the fact the trend in school closure was influenced by the motivation of the location religious organization to keep the school option which arguabiliy had more to do with their own moral previlages than the demands of the Aboriginal people. The next section presents the main source of data used in this paper and presents the basic patterns. I argue that these patterns may be explained by the selective process that sorted children into schools, rather than the effect of residential school attendance itself.

3   Data Source, Basic Patterns and the Identification Problem

The main body of this analysis uses the confidential 1991 Aboriginal Peoples Survey (APS) Adult Retrieval file. The APS sample was derived from the Canadian census population that answered the long form questionnaire and claimed Aboriginal ancestry and/or individuals who were registered under the Indian Act. It is important to note that the survey does not include the institutional population (such as those in prisons) nor does it include the homeless. To the extent that residential schooling increases incarceration rates or homelessness, the results here will be biased. This issue is explored further in the online data appendix.

The APS 1991 includes a substantial fraction of individuals who were between the ages of seven and fifteen during the peak of the residential schooling system who were still living and of working age. The oldest people who answered residential schooling questions were 65 years of age and would have been of the mandatory schooling age by 1933. I restrict my sample to include those individuals who are registered under the Indian Act, are members of an identified band, live in the western provinces (British Columbia, Alberta, Manitoba

Table 1: Descriptive Statistics By Residential School Attendance

	Attended	Did Not Attend
Female	0.547	0.518
	(0.012)	(0.009)
Single Ethnicity	0.926	0.705
	(0.007)	(0.009)
Latitude	52.393	52.631
	(0.060)	(0.043)
Age	40.139	30.759
	(0.286)	(0.131)
Distance to City (KM)	109.19	116.85
	(0.205)	0.151
High School Graduate	0.477	0.487
	(0.012)	(0.009)
At Least Grade 5	0.695	0.766
	(0.011)	(0.006)
Receive Government Transfers	0.372	0.274
	(0.012)	(0.007)
Employed	0.394	0.492
	(0.012)	(0.009)
In Aboriginal Community	0.559	0.348
	(0.013)	(0.006)
Participate in Traditions	0.147	0.068
	(0.009)	(0.004)
Number of Observations	5460	16999
Number of Schools		62

Notes: Standard errors are reported in parentheses. The variable labeled "Single Ethnicity" is a one if an individual claimed they only has Aboriginal ancestry and zero otherwise. The variable labeled "Participate in Traditions" equals one if an individual saw a traditional healer or participated in hunting, gathering, dancing and other traditional recreational and religious activities in the past year.

and Saskatchewan) and are aged 20 to 65. I limit my sample to those who are registered under the Indian Act and are members of a band since these are the individuals that the residential schooling system was designed for.

Table 1 shows summary statistics of the dependent and independent variables of interest by whether or not a child attended a residential school. This includes all people independent of the time their closest residential school ceased operation. Individuals who attended residential schools are more likely to be female, tend to have solely Aboriginal ethnic origins and are on average ten years older than those who did not attend residential school. They are also located closer to their nearest major city.

Although many have critized the residential schooling as an education system (Milloy

1999; RCAP 1996) table 1 suggests that children who attended a residential school are just as likely to be high school graduates as those who attended a day school. However, despite this educational equivalence Aboriginal people who attended a residential school are more likely to receive government transfers and less likely to be employed. This falls in line with earlier suggestions that the schools were ineffective at economically integrating the children that attended into the mainstream economic system (Miller 1996). On the other hand, those who attended residential school are more likely to speak an Aboriginal language at home and to participate in traditional activities than if they had not, contrary to the claim that these schools were culturally destructive. While it is possible these patterns are due to some causal relationship it is equally plausible that children that were selected to attend residential school were from relatively more traditional homes and more likely to abide by these traditions as adults. The next section lays out a framework to empirically distinguish between these two possibilities.

4   The Empirical Framework

The first possibility would be to use the large change in government policy around 1945 to identify the effect of residential schooling. The enforcement of residential school attendance by the federal government varied over time as a consequence of shifting public opinion and culminated in a sudden change in government policy as discussed above and as demonstrated in Figure 2. This figure explains why those who attended a residential school are much older than those who did not attend a residential school. However, this sharp change in policy coincided with a rising demand for education in Canada in general (Milloy 1999). At the same time, Aboriginal languages were in decline. As a consequence, subsequent generations are more likely have formal education and less likely to participate in cultural activities than the older generation are due to trends unrelated to residential school attendance. In this environment, it is clearly important to account for cohort effects which can not be seperated from national changes in government policy. It is also likely not credible to use regional variation in residential school attendance because of varying treaty obligations and geographic

circumstances of the band are likely to influence both residential school attendance and other adult outcomes.

What is left is the variation within communities over time, net of national cohort trends. While this may seem like a promising source of variation, it is not robust to the selective enforcement of residential school attendance within communities and cohorts by the government. For example, if a community had slower than average economic integration, then the federal government (based on the historical discussion above) would likely reduce pressure to attend residential schools more slowly than in areas with faster than average economic integration. If this is related to outcome differences between cohorts within communities, this source of variation will also be invalid.

Given the above discussion, it is useful to be more formal about the actions and decisions of the government, Aboriginal families, and the missionaries. In this section I lay out a simple framework based on the historical accounts of the residential schooling system. I model the federal government as an enforcement agent who desires to assimilate and educate Aboriginal children. Aboriginal families are concerned with their children's well-being and choose how much to resist their children being taken to residential school. Together, the decision rules of the government and Aboriginal families determine the demand for residential schools. Missionary organizations are assumed to care only about converting Aboriginal children and choose the supply and location of residential schools on that basis. This framework is obviously a highly stylized, but its simplicity allows me to be precise about the nature of the endogeneity concerns and assists me in clarifying my identification strategy and its plausibility.

First, assume the government attempts to educate and assimilate Aboriginal children by selectively enforcing the provision that allows the state to remove children from their homes. The level of enforcement the government chooses to implement is child specific and given by E_{ijt}, where i indexes children, j a given child's community and t their cohort. Enforcement should be thought of as the cost the government imposes on parents if the child is not sent to residential school. Second, assume that a person's well-being is determined by their adult

skills, specifically, their skills that are valued in the market and skills that are valued their traditional community. For the sake of comparability with the rest of the economics literature I will call skills that are valued in the labour market human capital and skills that are valued in a traditional community cultural capital. Aboriginal families care about whether their child attends a residential school or a day school because it has different consequences for their child's final accumulation of these skills. Aboriginal families choose some "level of resistance" regarding their child being taken to residential school based on these preferences and the other options available to their children. Parent's optimal amount of resistance is given by ψ_{ijt}^{*}.[13] A child attends a residential school if the amount of resistance chosen by their parent is less than government enforcement, $E_{ijt} > \psi_{ijt}^{*}$. This can be represented as:

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A_{ijt} = \begin{cases} 1 & \text{if} \quad E_{ijt} > \psi_{ijt}^{*} \\ 0 & \text{if} \quad \text{otherwise} \end{cases}, \tag{1}
$$

where A_{ijt} indicates attendance at a residential school.

We saw in section 2 that government enforcement varied along several dimensions. First, government enforcement varies by cohort due to changes in policy over time (demonstrated in Figure 2). The cohort-dependent level of enforcement is given by C_t. Enforcement also varies by community: the community specific level of enforcement is given by B_j in the model.[14] This allows government preferences to vary over fixed community characteristics such as treaty region or proximity to the closest city. The government enforcement level also depends on the cost of sending a child to a residential school. The cost of enforcement for a cohort and community depends on the local supply of residential schools, given by $e(z_{jt}, \delta_j)$ where δ_j is the distance of the closest residential school to community j, and z_{jt} indicates whether the school is open when cohort t is of schooling age.[15]

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[13]Examples of parental resistance include hiding their children, physically resisting the Indian Agent, or paying fines.

[14]I use B_j to represent band which is not the same necessarily the same as geographic community. However, frequently they are and a set of fixed effects can be used for band or communities with no consequential effects on the empirical results.

[15]This can also be thought of as representing an existing contract with a religious group to operate the school for a specific band or group of bands.

Government enforcement is assumed to also depend on unobservable, individual specific, idiosyncratic endowments of market and cultural skill (which are given by h_{ijt} and κ_{ijt} respectively). The initial idiosyncratic endowments of cultural and market skill children receive will also determine their adult stocks of these skills independent of parental decisions. The government is assumed to care about these endowments since families with more adherence to traditional cultural norms were targeted historically. Adherence to traditional cultural norms is assumed to be correlated with fewer market skills because of the naturally limited time available to dedicate to each of these activities, but not perfectly so. Thus, the effect of cultural capital on the enforcement level, ρ_κ, is positive while the effect of human capital, ρ_h, is negative. I also allow the selection of individuals to depend on their gender and whether they have non-aboriginal ancestry, which is given by the vector x_{ijt}. There is also another unobservable idiosyncratic term that varies by cohort, community and individual, υ_{ijt}.[16] Thus the enforcement level for each individual is given by:

$$E_{ijt} = \lambda x'_{ijt} + C_t + B_j - e(z_{jt}, \delta_j) + \epsilon_{ijt}. \tag{2}$$

where λ is a parameter vector and $\epsilon_{ijt} = \rho_\kappa \kappa_{ijt} + \rho_h h_{ijt} + \upsilon_{ijt}$.

Aboriginal parents know that the government will enforce attendance according to Equation 2, but do not observe υ_{ijt}. Let $\bar{\kappa}_{ijt}$ represent total cultural capital and $\bar{h}_{ijt}$ total human capital. Human capital accumulates for each child according to the total amount of time they spend in school, given by τ_s, where s indexes the type of school ($s = d$ for day school and $s = b$ for residential school), multiplied by the quality of the schooling given by q. Note that the time in boardings school will be greater than the time spent in a day school so $\tau_b > \tau_d$. The amount of cultural capital accumulated is given by the amount of time a child spends with their family over the course of their schooling years. This is given by $\bar{\tau} - \tau_s$ where $\bar{\tau}$ is the total time available during their schooling years. The accumulation rate of cultural capital is given by ι. The human and cultural capital accumulation equations are

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[16]This is meant to represent Indian Agent specific preferences for residential school attendance for a particular child. Since Indian agents vary by time and place, υ also indexed by j and t.

given respectively as $\bar{h}_{ijt} = q\tau_s + h_{ijt}$ and $\bar{\kappa}_{ijt} = \iota(\bar{\tau} - \tau_s) + \kappa_{ijt}$. Parent's utility is assumed to be given by the some linear combination of $\bar{h}_{ijt}$ and $\bar{\kappa}_{ijt}$ and parents choose their optimal level of resistance, ψ^*, accordingly. To solve the parental decision problem I assume that ϵ_{ijt} is normally distributed with mean zero and variance equal to one.

To construct the outcome equations assume there exists a set of cultural outcomes, each given by κ_{ijtk} and market outcomes, e_{ijtm}, whose return is given by $\alpha_k \bar{\kappa}_{ijt} + \tilde{B}_{jk} + \tilde{C}_{tk} + \alpha'_{k2} x_{ijt}$ and $\alpha_m \bar{h}_{ijt} + \tilde{B}_{jm} + \tilde{C}_{tm} + \alpha'_{m2} x_{ijt}$ respectively.[17] The subscript m indexes market outcomes and k indexes cultural outcomes. The factors $\tilde{B}_{jk}$, $\tilde{C}_{tk}$, and $\alpha'_{k2} x_{ijt}$, allow the return to a given cultural activity k to vary by community, birth cohort and a set of individual characteristics such as gender and ethnic origins. Parameters specific to market activities are defined similarly. Whether an individual chooses to engage in each type of activity will depend on their return to that activity. If the return to that activity is positive they will engage in it, and if negative they won't. Substituting for $\bar{h}_{ijt}$ in the return to market activity m will give the decision rule for engaging in market activities and substituting in for $\bar{\kappa}_{ijt}$ in the returns to cultural activity k gives the cultural activity decision rule. Solving the parent's decision problem yields[18]

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[17]Given that most of the outcomes I have access to are binary I focus on zero/one outcomes here, but a similar intuition follows for continuous variables.

