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The Compelling Effects of Compulsory Schooling in Canada

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I. Introduction

The motivations for mandating compulsory school attendance often relate to paternalistic assumptions that children wishing to leave school early are better off staying on, or that society benefits collectively from raising a country's overall education attainment. In Canada, compulsory schooling began in 1871 in Ontario. Teachers, politicians, and other authorities believed that encouraging youths to attend classes would promote good citizenship, increase economic development and improve well-being. Archibald Macallum, an Ontario teacher, summarized these arguments vigorously:

“Society has suffered so cruelly from ignorance, that its riddance is a matter of necessity, and by the universal diffusion of knowledge alone can ignorance and crime be banished from our midst; in no other way can the best interests of society be conserved and improved than by this one remedy – the compulsory enforcement of this great boon – the right of every Canadian child to receive that education that will make him a good, loyal subject, prepared to serve his country in the various social functions which he may be called on to fill during his life; and prepare him, through grace, for the life to come” [Annual Report of the Ontario Teachers' Association, 1875, as cited in Prentice and Houston, 1975, pp. 175-176].

All other provinces introduced compulsory schooling soon after Ontario's introduction. Currently, all provinces, except New Brunswick, enforce a school leaving age of 16. For the first time in Canada, New Brunswick introduced a school leaving of 18, in 2000. The School Leaving Age Task Force (1998), commissioned by the province, cited similar reasons for recommending raising the school leaving age as those used to justify the introduction of these laws more than one hundred years ago. The Task Force suggested high school leavers at ages 16 and 17 did not acquire appropriate skills to cope successfully in the present labour market. It recommended

raising the dropout age limit to 18 in order to extend the amount of time spent learning skills that improve school leavers' chances for labour market success.

Surprisingly little research discusses the welfare implications of compulsory schooling, even though these policies have existed for more than a hundred years and are often updated by imposing even greater mandatory age requirements. Most arguments in favour of compulsory seem to rely on intuition rather than theoretical or empirical evidence. The most common model of school choice in social science, however, suggests compulsory schooling should lower lifetime welfare [e.g. Becker, 1965, Chiswick, 1967]. The human capital model of school choice views education as an investment. Students invest time, forgo earnings, and endure possible psychological costs from attending school, but only if the benefits from doing so are large enough to offset these costs. If not, a student's optimal decision should be to leave. Compulsory schooling prevents that option. If students already choose optimally when to leave, then imposing a longer stay in school makes them worse off, on average, than before. Only in the presence of positive externalities, or sub-optimal school choice can compulsory attendance legislation improve welfare.¹

The goal of this paper is to provide empirical evidence on the effects of compulsory school legislation in Canada during the period between 1920 and 1970, when education attainment increased substantially. Compulsory school laws are collected from provincial Statutes and Revised Statutes and matched to enrolment and Census data. First, I examine the overall effects of compulsory schooling on enrolment and grade attainment. I find changes to the school leaving age, school entry age, and the removal of work permit exemptions to the laws substantially influenced average education attainment. I estimate changes to compulsory schooling accounts for about 21 percent of the two to four-fold increase in overall education attainment during this fifty-year period. The laws are predicted to have similar effects over

¹ In another paper [Oreopoulos, 2003], I investigate in more detail if decisions to drop out of high school are sub-optimal, and whether students benefit from compulsory schooling law policies that oblige them to finish school beyond the time they choose on their own.

smaller time periods, and for different regions. The estimates are somewhat larger than those found by Lleras-Muney (2002) and Goldin and Katz (2003) for the United States.

Second, I attempt to identify how compelling high school dropouts to attain additional education impacts adult earnings, income, and other labour market outcomes. Differences in the timing of the law changes across provinces allow the estimates control for province specific differences in average education attainment and birth cohort differences. Several previous papers use a similar methodology to estimate the effects of compulsory schooling on various outcomes in the United States and the United Kingdom [Angrist and Krueger (1991), Acemoglu and Angrist (2002), Lleras-Muney (2002), Goldin and Katz (2003), Harmon and Walker (1999), and Oreopoulos (2003)]. This is the first study to estimate the returns to compulsory schooling in Canada. I find students compelled to take an extra grade of school experienced an average increase of 13.6 percent in annual earnings. I also find students with additional schooling, due to compulsory attendance restrictions, are more likely to be bilingual, work, and less likely to be below the Low Income Cut-off, unemployed, and in a manual occupation. I arrive at similar estimates whether looking over different periods between 1920 and 1980, and whether looking over different regions. The significant results reinforce similar findings from the U.S. and U.K., and suggest that compulsory schooling offers a useful policy option for improving adult outcomes for those considering leaving school early.²

² The returns to compulsory schooling presented here are also one of the few estimates of the causal impact of education. Noting that individuals with higher levels of education attainment earn, on average, more than those with lower levels contributes little to the discussion on education policy. The association cannot tell us, for example, the predicted impact from improving access to higher education for low income households, or the impact from choosing to take an engineering degree at university instead of a 2 year degree in computer science because family background and individual characteristics are almost certainly related to the type of degree chosen. Many recent papers try to disentangle the causal effect of additional schooling by using particular events that affect the education attainment of one set of individuals differently than another, holding the characteristics of both groups the same. In Canada, I know of only three other studies that estimate the causal impact of education in Canada: Lemieux and Card (2001) examine the impact of Canadian government policy that provided incentive to returning World War II veterans to enrol in university. Sweetman (2000