[18]The parents decision problem and the outcome equations is repeated and expanded on in appendix A.

$$A_{ijt} = \begin{cases} 1 & \text{if} \quad \beta_1 + \beta_2' x_{ijt} - e(z_{jt}, \delta_j) + B_j + C_t + \epsilon_{ijt} > 0 \\ \\ 0 & \text{if} \qquad\qquad\qquad \text{otherwise} \end{cases}$$

$$e_{ijtm} = \begin{cases} 1 & \text{if} \quad \alpha_{m1} + \alpha_{m2}' x_{ijt} + \alpha_{m3} A_{ijt} + \tilde{B}_{jm} + \tilde{C}_{tm} + \eta_{mijt} > 0, \\ \\ 0 & \text{if} \qquad\qquad\qquad \text{otherwise} \end{cases}$$

$$(3)$$

$$\kappa_{ijtk} = \begin{cases} 1 & \text{if} \quad \alpha_{k1} + \alpha_{k2}' x_{ijt} + \alpha_{k3} A_{ijt} + \tilde{B}_{jk} + \tilde{C}_{tk} + \eta_{kijt} > 0, \\ \\ 0 & \text{if} \qquad\qquad\qquad \text{otherwise} \end{cases}$$

$$\eta_{kijt}, \eta_{mijt}, \epsilon_{ijt} \sim N(\mu, \sigma), \ \mu = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}, \ \sigma = \begin{bmatrix} 1 & 0 & \rho_1 \\ 0 & 1 & \rho_2 \\ \rho_1 & \rho_2 & 1 \end{bmatrix}$$

where κ_{ijtk} represents a set of k cultural outcomes and e_{ijtm} a set of m market outcomes, $\eta_{kijt} = \alpha_k \kappa_{ijt}$, $\eta_{kijt} = \alpha_k \kappa_{ijt}$, $i = 1, ...N$, $j = 1, ..., J$, $t = 1, ..., T$, and $\rho_1 = \alpha_k \rho_k$ and $\rho_2 = \alpha_m \rho_h$.[19] The parameters $\tilde{B}_{jk}$, $\tilde{C}_{tk}$, and $\alpha_{k2}' x_{ijt}$, allow the return to a given cultural activity k to vary by community, birth cohort and a set of individual characteristics such as gender. Parameters specific to market activities are defined similarly.

As a result of government selection being based on children's initial unobservable endowments of human and cultural capital the outcome and attendance equations are correlated through their error terms. To evaluate the causal effect of residential school attendance on outcomes, an additional parameter - the correlation of the errors terms - must be estimated.[20] For the model above to be identified independent of functional form restrictions there must be at least one variable that varies over both cohorts and communities and affects residential

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[19]Given that most of the outcomes I have access to are binary I focus on zero/one outcomes here, but a similar intuition follows for continuous variables.

[20]Note that η_{kijt} and η_{mijt} do not have to be uncorrelated for the results to be consistent since this restriction is not imposed in estimation.

school attendance but not adult outcomes.

Note that in this framework, the cost of government enforcement depends on the time varying local supply of residential schools. This supply depended heavily (and does exclusively in this framework) on the decisions of the missionaries. If the geographic supply of residential schools is driven primarily by religious objectives rather than the selective process of the federal government, one could imagine using a community's distance from the closest residential school, δ_j, and the process of the school's opening and closing, z_{jt}, as exogenous variation (i.e. I could impose that $e(z_{jt}, \delta_j) = \beta_3 z_{jt} + \beta_4 z_{jt} \delta_j$ in estimation).

However, thinking about the missionary's decision problem makes clear the strong restrictions required to use distance and school opening and closing as exogenous variation. Consider the decision of a missionary that is distance δ from community j. The missionary gets utility from educating and converting Aboriginal children. The missionary's indirect utility function can be given by:

$$ v_{\delta_j} = z_{jt} \gamma_{jt}^1 \mathrm{E}\left[\sum_{i=1}^{N_{tj}} A_{ijt}\right] + (1 - z_{jt}) \gamma_{jt}^2 N_{jt}, $$

where A_{ijt} is equal to one when a child in community j and time t attends a residential school and zero otherwise. The expected number of children who will attend the residential school is given by $\mathrm{E}\left[\sum_{i=1}^{N_{tj}} A_{ijt}\right]$ and the proportion of those children who will be converted and educated is given by γ_{jt}^1 per dollar spent. The expectation is taken over the sum of the attendance equation in 3 for all individuals in a cohort and community. The per dollar fraction of the community that will be educated and converted if the missionary does not open a residential school given by $\gamma_{jt}^2 N_{jt}$ where N_{jt} is the number of Aboriginal people within a community. The variable $z_{jt} = 1$ if the missionary opens the school and $z_{jt} = 0$ otherwise. A similar intuition follows if the school is already open at a given t and j and the missionary must decide to keep the school open or close it (although γ_{jt}^1 and γ_{jt}^2 will be different). Thus missionary decisions to open or close a residential will depend on $\mathrm{E}\left[\sum_{i=1}^{N_{tj}} A_{ijt}^*\right]$, N_{tj}, γ_{jt}^2 and γ_{jt}^1 (the average attendance at a residential school, size of the Aboriginal population, and the relative cost effectiveness of conversion).

To use distance and the opening and closing of schools as exogenous variation, variations in $\mathrm{E}\left[\sum_{i=1}^{N_{tj}} A_{ijt}^*\right]$, N_{tj}, γ_{jt}^2 and γ_{jt}^1 from their community and cohort averages must vary independently from human and cultural capital endowments κ_{ijt} and h_{ijt}. In other words, if openings and closings are to be used directly as a source of exogenous variation, missionaries must only make decisions based on *persistent* impressions of a given community's residential school attendance given the selection process. This restriction is rather strong. For example, it assumes that missionaries cannot have rational expectations regarding student residential school attendance. In this framework, if one cohort in a community has relatively low market skill endowments then the government will select many children from this cohort to attend a nearby residential school. Consequentially, nearby missionaries may choose to open a school and keep it open. However, if successive cohorts in this community have higher market skill endowments, fewer children will successively be selected to attend a residential school. As a consequence, missionaries nearby may choose to close their school. If this story was systematically true, then the opening and closing of schools may be correlated with student outcomes through their human capital endowments and could not be used as exogenous variation.

Fortunately, this framework also suggests capitalizing on a cleaner source of variation. What the framework makes clear is that there is at least one factor that influences the supply of residential schools that does not enter demand. Specifically, the likelihood of conversion per dollar which enters the objective function of the missionaries (who control the supply of residential schools) but does not enter the decisions of the Aboriginal people or the federal government (whose joint decisions determine the demand for residential schools). Thus, the perceived effectiveness of religious alternatives available to the Aboriginal people could be used to directly determine the effect of residential school attendance. In the model, the size of γ_{jt}^1 relative to γ_{jt}^2 represents the per dollar likelihood of conversion through residential schooling relative to the likelihood of conversion using the existing religious infrastructure. Differing amounts of religious infrastructure imply differing returns from a residential school and thus differing levels of resistance to school closure on the part of the missionaries when

the federal government attempted to reduce enrollments rates. If there were fewer options for non-secular education - or more competition from other religious organizations - missionaries would be less likely to close their residential school, which would reduce the cost of enforcement and thus kept enrollment rates higher for longer periods than in areas where there were more options for non-secular education or less competition from other religious organizations. Conditional on fixed geographic characteristics (such as distance from the closest major city), this sort of community-cohort variation in residential school attendance is a useful source of variation since it is plausibly exogenous from changes within communities and cohorts in adult outcomes.

The general religiosity of the non-aboriginal population surrounding an Aboriginal community should be highly correlated with the presence of a non-indigenous denominational school nearby and general religious infrastructure. Thus, historic variation in geographic religious composition should influence the trends in enrollments within communities over time. To capture this, I multiply the 1941 religious composition (specifically the Catholic proportion) surrounding an Aboriginal community with the deviation in national enrollment rates from their peak in the 1930s. Let $\gamma_{jt}^2/\gamma_{jt}^1 = \gamma_t w_{jt=1941}$ where $w_{jt=1941}$ indicates the Catholic proportion in a census division surrounding an Aboriginal community in 1941 and γ_t is the proportion of children nationally that attended a residential school in each cohort. Since $\gamma_t w_{jt=1941}$ is plausibly independent of variations in N_{jt} and h_{jt} and κ_{tj}, this proposed source of variation will not suffer from the same challenges as using z_{jt} and δ_{jt} directly.

Given that I control for cohort effects and geographic fixed effects, I need the following assumption for identification: how the historic non-aboriginal religious composition in a given area interacts with the overall government-determined trend in residential school enrollment is conditionally independent of unobserved changes in outcomes between cohorts within communities. If this assumption holds and the variable just described is significantly correlated with attendance at a residential school, then the model is identified independent of functional form restrictions. An example of a phenomenon that might violate this restriction would be if the proportion of Catholic individuals (of the non-aboriginal population) influenced rate

of change in discrimination against the Aboriginal population in proportion to the change in residential school attendance at the national level. So, for example, if the opportunities for employment of Aboriginal peoples increase when there is less discrimination, and in areas with a higher proportion of Catholic people decrease discrimination more quickly than those with a lower proportion of Catholic people, this estimation strategy would be biased toward finding positive economic effects of residential schooling.

From the above framework, the missionaries' choice of δ_j is a function of $\gamma_{jt}^1, \gamma_{jt}^2, \mathrm{E}\left[\sum_{i=1}^{N_{tj}} A_{ijt}^*\right]$, and N_{jt}. As a consequence, $e(z_{jt}, \delta_j) = e(\gamma_{jt}^1, \gamma_{jt}^2, \mathrm{E}\left[\sum_{i=1}^{N_{tj}} A_{ijt}^*\right], N_{jt})$ where $\mathrm{E}\left[\sum_{i=1}^{N_{tj}} A_{ijt}^*\right]$ may depend on N_{tj}, h_{jt}, and κ_{tj}. If $\gamma_{jt}^2/\gamma_{jt}^1$ is an additively separable, linear component of this function, $e(z_{jt}, \delta_j) = \tilde{\beta}_3 \gamma_t w_{jt=1941} + \tilde{f}(N_{tj}, h_{ijt}, \kappa_{ijt})$, it implies that the error term, ϵ_{ijt}, in Equation 7 becomes $\tilde{\epsilon}_{ijt} = \tilde{f}(N_{tj}, h_{ijt}, \kappa_{ijt}) + \rho_h h_{ijt} + \rho_\kappa \kappa_{ijt} + \upsilon_{ijt}$. Assuming $\tilde{\epsilon}_{ijt}$ is normally distributed with mean zero and variance one, both these models can be estimated by quasi-maximum likelihood (using a bivariate probit). The model's likelihoods are given in appendix C.

The results of estimating the specifications given by Equation 3 can be found in section 6.1. This model allows me to estimate the causal effect of attending a residential school for all children (also known as the average treatment effect or ATE) and, perhaps more plausibly, the effect of attending a residential school for the children who actually attended (also known as the average treatment effect on the treated or ATET).

5   Additional Data

In addition to the APS, I use several other data sources to construct the variables discussed in Section 4. The variables I construct include the distance of a community to the closest residential school, δ_j, an indicator of whether the closest residential school was open when an individual was of schooling age, z_{jt}, the proportion of Catholics surrounding a community in 1941, $w_{jt=1941}$, and the national residential school enrollment rates γ_t. I use information from the Aboriginal Healing Foundation on the dates of closure, opening and location of

different residential schools across the country.[21] At total of sixty-two schools are included in the main analysis. This is approximately half of all the residential schools that existed. The other schools are not used either because they were in the territories or the eastern provinces, closed before the time the individuals in my sample were of schooling age, many schools often listed separately are in fact geographic and religious continuations of each other and thus I do not count them as different entities, and, finally, at times schools of different religious affiliations existed in the same area and I choose only the closest school. The sample of schools is further restricted beyond the sixty-two schools because I limit attention to those communities with residential schools that closed before 1965.[22] In addition in specifications that include band (community) fixed effects, all bands with sample sizes less than 40 are excluded to ensure credible estimation.

To construct z_{jt} and δ_j I combining data on the coordinates of Aboriginal communities provided by the Environmental Systems Institute with several provincial data sets from the Canadian Atlas Map Bundle on Canadian cities and towns which allows schools to be matched with communities. Residential schools are matched to cities/towns and then ARC GIS is used to locate the closest residential school to a given community.[23] Then, the closest residential school to each community is chosen using "as the crow flies" distance from the center of the community. This distance is used as the main distance measure δ_j. By construction, all communities are tied to some residential school. For each cohort in each community $z_{jt} = 1$ if a school was open when a given cohort would have been affected by the compulsory school attendance laws. Otherwise, $z_{jt} = 0$.[24]

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[21]These dates and locations can be found at http://wherearethechildren.ca/en/about/ahf.html. Last Retrieved September 29, 2012. These are not the only dates that could be used. For a discussion regarding the details of these dates and the number of schools used see the online data appendix.

[22]Past 1965 the federal government began to take over residential schools from the churches and the Aboriginal people began to acquire more authority in the education of their children and residential schools began to become more ambiguous in nature with some acting solely as hostels rather than schools. Restricting the analysis to schools that closed pre-1966 makes understanding what it means to attend residential school more straight forward and does not have a qualitative impact on the results.

[23]The only schools included in the match are those that existed in 1928 or later since it is the meaningful time frame for my sample. Using these files, the latitude and distance from the closest city are also calculated.

[24]Before 1945, the mandatory school attendance ages for Aboriginal children were defined through the Indian Act. In 1920, the mandatory ages for school attendance were seven to fifteen. In 1930, there was an amendment to the Indian Act to extend the mandatory ages to sixteen. To be eligible for the Family Allowance implemented in 1945, parents had to comply with provincial schooling laws. Thus, mandatory ages are defined to comply with both federal and provincial legislation after 1945. The provincial schooling ages and their changes over time after 1945 is taken from Riddell and Song (2011). Riddell and Song (2011) expand upon the initial data collected by Oreopoulos (2006).

To construct a measure of historic religious infrastructure surrounding an Aboriginal community, I visually match 1941 census divisions and sub-divisions to their 1991 counterparts using the division maps from the 1941 and 1991 Census. At times this involves reconstructing the 1991 divisions using subdivisions in the 1941 data. Once comparable geographic regions are constructed, I use the 1941 census population counts to construct the proportion of non-aboriginal people in a division that are Catholic in 1941. This gives $w_{jt=1941}$. To estimate changes in national policy, γ_t, I use the national downward trend in residential school attendance from 1928 to 1966 from the Canada Year Book (1940-1970) and past 1966 I construct this measure using the proportion in each cohort that attended a residential school in the 1991 APS. Specifically for each year I use the proportion of children who would have been seven in that year minus the proportion who attended a residential school at the system's peak in 1934. Using historic geographical variation combined with national trends as exogenous variation is reminiscent of strategies used in the local labour market literature (Bartik 1991; and Blanchard and Katz 1992).

The process of mapping individuals outside of Aboriginal communities to their "origin" community is more involved. Although the APS does not specify where an individual was born, it does specify what band an individual belongs to. More than half of these bands have a legally defined land base. A large fraction of these land bases link uniquely to one or two Aboriginal communities. Using Aboriginal Affairs and Northern Development Canada's (AANDC) legal-linkage files of bands to Aboriginal communities, I can reconstruct individuals' "origin" communities. If a band is linked to more than one possible sub-division, I use the 1991 Confidential Long Form Census files to estimate the probability of being from each of these communities. I then match individuals who currently reside outside one of the previously specified communities to the relevant area using the estimated probability distributions. A more thorough discussion of this process is given in the online data appendix.

6   Results

6.1   Main Results

One standard piece of evidence often provided in favor of random assignment is to show balance in observable covariates. Assuming observable variables are randomly drawn from a sample of total characteristics, observable variables being uncorrelated with the instrument is suggestive evidence that unobservable variables are also uncorrelated with the instrument and thus assignment to treatment is effectively random. Since the argument presented here requires conditional exogeneity, I regress the variables used as exogenous variation on a set of observable characteristics conditional on cohort and band fixed effects. The results from this exercise can be found in Table 2. While there is some evidence that the observables are correlated with opening and closure, there is far less evidence that they are correlated with the Bartik style instrument once band fixed effects are accounted for. This provides some suggestive evidence that the 1941 Proportion of Catholic multiplied by the national trend in residential school attendance, $\gamma_t w_{jt=1941}$, is not significantly correlated with unobservables. Of course, this is far from proof of the exclusion restriction, but it is at least reassuring. In addition, it should be noted that the proportion of Catholics in 1941 multiplied by the national trend in attendance enters the probability of being open (z_{jt}) negatively as predicted by the model. The intuition is the following: if there is a higher proportion of Catholic individuals in a region, there will be more religious infrastructure and thus the value of a residential school to the Catholic Church is lower and thus the school is more likely to close.

Table 2: What Determines Whether a School is Open When an Individual is of Schooling Age?

| | Dependent Variable | | | | | |
| | Open | | Open ×Distance | | 1941 Prop Catholic × Trend | |
Covariates	(1)	(2)	(1)	(2)	(1)	(2)
Female	0.126	-0.034	-0.741*	-0.280	-0.003*	0.001
	(0.074)	(0.071)	(0.312)	(0.236)	(0.001)	(0.001)
Single Ethnicity	-0.025	0.395**	0.104	-0.148	-0.004*	-0.003
	(0.125)	(0.151)	(0.565)	(0.526)	(0.002)	(0.001)
non-aboriginal Emp Rate	-0.168	0.480*	1.585**	1.091**	0.002	0.002
	(0.144)	(0.196)	(0.544)	(0.397)	(0.002)	(0.001)
Latitude	-0.157***	-0.460***	2.388***	3.175***	0.002***	0.000
	(0.016)	(0.132)	(0.086)	(0.476)	(0.000)	(0.001)
KM (10) to City	0.038***	0.016	0.296***	0.203**	0.001***	0.001***
	(0.004)	(0.024)	(0.026)	(0.064)	(0.000)	(0.000)
1941 Prop Catholic × Trend	0.232	-3.756***	-51.060***	-13.015***	-	-
	(0.717)	(0.688)	(3.859)	(3.886)	-	-
N	11460	10271	11460	10271	11460	10271

Notes: Standard errors are reported in parentheses and are clustered by band and three year cohort.. Panel (1) is the full sample with province effects, while Panel (2) includes all bands with at least 40 people. The total number of bands in this specification is 108. Both specifications include a full set of cohort fixed effects. The reason for these restrictions with the various geographic controls regards convergence of the likelihood function and credible estimation of the time invariant effects. The dependent variable is indicator variable called "open" which is equal to one for an individual if the closest residential school to a community was open when they of the legally mandated schooling age (which depend on federal and provincial legislation). The asterisks indicate the level of significance: * p<0.10, ** p<0.05, *** p<0.01.

Table 3 reports the results from the bivariate probit model described by Equation 3 using high school graduation as the outcome equation. The first panel uses the indicator of the school being open when the individual was of schooling age (z_{jt} and $z_{tj}\delta_j$) as the exclusion restriction. The second panel uses the Bartik style variation, $\gamma_t w_{jt=1941}$, as the exclusion restriction. The first column in each panel reports the estimated coefficients from the high school graduation determination equation (the $\alpha's$ in Equation 3) and second column contains the results from the residential school attendance equation (the $\beta's$ in Equation 3). All the specifications include all bands over sample size 40 with 108 band fixed effect. The reason for these restrictions with the various geographic controls is due to convergence of the likelihood function and credible estimation of the time invariant effects.[25] First, the effect of residential school attendance on high school graduation is large, positive, and statistically significant in all specifications. Being female is positively associated with high school graduation, while distance from a major city and latitude are negatively correlated. The second panel presents the results from the attendance equation. Conditional on distance to the closest major city, latitude, solely Aboriginal ethnic origin, gender, birth cohort, and geographic fixed effects, the excluded instruments are significantly correlated with residential school attendance. In the online appendix tables, table 3 reports the first stage in a linear probability model. The F-statistics for the instruments are all above ten controlling for band fixed effects. If I include the full sample rather than just communities whose schools closed before 1965, then the F-statistics meets the more stringent criteria of Stock and Yogo (2003). However, it should be noted that the conditions for valid estimate in a bivariate probit specification are not necessarily the same as in linear IV regression. This is suggestive evidence that the model is well identified in the absence of functional form restrictions.

Table 4 reports the average treatment effect (ATE) and effect of the treatment on the treated (ATET) for a set of human and cultural capital outcomes and contains the main results of this paper. The treatment is whether or not an individual attended a residential

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[25]The incidental parameters problem is not encountered in this context since the asymptotics are taken to be with respect to large N rather than large J or T (Neyman and Scott 1948).

school. I calculate the ATE by first predicting the probability each individual in the sample would have a particular outcome if they were and were not to attend a residential school. I then average the predicted outcome probabilities if individuals were to attend a residential school and if they were to not attend a residential school. Finally I subtract one from the other which yields the ATE. The ATET is calculated similarly, but the sample is limited to only those individuals who actually attended a residential school.

Table 3: Residential School Attendance and High School Graduation: Coefficient Estimates from the Bivariate Probit Model

	School Open and Distance		1941 Prop Catholic × Trend	
	High School Graduate	Attendance	High School Graduate	Attendance
Attendance	0.604***		0.573***	
	(0.191)		(0.207)	
Open		0.684***		
		(0.105)		
Open × Distance		-0.041***		
		(0.007)		
1941 Prop Catholic × Trend				-4.229***
				(1.011)
Female	0.207***	0.045	0.207***	0.064
	(0.055)	(0.047)	(0.057)	(0.049)
Single Ethnicity	-0.130*	0.525***	-0.128*	0.522***
	(0.067)	(0.126)	(0.068)	(0.128)
Latitude	0.006	-0.297***	0.006	-0.249***
	(0.011)	(0.077)	(0.012)	(0.077)
KM (10) to City	-0.733***	-0.029**	-0.730***	-0.034***
	(0.126)	(0.019)	(0.131)	(0.012)
Birth Cohort Fixed Effects	X	X	X	X
Band Fixed Effects	X	X	X	X
Correlation	-0.234**		-0.222*	
	(0.115)		(0.125)	
N	10271		10271	

Notes: Standard errors are reported in parentheses and are clustered by band and three year cohort. Columns labeled (1) include the full sample with province effects. Columns labeled (2) includes all bands over sample size 40 with band fixed effects with a total of 108 bands. The reason for this restriction with the band fixed effects regards convergence of the likelihood function and credible estimation of the time invariant effects. All regressions include latitude, gender, distance from closest city, an only Aboriginal ancestry indicator, birth cohort fixed effects, the geographical effects specified. The first set of panels includes the open indicator and the distances to the school in the attendance equation while the second set of panels includes 1941 Proportion Catholic in individual's subdivision × (average attendance in that individual's cohort - average attendance in cohort at peak 1934). The row titled "correlation" contain the estimate the correlation of the error terms between the high school graduation equation and the residential school attendance equation. It can be understood as a summary statistic for the extent of unobservable selection bias. The asterisks indicate the level of significance: * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

Table 4: The Impact of Residential School on Economic Outcomes

		(1)				(2)	
Outcomes	ATE ($\rho = 0$)	ATE ($\rho \neq 0$)	ATET ($\rho \neq 0$)	Correlation (ρ)	ATE ($\rho \neq 0$)	ATET ($\rho \neq 0$)	Correlation (ρ)
HS Graduation	0.070***	0.181***	0.179***	-0.222*	0.191***	0.188***	-0.243**
	(0.023)	(0.044)	(0.065)	(0.125)	(0.044)	(0.066)	(0.115)
Government Transfers	0.001	-0.158***	-0.210***	0.410***	-0.117***	-0.153***	0.289**
	(0.057)	(0.042)	(0.052)	(0.134)	(0.036)	(0.045)	(0.134)
Employed	-0.045**	0.121***	0.145***	-0.346**	0.140***	0.172***	-0.398**
	(0.023)	(0.043)	(0.065)	(0.175)	(0.047)	(0.070)	(0.159)
In Aboriginal Community	-0.021	-0.187***	-0.253***	0.555***	-0.085***	-0.113	0.207
	(0.019)	0.062	(0.132)	(0.196)	(0.038)	(0.073)	(0.141)
Participate Traditional	0.008	-0.078	-0.129*	0.552***	-0.057	-0.092*	0.412***
	(0.020)	(0.064)	(0.082)	(0.147)	(0.050)	(0.066)	(0.151)
Aboriginal Language	-0.021***	-0.053**	-0.076**	0.141	-0.067**	-0.095**	0.208*
	(0.007)	(0.030)	(0.044)	(0.136)	(0.031)	(0.045)	(0.123)
Source of Variation	1941 Prop Catholic × Trend ($\gamma_t w_{jt=1941}$)				School Open (z_{jt}) and Distance ($z_{jt}\delta_j$)		
N				~10271			

Notes: The columns titled "ATE ($\rho = 0$)" contain the univariate probit marginal effects. The columns titled "correlation" contain the estimate of the correlation of the error terms between the outcome equations, whose dependent variable is listed on the left hand side, and the residential school attendance equation. Standard errors are reported in parentheses and are estimated by the Huber Sandwich Estimator. The columns titled "ATE" and "ATET" contain estimates of the average treatment effect and the effect of the treatment on the treated respectively. It can be understood as a summary statistic for the extent of unobservable selection bias. Both of their standard errors are calculated using the delta method, are reported in parentheses and are based off standard errors clustered at the band-and three year cohort level. The first panel used 1941 Proportion Catholic in an individual's census division × (average attendance in that individual's cohort - average attendance in cohort at peak 1934) in the attendance equation. The second panel includes the open indicator and the distances to the school in the attendance equation as the exclusion restriction. All regressions include latitude, gender, distance from closest city, an only Aboriginal ancestry indicator, birth cohort fixed effects, and band fixed effects with 108 bands in total. All bands included have a sample size of 40. The sample size varies by the dependent variable and thus the number of observations, N, is approximate. The asterisks indicate the level of significance: * p<0.10, ** p<0.05, *** p<0.01.

All estimations include the same control variables as in Table 3 and band fixed effects.[26] The first panel contains the results from the specification that uses the Bartik style instrument as exogenous variation, while the second panel uses the open indicator and its interaction with distance. The first column reports an estimate of the ATE that does not account for selection into residential school attendance (i.e. assuming $\rho = 0$). This is estimated using the marginal effects of a univariate probit for each outcome specified. The second column reports an estimate of the ATE that takes into account selection into residential school attendance. The third column reports the ATET and the final column reports the correlation between residential school attendance and the outcome listed on the left most column (ρ).

The first thing to note is that estimates of the ATE in the first and second column are notably different. In fact the estimate of the ATE is actually of the opposite sign in the two columns. This implies accounting for the selection of children into residential school attendance is of substantial importance. If one were not to account for selection into attendance (as in the first column), one would conclude that residential schooling had little or positive effects on cultural outcomes and negative effects on economic outcomes even though it increased high school graduation rates. The correlation coefficients reported in the fourth row in each panel clearly demonstrate that the selection of children into residential school is positively correlated with cultural outcomes, but negatively correlated with economic outcomes. In addition, the effects of residential school attendance are large. The more conservative specification suggests residential school decreased the likelihood of receiving government transfers by nearly 15 percent for those that attended. Given the proportion of individuals receiving government transfers in this group, this implies residential schools decreased government transfer receipts by 40 percent. Attendance at a residential school also dramatically increases the likelihood of high school graduation and employment.

However, this table also highlights the cultural implications of residential schooling. Conservative estimates suggest the the percentage of people who speak an Aboriginal language

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[26]The results are very similar if the model is ran with the full sample and with province fixed effects.

at home was reduced by nearly 30 percent due to residential schools. I arrive at this number since approximately 20 percent of individuals who attended a residential school currently speak an Aboriginal language at home. The most conservative estimates show this would have been at least 27.6 percent according to estimates of the ATET in Table 4. The reduction in participation in traditional activities due to residential schooling was about 12 percent for those that attended. This implies that the proportion of people in this group who participated in traditional activities would have been nearly double were it not for residential school.

While the results above are interesting, there are a few concerns about their interpretation. First, individuals may not honestly report whether they attended a residential school, and, even if they do, the residential schooling question is inconsistent between cohorts which may bias estimates of the ATE and ATET. Second, although the APS was designed be a representative sample of all Aboriginal communities, the cost of running this extensive survey in remote areas may result in their under-representation. Third, spill-overs from individuals attending residential schools will bias the estimates of the ATE and the ATET. To overcome these problems I use the 1991 Confidential Long Form Census files and estimate the effect of the intention to treat. Specially, I measure the effect of having an individual's closest residential school open during his or her schooling years. I then adjust this effect for how far away this residential school is. This larger data set includes more Aboriginal communities and this methodology captures any spill-over effects that residential schooling may have while avoiding problems with non-random measurement error in residential school attendance.

Table 5 presents the results of this exercise. The row labeled "open" contains my measure of the intention to treat for each outcome listed in the top row. The intent to treat is measured in this context by the effect of a community's closest residential school being open when an individual was between the legally mandated schooling ages (z_{jt}). The row labeled "open $\times$ distance" shows the decrease in this effect for every ten kilometers of distance between the residential school and the center of the community of interest ($z_{jt}\delta_j$). The impact on high school graduation and employment is positive and significant and impact on the likelihood

Table 5: Estimates of the Intent to Treat From the 1991 Census

Outcome	High School	Bachelor's Degree	Government Transfers	Employed
Open	0.087***	0.008	-0.048***	0.052**
	(0.050)	(0.005)	(0.022)	(0.024)
Open X Distance	-0.018***	-0.009	0.007**	-0.006**
	(0.004)	(0.009)	(0.003)	(0.003)
N	35574	35574	35440	35568

Outcome	Total Ln Wages	Total Weeks Worked	On reserve	Aboriginal Language
Open	0.140***	0.001	-0.022	-0.042**
	(0.065)	(0.037)	(0.034)	(0.011)
Open X Distance	-0.008*	-0.004	-0.005	0.012***
	(0.004)	(0.003)	(0.004)	(0.004)
N	19657	20400	34959	34787

Notes: The estimates reported are the probit marginal effects. Standard errors are reported in parentheses and clustered at the band-cohort level. All specifications include latitude, gender, distance from closest city, an only Aboriginal ancestry indicator, birth cohort fixed effects and band fixed effects with 458 bands in total. The asterisks indicate the level of significance: * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

of receiving government transfers is negative and significant, as before. There is also a 14 percent log point increase in the average log wage, but the impact on total weeks worked is insignificant. On the other hand, there is a negative impact on both the likelihood of living on reserve or speaking an Aboriginal language at home. Information on participation in traditional activities are unavailable in the census. To obtain an estimate of the ATE from the intention to treat, one merely divides the intention to treat by the percentage of individuals induced to attend residential school via the instrument (the compliers). This is approximately 20 percent. Doing this yields a larger estimate of the ATE than those calculated in Table 4 which suggests one of several things. First, there may be spill-over effects from individuals attending a residential school. Second, smaller Aboriginal communities missed in the APS may be more intensely impacted by residential schools. Finally, there may be misreporting of residential school attendance which biases the estimated effect toward zero. These results reinforce the findings of Table 4: residential schools increased economic integration at the expense of cultural connection.

To offer further support of the exclusion restriction we can perform this same exercise for geographically adjacent non-indigenous cohorts. If opening and closing are not correlated with changes in local conditions reflected in the outcomes of non-indigenous people (such

as employment conditions or educational opportunities) then we should observe no effect of an "intention to treat" as measured above on non-indigenous people. Table 6 estimates the intent to treat for non-aboriginal people who lived in the census divisions where the Aboriginal communities of interests are located. In nearly all specifications, estimates of the intent to treat are small and insignificant. In the one case it is significant the effect is of the opposite sign to that in Table 5. This supports the conclusion that, to the extent changing conditions among the non-aboriginal and Aboriginal people are correlated, changing local conditions are not driving the findings in Table 5.

Table 6: Estimates of the Intent to Treat For Those Who Are Ineligible: The Effect of Having the Closest School Open

Outcome	High School	Bachelor's Degree	Gov't Transfers	Employed	Total Ln Wages	Total Weeks Worked
Open	-0.059*	-0.047	-0.011	-0.003	0.011	-0.003
	(0.031)	(0.035)	(0.040)	(0.032)	(0.025)	(0.011)
Open X Distance	-0.003	-0.003	0.005	0.004	-0.007***	0.001
	(0.003)	(0.004)	(0.004)	(0.003)	(0.002)	(0.001)
N	41320	41320	59748	59740	46779	51033

Notes: The estimates reported are the probit marginal effects. Standard errors are reported in parentheses and clustered at the band-cohort level. All regressions include latitude, gender, distance from closest city, an only Aboriginal ancestry indicator, birth cohort fixed effects, and census division fixed effects. The indicator "open" is equal to one for an individual if the closest residential school to a community was open when they of the legally mandated schooling age (which depend on federal and provincial legislation). It is zero otherwise. "Open ×Distance" is this indicator times the distance from the closest residential school. The asterisks indicate the level of significance: * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

Another concern regarding the results above regards the matching procedure. Those off reserve had to be matched back to their "origin communities" using information on band membership and the geographical association of bands. There is necessarily error in this matching process due to changes in band names over time and misreporting of band information. Consequently, both of the instruments may be more weakly associated with the off reserve population than the on-reserve population. To address this Table 7 splits the sample by those who had to be matched back to an origin community and those who already lived in one. Table 7 demonstrates that the effect of residential schools is similar both on and off reserve although the estimates for the off reserve population are less precise. This implies the economic effects of residential schools were not driven by leaving the reservation: an individual can still retain traditional cultural connections (as represented by living on reserve) and engage in the labour market. This suggests that although residential schooling did result in migration off reservations, communities could still potentially benefit from the formal educational consequences of the schools.

Table 7: On and Off Reserve: Bivariate Probit Results

| | on reserve | | | | | | off reserve | | | | | |
| | (1) | | | (2) | | | (1) | | | (2) | | |
Outcomes	ATE	ATET	ρ	ATE	ATET	ρ	ATE	ATET	ρ	ATE	ATET	ρ
HS Graduation	0.171***	0.167***	-0.125	0.183***	0.179***	-0.149	0.148***	0.177**	-0.221	0.168***	0.199***	-0.265
	(0.028)	(0.047)	(0.135)	(0.027)	(0.047)	(0.133)	(0.055)	(0.081)	(0.254)	(0.056)	(0.083)	(0.247)
Gov't Transfers	-0.084***	-0.085***	0.133	-0.060***	-0.060***	0.090	-0.155	-0.221**	0.647**	-0.147*	-0.207**	0.680***
	(0.028)	(0.031)	(0.159)	(0.027)	(0.030)	(0.152)	(0.123)	(0.134)	(0.262)	(0.114)	(0.126)	(0.255)
Employed	0.203***	0.201***	-0.335	0.171***	0.171***	-0.278	0.032	0.041	-0.399	0.053	0.066	-0.444
	(0.050)	(0.070)	(0.410)	(0.040)	(0.054)	(0.313)	(0.083)	(0.101)	(0.298)	(0.089)	(0.110)	(0.283)
Traditional	-0.163*	-0.205**	0.776***	-0.032	-0.037	0.149	-0.043	-0.071	0.612**	-0.069	-0.118	0.396**
	(0.102)	(0.113)	(0.295)	(0.037)	(0.048)	(0.201)	(0.066)	(0.096)	(0.260)	(0.108)	(0.137)	(0.201)
Aborig Language	0.004	0.004	-0.143*	-0.071***	-0.073**	0.062	0.008	0.012	0.011	-0.009	-0.014	-0.154
	(0.030)	(0.043)	(0.097)	(0.027)	(0.040)	(0.114)	(0.040)	(0.070)	(0.249)	(0.038)	(0.058)	(0.196)
Source of Variation	$\gamma_t w_{jt=1941}$			z_{jt} and $z_{jt}\delta_j$			$\gamma_t w_{jt=1941}$			z_{jt} and $z_{jt}\delta_j$		
Birth Cohort FE	X	X	X	X	X	X	X	X	X	X	X	X
Province FE							X	X	X	X	X	X
Census Division FE	X	X	X	X	X	X						
F-Stat in First		34.71			25.24			4.50			0.63	
N		8789						2671				

Notes: The columns titled "ATE" and "ATET" contain estimates of the average treatment effect and the effect of the treatment on the treated respectively. Both of their standard errors are calculated using the delta method, are clustered at the birth cohort-year level and are reported in parentheses. The columns titled "ρ" contain the estimate the correlation of the error terms between the outcome equations, whose dependent variable is listed on the left hand side, and the residential school attendance equation. It can be understood as a summary statistic for the extent of unobservable selection bias. All regressions include latitude, gender, distance from closest city, an only Aboriginal ancestry indicator, birth cohort fixed effects, provincial fixed effects specified. The first set of panels that contain "$\gamma_t w_{jt=1941}$" use the Bartik style variation for identification, while the panels that contain "z_{jt} and $z_{jt}\delta_j$" use the open indicator and the distances to the school in the attendance equation as the exclusion restriction. The asterisks indicate the level of significance: * p<0.10, ** p<0.05, *** p<0.01.

6.2 Mechanisms

Obviously, the treatment effects discussed above is really bundled effect of several treatments. For example, the "effect" of attending a residential school is relative to a number of counterfactuals: attending a federal Indian day school, a provinical non-Indian school, not attending school, and living at home versus not living at home. As a consequence it is difficult to draw general economic lessons from the estimates above. I narrow down the possible channels by restricting the sample to exclude alternative counterfactuals. I first investigate whether the increase in high school graduation was purely a mechanical phenomon due to access and secondly the extent to which the assimilative effect of residential school was due to the culturally oppressive environment in the institutions or whether it was due to removal from the home and community.

In the first exercise, I limit my sample to individuals who have a grade ten education at minimum. By definition, all members of this subgroup had access to high school. If the effect of residential school on high school graduation is still found it implies that the effect was not solely due to access. Table 8 demonstrates that residential schools' impact on high school graduation was not purely mechanical. Panel (1) includes the full sample, all the control variables as in previous specifications and provincial fixed effects. Panel (2) includes all individuals in bands that have a sample size greater than 40, all the control variables in previous specifications and band fixed effects. It becomes immediately apparent that the effect of residential school attendance on those that attended is not due to access alone. In the preferred specification (with full band fixed effects and the Bartik style instrument), none of the effect of residential schooling is accounted for through this channel.

Table 8: Effect on High School Graduation Conditional on Obtaining At Least Grade 10: A Lower Bound on the Impact of Residential School on High School Graduation Rates

	Sample Restriction: Conditional on Getting Grade 10							
	Open and School Distance				1941 Prop Catholic × Trend			
	(1)							
	Coefficient	ATE ($\rho \neq 0$)	ATET ($\rho \neq 0$)	Correlation (ρ)	Coefficient	ATE ($\rho \neq 0$)	ATET ($\rho \neq 0$)	Correlation (ρ)
HS Graduation	2.111***	0.135***	0.226***	-0.952***	1.871***	0.099**	0.164***	-0.592*
	(0.187)	(0.024)	(0.034)	(0.228)	(0.373)	(0.059)	(0.051)	(0.334)
	(2)							
HS Graduation	2.055***	0.112	0.185*	-0.846***	2.021***	0.108	0.179**	0.890
	(0.299)	(0.141)	(0.119)	(0.366)	(0.299)	(0.114)	(0.102)	(0.600)

Notes: Standard errors are reported in parentheses and and clustered at the band-three year cohort level for the last set of panels and at the band-year cohort level for the first set of panels. The columns titled "ATE" and "ATET" contain estimates of the average treatment effect and the effect of the treatment on the treated respectively. Both of their standard errors are calculated using the delta method based off the standard errors clustered at the aforementioned levels above. The columns titled "correlation" contain the estimate the correlation of the error terms between the outcome equations, whose dependent variable is listed on the left hand side, and the residential school attendance equation. It can be understood as a summary statistic for the extent of unobservable selection bias. Panel (1) is the full sample with province effects. Panel (2) includes all bands over sample size 40 with fixed effects for band. The total number of bands in this specification is 108. The reason for these restrictions with the various geographic controls regards convergence of the likelihood function and credible estimation of the time invariant effects. All regressions include latitude, gender, distance from closest city, an only Aboriginal ancestry indicator, birth cohort fixed effects, the geographical effects specified. All specifications include includes opening, closure and school distance in the attendance equation in the left hand panel and the 1941 Proportion Catholic in individual's census division × (average attendance in that individual's cohort - average attendance in cohort at peak 1934). The asterisks indicate the level of significance: * p<0.10, ** p<0.05, *** p<0.01.

In the second I leverage information available in the APS on were an individual lived during school in order to determine whether some particular environmental characteristic within the residential school drove the results presented in the last section or if it was more plausibly due to removal from the community. Those under the age of forty-nine were asked whether they lived at a residential school, at home, with an Aboriginal family other than their own, a non-aboriginal family, or "somewhere else." Given the historical context "somewhere else" was likely a de-segregated foster or boarding home. The objective is to isolate the effect of the residential school environment from the effect of an individual being removed from their community or family. To do this I restrict the sample to only individuals that attended school while away from their families. As a consequence of the sixties sweep, and the binding nature of capacity constraints on either residential school enrollment or the Children Aid societies, there was a sizable proportion of children that were removed from their communities and that where both in residential schools and not in residential schools, but still away from their homes. Limiting the sample to only those people who attended school while staying away from home (with a non-aboriginal family, "somewhere else", or a residential school) and re-estimating the model will net out any effect of home removal from the results.

In addition, since children who stayed at home to attend school and those that went away to attend school and did not go to a residential school were extremely likely to receive the same form of high school education, I can infer that the difference between these results and in the full sample of those under forty-nine is due to removal from the home. Figure 3 supports the argument that those that did not attend a residential school where very likely to have the same quality of schooling. It demonstrates that high school education was either provided by provincial public schools or residential schools during this time period: graphically this is indicated in Figure 3 by the dotted "Federal High School" line almost overlapping the "Residential High School" line.[27] Table 9 shows the results from estimating the model within this sub-sample. In this sub-sample, residential schools played a relatively

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[27] Note that it must also be true that are not extreme differences in the ease of access to high schools between children.

minor role in high school graduation rates, increased the likelihood of receiving government transfers, increased the likelihood of living on reserve and increased the likelihood of speaking an Aboriginal language. These results suggest that residential schools' primary effect was through removal from the home/community environment.

Table 9: Being Away from Home: The Effect of Residential School

| | Sample Restriction | | | | | |
| | < 49 | | | < 49 & Away | | |
Outcome	ATE ($\rho \neq 0$)	ATET ($\rho \neq 0$)	Correlation (ρ)	ATE ($\rho \neq 0$)	ATET ($\rho \neq 0$)	Correlation (ρ)
HS Graduation	0.225***	0.247***	-0.986***	-0.181*	-0.199*	0.308*
	(0.007)	(0.018)	(0.765)	(0.090)	(0.101)	(0.189)
Government Transfers	-0.229***	-0.281***	0.779***	0.089*	0.092	-0.009
	(0.001)	(0.004)	(0.158)	(0.063)	(0.079)	(0.127)
Employed	0.148***	0.169***	-0.487***	-0.129*	-0.134*	-0.049
	(0.009)	(0.023)	(0.163)	(0.083)	(0.091)	(0.222)
Participate Traditional	-0.079***	-0.109***	0.575***	-0.114**	-0.048*	0.305
	(0.006)	(0.014)	(0.181)	(0.068)	(0.033)	(0.235)
Aboriginal Language	-0.218***	-0.309***	0.875***	0.167***	0.177***	-0.450*
	(0.001)	(0.002)	(0.157)	(0.010)	(0.020)	(0.234)
In Aboriginal Community	-0.345***	-0.430***	0.845**	0.034***	0.038***	0.145
	(0.001)	(0.001)	(0.242)	(0.011)	(0.016)	(0.237)
N	9769			3899		

Notes: The columns titled "ATE" and "ATET" contain estimates of the average treatment effect and the effect of the treatment on the treated respectively. Standard errors are reported in parentheses and are clustered at the birth cohort-band level and calculated using the delta method. The columns titled "correlation" contain the estimate of the correlation of the error terms between the outcome equations, whose dependent variable is listed on the left hand side, and the residential school attendance equation. It can be understood as a summary statistic for the extent of unobservable selection bias. The panel labeled "<49" includes all people who were asked there they lived while attending schools, which is the less than 49 age group. The panel labeled "<49 and Away" includes only individuals who went to residential school, lived with a non-aboriginal family, or "somewhere else." All specifications include latitude, gender, distance from closest city, an only Aboriginal ancestry indicator, birth cohort fixed effects, provincial fixed effects. All specifications include includes open indicator and distance × open as excluded instruments. The asterisks indicate the level of significance: * p<0.10, ** p<0.05, *** p<0.01.

6.2.1 Religion and Abuse

If there is heterogeneity in student treatment over time and schooling that influences the rate of human and cultural capital accumulation (q and ι), the effect of residential schooling will differ. I explore two other avenues that may significantly impact the rate of human and cultural capital accumulation: the religion of the school and whether the school had an "abusive" environment.

The history of residential schools is tightly connected with emotional, physical and sexual abuse[28], but how it varied among schools, time periods and affected individual's outcomes is unexplored. To explore these issues, I have obtained data from Aboriginal Affairs and Northern Development Canada on the number of individuals who attended each residential school in each decade and data from the Indian Residential School Adjudication Secretariat on the number of approved abuse claims by school and decade under the Independent Assessment Process. This allows me to construct the proportion of individuals who were abused in each school in each decade. If a school in a given decade had five or fewer cases of abuse, the Independent Assessment Process has censored the count to be zero. I assume all decades and schools not in the sample had five individuals who were abused to account for this censoring. Then I scale up the number of abuse cases reported in each school-decade to account for the fact they only represent approximately 30 percent of the total expected. This gives results in an estimate of the expected proportion of children abused by school and decade. The number of approved cases to date is 8,960, with a total of 29,000 expected to apply. Although the levels of abuse calculated here are obviously an underestimate, the Adjudication Secretariat believes this sample is representative of the final distribution of abuse cases.

However, one feasible scenario that may lead to the sample distribution inaccurately representing the final distribution would be abuse claims occurring in a cascade. Specifically, if as soon as some threshold number of victims in a cohort and community make an abuse claim, the remaining victims also do, the sample distribution would be unrepresentative.

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[28]A non-exhaustive list of references include Report of the Royal Commission of Aboriginal People 1996; 1991 the Cariboo Tribal Council 1991; The Nuu-Chah-Nulth Tribal Council 1994; Miller 1996; Milloy 1999; Smith 2009; and Dawson 2012.

However, as long as reaching the threshold number of abuse cases is not correlated with the socioeconomic outcomes of interest then this would only result in attenuation bias. If an effect of abuse is found, then we can assume it is a lower bound. It should be noted that the process of filing an abuse claim is completely confidential and all claims undergo an examination process regarding their plausibility. Thus, it is feasible that individual abuse claims are not inherently correlated with each other within a cohort or community. In addition the process of needing to validate claims acts as a disincentive to filing a false claim. If anything, the application process and extensive examination of the claims would result in under-reporting.

Two things should be noted regarding the possible cohort patterns in abuse reporting. First, one might suspect that older generations would be less likely to report any abuse (or even recognize some forms of physical maltreatment as abuse – such as being hit with a leather strap) even if there was more abuse present during the era they attended school. In the data, there does appear to be a correlation between the number of abuse cases and the decade of attendance: individuals who attended residential schools in later decades are more likely to claim severe forms of sexual abuse. However, any cohort trends that may be correlated with the socioeconomic outcomes of interest are taken into account by cohort specific fixed effects in all of the specifications.

Second, the main results presented in the last sections were only for a sub-sample of schools that closed relatively early. To the extent that staff in schools that closed before 1965 date were more abusive than staff in schools that closed after, the estimates in the last section will under-estimate the positive economic effects of residential school. In this section, I include all schools that I have abuse information for.

Table 10 contains descriptive statistics for the proportion of students abused, calculated from the data sources described above. The first column contains the proportion of students who have successfully filed an abuse claim over the total proportion of students who attended that school in that decade. The second reports the scaled estimates. The table reports the mean, median, 95th percentile, and maximum proportion of individuals who have filed

Table 10: Descriptive Statistics Abuse

Statistic	Using Sample of Abused Cases	Scaled Sample of Abused Cases
Mean	0.03	5%
Median	0.02	3%
95th Percentile	0.09	15%
99th Percentile	0.21	36%
Max	0.47	78%
N	434	

Notes: The proportion abused is calculated from data provided by Aboriginal Affairs and Northern Development on the number of individuals who attended each residential school in each decade. In addition, the Indian Residential School Adjudication Secretariat has provided the number of approved individuals who have applied for compensation for abuse under the Independent Assessment Process by school and by decade. If a school in a decade has five or less cases of abuse, the school is counted as having zero cases of abuse. The number of approved cases I have been given access to at this point include 8,960 cases, with total number expected to apply at 29,000. The Adjudication Secretariat predicts that this sample will be representative of the distribution of abuse cases among schools and decades, but the level of abuse is obviously an underestimate. To obtain a reasonable estimate of the level of abuse, I assume all decades and schools where abuse was not reported in my sample to have 5 individuals who were abused. Then I scale up all decades by 70 percent to arrive at the final estimates reported. This process will obviously entail error, but its ultimate effect on the estimates should not be affected since the measurements used in estimation are based on rank in the upper tail of the distribution rather than scale. The first column is the proportion abused by decade within the sample and the second column uses the scaled up numbers to construct the proportion.

successful abuse claim or who are expected to do so. The table indicates that abuse outcomes are highly skewed. The vast majority of schools in most decades have five or fewer cases of abuse. However, the results from some decades are dramatic, with the greatest proportion of children who have filed successful abuse claims reaching 44 percent.

I link this information to schools and decades in the 1991 APS. This provides a measure of the abusiveness of an environment in each school and decade. Schools are linked to individuals through their proximity to communities and the decade an individual was seven years of age. Merging the data on abuse with the APS results in some loss of information. I do not include all schools in all decades for the reasons discussed in the data section. In addition, in the original analysis I included schools that were not covered under the Independent Assessment Process.[29] I then construct two indicators of whether a school had an "abusive environment" in a given decade. I count a school-decade as having an abusive environment if the school-decade was in the 95th or 99th percentile of school-decade abuse proportions. This corresponds to proportions between 8 and 14 percent.

I explore heterogeneity in the effect of residential school attendance in Table 11. Table

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[29]Only those decades in which the federal government had involvement with a school are covered under this process.

11 reports the marginal effects of residential school attendance (given in the row labeled "attendance"), whether the school had an abusive environment (the two different percentiles interacted with attendance) and the school's religion (Anglican, Methodist or Presbyterian: Catholic schools are used as the comparison group). Opening, closing and distance are used as exclusion restrictions and all specifications include latitude, gender, distance from closest city, an indicator for only Aboriginal ancestry, birth cohort and provincial fixed effects. All previous conclusions regarding the effects of residential school attendance are unchanged. Presbyterian schools perform worse than Catholic schools in economic outcomes, but are more likely to have their former students marry. Methodists and Anglican schools do not seem to have different effects than Catholic schools. The effect of attending a school in the 95th percentile of school-decade abuse proportions is insignificant in most cases. On the other hand, the impact of attending a residential school in a decade with abuse proportions in the 99th percentile has substantial effects on outcomes. The likelihood of marriage and employment is substantially decreased while the likelihood receiving government transfers increases substantially. Attending a school with a relatively abusive environment completely wipes out any positive economic effect of residential schooling. It should be noted that the reported specification only includes provincial fixed effects. Estimations of a full set of band fixed effects creates difficulties with convergence, so these results should be kept with this qualification in mind. However, it becomes clear from Table 11 that abusive environments and the religion of the school are not main drivers of the results.

Table 11: Heterogeneity in the Effect of Residential Schooling: Religion and Abuse

	Outcome						
ATET of Interest	HS Graduation	Government Transfers	Employed	on reserve	Participate Traditional	Aboriginal Language	Married
Attendance	0.234***	-0.184***	0.114***	-0.383***	-0.095*	-0.356***	0.074***
	(0.054)	(0.044)	(0.05)	(0.163)	(0.065)	(0.286)	(0.029)
Abuse 95 Perc	-0.033	0.005	0.219***	0.120	-0.022	0.024	-0.097***
	(0.046)	(0.065)	(0.054)	(0.152)	(0.079)	(0.431)	(0.031)
Abuse 99 Perc	**-0.03**	**0.251*****	**-0.482*****	**-0.145**	**0.101**	**-0.038**	**-0.29*****
	(0.066)	**(0.077)**	**(0.056)**	**(0.253)**	**(0.149)**	**(0.652)**	**(0.062)**
Anglican	-0.017	0.006	0.043	0.028	0.009	0.027	-0.035
	(0.044)	(0.06)	(0.050)	(0.153)	(0.084)	(0.414)	(0.032)
Methodist	-0.073	0.024	-0.011	0.026	0.004	0.011	-0.032
	(0.043)	(0.062)	(0.05)	(0.154)	(0.082)	(0.403)	(0.032)
Presbyterian	-0.33***	0.007	-0.168***	0.176	0.041	0.195	0.093**
	(0.062)	(0.07)	(0.062)	(0.17)	(0.101)	(0.526)	(0.041)

Notes: The marginal effects are reported on residential school attendance (given in the row labeled "attendance"), whether the school had an abusive environment interacted with attendance, and whether the school was Anglican or Methodist, interacted with attendance. Standard errors are reported in parentheses, estimated by the delta method and clustered at the band-cohort level. All specification include latitude, gender, distance from closest city, an only Aboriginal ancestry indicator, birth cohort fixed effects and provincial fixed effects specified. The open indicator and distance × open are included in the attendance equation as excluded instruments and their interaction with abuse and the Anglican, Presbyterian and Methodist indicators. The asterisks indicate the level of significance: * p<0.10, ** p<0.05, *** p<0.01.

7 Conclusion

This is the first analysis to offer causal evidence on the long term consequences of forcible child removal and residential schools. To circumvent the non-random selection of children into residential schools, I use two connected sources of exogenous variation. The first source is geographic variation in the times of school opening, closing and changes in school distance. The second source uses a Bartik style instrument that exploits policy-driven national changes in residential school attendance and its interaction with historic regional religious composition.

My results suggest that on average residential schools achieved at least partially achieve their goals of economic and cultural assimilation. However, I find suggestive evidence that residential schooling was a less effective assimilation tool than the simultaneous removal of children from their homes and their placement in de-segregated public schools and non-indigenous boarding homes. These findings contribute the literature on identity and peer group formation by providing the first evidence regarding the effects of partial and complete racial separation and aggressive attempts at assimilation.

These finds have mixed implications for the literature on the long term economic development of indigenous communities. The education and economic assimilation of indigenous peoples may aid in economic growth in reservations and may allow more effective interaction between indigenous people and the federal government. However, since the evidence suggests that indigenous cultural traditions may have also been eroded, it may have been more difficult for communities develop governance structures due to a lack of cultural common ground.

Finally, this paper contributes by providing the first evidence regarding the long term effects of abuse on long run economic outcomes. While the results are merely suggestive, there is evidence that attending a boarding school during a decade when there was a high level of abuse results eliminates any economic integration generally associated with attendance at a boarding school.

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The last three sources are the exact same expect "British Columbia" is replaced with all other provinces and BC with the appropriate provincial abbreviations.

A   More Detail On The Decisions of Aboriginal Families

Here I further elaborate on decision problem of Aboriginal parents and how it interacts with government enforcement to generate the demand for residential schools. I also further discuss the outcome equations.

Remember that government enforcement is given by

$$E_{ijt} = \lambda' x_{ijt} + B_j + C_t - e(z_{jt}, \delta_j) + \rho_\kappa \kappa_{ijt} + \rho_h h_{ijt} + \upsilon_{ijt}. \tag{4}$$

where λ is a parameter vector.

Substituting in for E_{ijt} in Equation 1 gives:

$$A_{ijt} = \begin{cases} 1 & \text{if} \quad \lambda' x_{ijt} + B_j + C_t - e(z_{jt}, \delta_j) - \psi_{ijt}^* > -\epsilon_{ijt} \\ 0 & \text{if} \qquad\qquad\qquad \text{otherwise} \end{cases} \tag{5}$$

where A_{ijt} is an indicator of whether a child attends a residential school or not and $\epsilon_{ijt} = \rho_\kappa \kappa_{ijt} + \rho_h h_{ijt} + \upsilon_{ijt}$.

Aboriginal parents know that the government will enforce attendance according to Equation 4, but do not observe ϵ_{ijt}. They choose their level of resistance, ψ_{ijt}^*, accordingly. I assume that parents care about two things for their children: cultural capital and human capital. Let $\bar{\kappa}_{ijt}$ represent total cultural capital and $\bar{h}_{ijt}$ total human capital. Human capital accumulates for each individual according to the total amount of time they spend in school, given by τ_s, where s indexes the type of school ($s = d$ for day school and $s = b$ for residential school), multiplied by the quality of the schooling given by q. Note that the time in boardings school will be greater than the time spent in a day school so $\tau_b > \tau_d$. The individual also inherits an idiosyncratic level of human capital given by h_{ijt}. The amount of cultural capital accumulated is given by the amount of time a child spends with their family over the course of their schooling years, which is assumed to be the amount of time they are not in school. This is given by $\bar{\tau} - \tau_s$ where $\bar{\tau}$ is the total time available during their schooling years. The accumulation rate of cultural capital is given by ι. Again, students inherit some

level of cultural capital, κ_{ijt}. The human and cultural capital accumulation equations are given respectively as:

$$\bar{h}_{ijt} = q\tau_s + h_{ijt}, \text{ and } \bar{\kappa}_{ijt} = \iota(\bar{\tau} - \tau_s) + \kappa_{ijt}.$$

The utility of the parents for their child attending each type of schooling is given by:

$$
\begin{aligned}
\text{Day School: } u_{ijt}^d &= \iota(\bar{\tau} - \tau_d) + q\tau_d + \kappa_{ijt} + h_{ijt} \\
\text{Residential School: } u_{ijt}^b &= \iota(\bar{\tau} - \tau_b) + q\tau_b + \kappa_{ijt} + h_{ijt}.
\end{aligned}
\tag{6}
$$

Parents choose the human and cultural capital of their child indirectly by choosing how strongly to resist their child being taken to a residential school. With knowledge of Equation 5 parents choose their optimal amount of resistance by solving:

$$\max_{\psi_{ijt}} \left\{ \Phi(\psi_{ijt})(u_{ijt}^b) + (1 - \Phi(\psi_{ijt}))(u_{ijt}^d) - \psi_{ijt} \right\}$$

subject to Equation 5, where Φ is the probability that a parents' resistance will surpass government enforcement.[30] An important assumption is that parents can exert negative resistance. Resistance surpassing enforcement is only probabilistic because parents cannot observe the idiosyncratic enforcement level for their child until resistance is exerted. Resistance is assumed to be costly to parents and thus enters their utility function negatively. This also could be modeled as the parents valuing some consumption good and resistance being financially costly. To get further I assume that ϵ_{ijt} in Equation 5 is normally distributed with mean zero and variance equal to one[31] and explicitly solve for the optimal choice of parental resistance ψ_{ijt}^*.[32] Substituting in for u_b, u_d, and ψ_{ijt}^* into 5, yields

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[30] I assume the distance to a day school is zero. Differences in travel time to day schools would translate into differences in time with family and time in school. It could also show up in the enforcement equation of the government where distance from a day school would be subtracted from distance to a residential school. In the actual estimations, distance to the closest city is intended to absorb distance to the closest day school.

[31] A sufficient condition for this is that $\rho_h h_{ijt}$, $\rho_\kappa \kappa_{ijt}$ and v_{ijt} are mean zero and their variances sum to one.

[32] This yields $\psi_{ijt}^* = \sqrt{\ln(\frac{2}{\sqrt{2\pi}}) + \ln((q - \iota)(\tau_b - \tau_d))} + \lambda x_{ijt} + B_j + C_t - e(z_{jt}, \delta_j)$.

$$A_{ijt} = \begin{cases} 1 & \text{if} \quad \beta_1 + \beta_2' x_{ijt} - e(z_{jt}, \delta_j) + B_j + C_t + \epsilon_{ijt} > 0 \\ 0 & \text{if} \qquad\qquad\qquad \text{otherwise} \end{cases} \tag{7}$$

where $\beta_1 = \sqrt{\ln(\frac{2}{\sqrt{2\pi}}) + \ln((q-\iota)(\tau_b - \tau_d))}$, and $\beta_2 = \lambda$. Note that for β_1 to be a real number, $(q-\iota)(\tau_b - \tau_d)$ must be positive. This will be true as long as the rate of accumulation of human capital is greater than of cultural capital. Equation 7 summarizes the selection of children into residential school.

In the model, parents care whether their children attend a residential school or a day school because it will influence their child's final human and cultural capital accumulation. Parents care about both human capital and cultural capital because they contribute differently into their child's later life outcomes. Children who grow up with high amounts of traditional cultural capital will receive higher returns from living with those who share their culture and thus will be more likely to live in Aboriginal communities. Since the cost will be lower for those individuals who have high cultural capital they will also be more likely to use their Aboriginal language in their homes and participate in traditional activities. Those with high human capital will be more likely to graduate high school, receive high returns to market activities and thus be employed, be less likely to receive government transfers, and receive higher income.

Assume there exists a set of cultural outcomes, each given by κ_{ijtk} and market outcomes, e_{ijtm}, whose return is given by $\alpha_k \bar{\kappa}_{ijt} + \tilde{B}_{jk} + \tilde{C}_{tk} + \alpha_{k2}' x_{ijt}$ and $\alpha_m \bar{h}_{ijt} + \tilde{B}_{jm} + \tilde{C}_{tm} + \alpha_{m2}' x_{ijt}$ respectively.[33] The subscript m indexes market outcomes and k indexes cultural outcomes. The parameters $\tilde{B}_{jk}$, $\tilde{C}_{tk}$, and $\alpha_{k2}' x_{ijt}$, allow the return to a given cultural activity k to vary by community, birth cohort and a set of individual characteristics such as gender and ethnic origins. Parameters specific to market activities are defined similarly. Whether an individual chooses to engage in each type of activity will depend on their return to that activity. If the return to that activity is positive they will engage in it, and if negative they won't.

---

[33] Given that most of the outcomes I have access to are binary I focus on zero/one outcomes here, but a similar intuition follows for continuous variables.

Substituting for $\bar{h}_{ijt}$ in the return to market activity m implies the decision to engage in that activity can be given by

$$e_{ijtm=} \begin{cases} 1 & \text{if} \quad \alpha_{m1} + \alpha'_{m2}x_{ijt} + \alpha_{m3}A_{ijt} + \tilde{B}_{jm} + \tilde{C}_{tm} + \eta_{mijt} > 0 \\ 0 & \text{if} \quad \qquad\qquad\qquad \text{otherwise} \end{cases}$$

where, $\alpha_{m1} = \alpha_m q\tau_d$, $\alpha_{m3} = \alpha_m q(\tau_d - \tau_b)$, and $\eta_{mijt} = \alpha_m h_{ijt}$. On the other hand, substituting in for $\bar{\kappa}_{ijt}$ in the returns to cultural activity k implies the decision to engage in a particular cultural activity is given by

$$\kappa_{ijtk=} \begin{cases} 1 & \text{if} \quad \alpha_{k1} + \alpha'_{k2}x_{ijt} + \alpha_{k3}A_{ijt} + \tilde{B}_{jk} + \tilde{C}_{tk} + \eta_{kijt} > 0 \\ 0 & \text{if} \quad \qquad\qquad\qquad \text{otherwise} \end{cases}$$

where $\alpha_{k1} = \alpha_k \iota(\bar{\tau} - \tau_d)$, $\alpha_{k3} = \alpha_k \iota(\tau_d - \tau_b)$, and $\eta_{mijt} = \alpha_k \kappa_{ijt}$.

Note that the error between the outcome and residential school attendance equations are correlated as a result of government selection on unobservable endowments of human and cultural capital: η_{kijt} and ϵ_{ijt} by $\alpha_k \rho_\kappa$ and η_{hijt} and ϵ_{ijt} by $\alpha_e \rho_h$. This implies the outcome equation cannot be estimated consistently without jointly estimating the attendance equation. To evaluate the causal effect of residential school attendance on outcomes, an additional parameter - the correlation of the errors terms - must be estimated. For the model above to be identified independent of functional form restriction long term life outcomes and which varies over both cohorts and communities.[34] The cost of enforcement for the government depends on how far the closest residential school is from a community which varies over time and place via the opening and closing of residential schools. This can be excluded from the outcome equations as it determines residential school attendance, but not human and cultural capital directly. It is important to note that this is conditional on a time invariant set of community characteristics such as distance to the closest major city. Whether or not this is reasonable depends on the nature of the missionaries' decisions.

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[34]The variable must vary over both cohorts and communities or it will be collinear with the cohort or community fixed effects.

Table 12: Linear Probability Model First Stage Results: The Effect of the Instruments on Residential School Attendance

	Residential School Attendance			
	(1)		(2)	
	(a)	(b)	(a)	(b)
Open	0.114***	0.182***		
	(0.035)	(0.034)		
Open×Distance	-0.012***	-0.012***		
	(0.002)	(0.002)		
1941 Prop Catholic × Trend			-0.517**	-1.222***
			(0.252)	(0.306)
Female	0.035**	0.014	0.039**	0.019
	(0.016)	(0.014)	(0.017)	(0.014)
Single Ethnicity	0.123***	0.111***	0.121***	0.110***
	(0.028)	(0.026)	(0.029)	(0.026)
Latitude	0.002	0.066***	-0.001	0.055***
	(0.004)	(0.017)	(0.004)	(0.017)
KM (10) to City	0.001	-0.006*	-0.002	-0.008**
	(0.001)	(0.003)	(0.001)	(0.004)
Birth Cohort FE	X	X	X	X
Provincial FE	X		X	
Band FE		X		X
F-Statistic	12.60	15.93	4.22	17.69
Hansen J Statistic	8.998	0.362	-	-
N	11460	10271	11460	10271

Notes: Standard errors are reported in parentheses and are clustered at the three year birth cohort-band level. Panel (a) is the full sample with province effects, while Panel (b) includes all bands with at least 40 people. The total number of bands in this specification is 108. The reason for these restrictions with the various geographic controls regards convergence of the likelihood function and credible estimation of the time invariant effects. The indicator "open" is equal to one for an individual if the closest residential school to a community was open when they were of the legally mandated schooling age (which depends on federal and provincial legislation). It is zero otherwise. "Open ×Distance" is this indicator times the distance from the closest residential school. The row labeled "1941 Prop Catholic ×Trend" is the coefficients on 1941 Proportion Catholic in individual's census division × (average attendance in that individual's cohort - average attendance in cohort at peak 1934). The F-statistic on the excluded instruments is given in the row labeled "F-Statistic". The row labeled "Hansen J Statistic" is the test statistic from the Sargan (1958) and Hansen (1982) tests of over-identifying restrictions. The asterisks indicate the level of significance: * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

B   Appendix Tables

C   The Log-Likelihood Function

The notation and set up below is from Greene (2002) p.710-711. Let $X_2 = [1, x_{ijt}, z_{jt}, \delta_j, b_t, c_j]$ and $X_1 = [1, a_i, b_t, c_j, x_{ijt}]$, where b_t is a vector of birth cohort dummies and c_j is a vector of community dummies. The bivariate normal cdf is given by[35]

$$Prob(X_1 < x_1, X_2 < x_2) = \int_{-\infty}^{x_2} \int_{-\infty}^{x_1} \phi_2(z_1, z_2, \rho) dz_1 dz_2,$$

which I will denote $\Phi_2(x_1, x_2, \rho)$. The density is

$$\phi_2(z_1, z_2, \rho) = \frac{e^{-1/2(x_1^2 + x_2^2 - 2\rho x_1 x_2)/(1-\rho^2)}}{2\pi(1-\rho^2)^{1/2}}.$$

To construct the log-likelihood, let $q_{ijt1} = 2\kappa_{kijt} - 1$ and $q_{ijt2} = 2A_{ijt} - 1$. Now let

$$z_{i1} = \alpha_{m1} + \alpha'_{m2} x_{ijt} + \alpha_{m3} A_{ijt} + \tilde{\Upsilon}_j c_j + \tilde{\Gamma}_t b_t \text{ and } z_{i2} = \beta_1 + \beta'_2 x_{ijt} + \beta_3 z_{jt} + \beta_4 z_{jt} \delta_j + \Gamma_t b_t + \Upsilon_j c_j$$

and $w_{i1} = q_{i1} z_{i1}$ and $w_{i2} = q_{i2} z_{i2}$ and $\rho_{i*} = q_{i1} q_{i2} \rho$.

Then the log likelihood function is given by

$$\log L = \sum_{i=1}^{n} ln\, Prob(Y_1 = \kappa_{kijt}, Y_2 = A_{ijt} | x_1, x_2) = \sum_{i=1}^{n} ln\, \Phi_2(w_{i1}, w_{i2}, \rho).$$

Which I estimate using maximum likelihood. The marginal effects of each independent factor on final outcomes can be computed as follows. Let $g_{i1} = \phi(w_{i1}) \Phi \left[\frac{w_{i2} - \rho_{i*} w_{i1}}{\sqrt{1-\rho_{i*}^2}} \right]$. Note that there are several "marginal effects" one might want to evaluate in the bivariate probit model (See Green 1996b). For convenience in evaluating them, we will define a vector $x_1 = x_1 \cup x_2$ and let $x_1' \beta_1 = x' \gamma_1$. Thus, γ_1 contains all the nonzero elements of β_1 and possibility some zeros in the positions of variables in x that appear on in the other equation; γ_2 is defined likewise. The bivariate probability is

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[35]The only away in which the likelihood differs when w_{jt} is used as exogenous variation is the omission of z_{jt} and δ_j by w_{jt}.

$$Prob[y_1 = 1, y_2 = 1 | x] = \Phi_2(x'\gamma_1, x'\gamma_2, \rho).$$

The marginal effects of changes in x on this probability are given by

$$\frac{\partial \Phi_2}{\partial x} = g_1\gamma_1 + g_2\gamma_2.$$

D   Data Appendix

D.1   The 1991 Aboriginal Peoples Survey

The 1991 Aboriginal Peoples Survey is a post-Census survey the derives it population from those that claimed Aboriginal ancestry and/or were registered under the Indian Act. Those in the APS sample were further required to "identify" with their Aboriginal origins.[36] The long form was given to 20 percent of households off reservation and 100 percent of people on reservation. The data was collected by personal interviews with respondents, and in 17 percent of cases the survey was conducted through another household member on the behalf of the respondent if they were absent at the time of interview. The data was collected in June 1991 and response to the survey was voluntary. The response rate was 79 percent. Contact could not be made with 14 percent of the sample and 7 percent refused to be interviewed. If an individual did not answer a question used to construct a specific dependent variable or if they are missing any of the primary dependent variables they are excluded from that part of the analysis.

It is important to note that the survey does not include the institutional population (such as those in prisons) nor does it include the homeless. To the extent that residential schooling increases incarceration rates or homelessness, the results here will be biased. This issue is explored further in the online data appendix. To get a sense of how important this could be, I form an estimate of the Canadian Aboriginal homeless population. According to the 2011 Vancouver Homeless Count (2012) there were approximately 2,650 people either visibly homeless or in shelters. I focus on Vancouver because it has a high proportion of homeless and a relatively large Aboriginal population. Twenty-seven percent of these individuals self-identified as Aboriginal. Extrapolating this number to the other four cities over one million

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[36]The identification question was: "With Which Aboriginal group do you identify? North American Indian, Inuit, Métis, Another Aboriginal group?" If they didn't identify with an Aboriginal group they asked if they were "a registered Indian under the Indian Act of Canada"? If they said no, they were asked one final question and were then excluded from the survey. If residential schools were extraordinarily effective at integration and out-marriage, then people may not identify as Aboriginal and as a consequence my estimates will be a lower bound on the assimilation resulting from residential schools.

people in Canada and weighting by their population sizes (Statistics Canada 2013) yields an estimate of approximate 5,000 Aboriginal homeless. Adding the number of federally incarcerated Aboriginal people, approximately 3,400 (CBC 2013), yields a final number of approximately 8,400 Aboriginal people not observed. An estimated 150,000 Aboriginal people attended residential school. If all of these 8,400 individuals attended residential school, it implies they would make up 5.6 percent of the residential schooling population. It should also be kept in mind that this research inherently looks individuals who are still living. Many of the children who attended residential school did not live until adulthood (Milloy 1999). To the extent that this fraction is higher than for children that did not attend residential school the results will be biased.

A notable disadvantage to the 1991 APS is that separate residential schooling questions were asked to those between the ages of 50 and 64 and for those between 15 and 49. The question asked to those between 50 and 64 was "Did you ever attend a residential school?". The question to those less than the age of 49 asked first whether an individual attended a single elementary school or multiple elementary schools. Then they asked subsequently "where did you live while attending school: a) lived with family while at school; b) lived with a non-aboriginal family while at school c) lived at a residential school d) lived somewhere else." This process was then repeated for high school education if attendants ever made it to high school. All of these sub-questions are used to create a single indicator of whether an individual ever attended a residential school. The empirical model was run on both samples separately and comparability does not seem to be an issue. Anyone over the age of 65 was not asked any questions regarding their education.

The Métis and Inuit were excluded from the analysis in order to avoid overgeneralizing. Although the Métis were affected by the residential schooling system, their experiences are unique and I do not include them here due to the risk of over-generalizing. The explicit policy outlining admission of Métis students was drawn up in a 1911 contract between the Federal government and the churches. Clause 4(b) of the contract stated that Métis children were not to be admitted unless Indian children did not fill the residential school authorized

admission level. If this was the cause, even then the Superintendent General could provide authorization for the child to be admitted, but was not allowed to fund his education in any dimension. This policy was maintained throughout the rest of the history of the system (RCAP, 1996). For a discussion of the Métis and Indian Residential schools see Chartrand, Logan and Daniels (2006). I restrict the location of residence to the western provinces because residential schooling serviced a greater proportion of individuals than in the eastern provinces, these bands are more uniform in their pre-settlement contact and educational alternatives and this avoids dealing with the unique circumstances of the Inuit. The Inuit had very little contact with formal schooling in general and were subject to Indian Residential Schools much later than most of Canada. For a discussion of the Inuit experience see King (2006). Aboriginal peoples in the West faced substantially different circumstances than those in the East in ways that might violate the assumptions of the framework outlined in this paper. The first, western Aboriginal people were viewed as less "socially advanced," than those in the eastern provinces (Sealey 1980; Miller 2004, 245); as early as 1869 and 1884 the federal government began granting a considerable levels of self-government for "the more progressive bands," and by 1946 with very few exceptions, all bands in Ontario Quebec, and the Maritime Provinces were under the elective system while no bands in Western Canada were (MacInnes 1946, 392-394). In addition western Canada did not have long standing day schools like in the eastern provinces – by the early 1900s there were 28 Aboriginal day schools in the Atlantic provinces alone (Hamilton 1986) and over one hundred in the Eastern provinces in total. Residential schools were also more prominent in the western provinces as a result of the treaty making process during the 1870s in an attempt to avoid violence and the decline of the buffalo (Glenn 2011). All of these facts could heavily influence the ability of Aboriginal communities to drive the opening and closure of residential schools and results in substantially different time patterns than in the eastern. Restricting the sample to the western provinces also clarifies the counter-factual environment faced by the Indigenous population. The sample is restricted to those older than 20 in order to ensure individuals are given a chance to complete their high school education, and it is restricted to those younger

than 65 since anyone older was not asked schooling questions in the 1991 APS.

D.2   Dates of School Closure

I use information from the Aboriginal Healing Foundation on the dates of closure, opening and location of different residential schools across the country.[37] These are certainly not the only dates of opening and closure of residential schools that could be used. For example If the school was transferred to a band or group of bands before the school was ultimately closed, the date of transfer is given instead of the date of closure. To obtain actual dates of closure of the schools I use records compiled by the General Synod Archives of the Anglican Church. I have also run specifications which use the dates of federal government involvement used in the Residential Schools Settlement Agreement. These last two sets of dates are not used as the main specifications because many of the dates extend well past the time when the schools resembled the historical residential schooling system, however similar results are found using either set.

It is important to understand what the closure of the closest residential school implies. If the closest school to a community closes - z_{jt} changes from one to zero – it implies that the cost of enforcement has increased for the federal government. This implies the government will have a weaker incentive to enforce attendance at residential school and thus fewer children will attend. However, there still may be a subset of children who are forced to attend residential school despite its increased cost to the government. These children will attend a residential school further away. In addition, if the closest residential school was Catholic and a child's parents were Anglican, the closure of the closest residential school would not affect their attendance. As a consequence, the closure of the closest residential school does not induce attendance to drop to zero. Tests for a structural break in residential school attendance suggests the decrease in attendance after closure is 21.4 percent with a standard error of 6 percent. Tests indicate that there is no statistical trend in attendance

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[37]These dates and locations can be found at http://wherearethechildren.ca/en/about/ahf.html. Last Retrieved September 29, 2012.

before school closure, with the pre-closure slope coefficient of attendance equal to -0.01 with a standard error of 0.01.

D.3 Mapping Individuals to Communities

The communities that are matched are all areas defined as Indian reserve, settlements or unorganized regions that contain Aboriginal communities that can be linked to a band. In some cases, villages or towns are included if they are associated with a particular Aboriginal band identified in the 1991 Census. Note here that the way I am defining communities is based on census subdivisions which are municipalities or areas that are deemed to be equivalent to a municipality for statistical reporting purposes such as an Indian reserve (Statistics Canada). The reader should note that there are technically many more reservations than Census subdivisions. There are 2,675 reserves Canada wide, but only 615 bands. Over half of these reservations are in British Columbia (http://www.gov.bc.ca/arr/reports/facts/overview.html). Census Subdivisions often aggregate many smaller settlements into larger statistical areas.

Once the sample is weighted using the population weights, nearly 50 percent of registered Indians who are in my sample do not currently live in one of the specified Aboriginal communities that have been linked to a school. Unweighted, this proportion of the population is a much less important part of the sample. Although the APS does not specify where an individual was born, it does specify what band an individual belongs to. More than half of these bands have a legally defined land base. A large fraction of these land bases link uniquely to only one or two CSDs. Using Aboriginal Affairs and Northern Development Canada's (AANDC) legal-linkage files of bands to CSDs, I can reconstruct an individual's "origin" communities. The draw-back of these files are that they define bands only by their 2006 names and their 2006 CSD. These differ substantially in some cases from their 1991 names and definitions. I convert the 2006 CSD using the correspondence tables proved by Statistics Canada to link the 2006 CSD to the 2001 CSD, then the 2001 divisions to the 1996 CSD and finally back to the 1991 CSD. Codes are aggregated when necessary to produce reasonably consistent geographic regions.

Neither Statistics Canada nor AANDC provides a correspondence table between the 2006 band definitions and the 1991 band definitions. I construct a correspondence using sources such as the Canadian encyclopedia or band websites which often provide band histories. A total of 420 out of the 660 bands in 2006 either had the same name in both years or were incorrectly spelled in 1991 and thus were straight forward. A total of 196 bands experiences name changes. Approximately 44 of the bands were difficult to match either because they had been dissolved, reformed, or had no legal land base and needed to be matched based on their traditional locations.

Another limitation of the band listings in the 1991 APS is that some individuals did not list their band but instead listed their tribal council or the ethnic group they belong to (for example instead of saying Bigstone Cree or Chapleau Cree, they would just list Cree). In these cases, I link the tribal council or ethnic group to a large subset of possible CSD.

If a band is linked to more than one possible sub-division, I use the 1991 Confidential Long Form Census files to estimate the probability of being from each of these divisions, given each band. I then match individuals who currently reside outside one of the previously specified Aboriginal communities to one of these divisions using these estimated probability distributions. If a community has no legal land base, or if there are no individuals in the communities predicted given their band's legal land base, I estimate the probability distribution of their location based on where they actually are.

Note that using the 1991 probabilities rather than the probabilities at the time the individuals were in school is a matter of practicality. I have been unable to find a statistical resources that would allow me to calculate these probabilities for earlier time periods. What do exist are the number of "Indians" in a particular census division in 1921, 1931, 1941 and 1951 and every five years thereafter. Theoretically, these broader regions could be linked to bands using the 1991 geographic distribution of First Nations. However, given the reliance on the 1991 distributions, this route would add little over what aggregation of the 1991 distributions would provide.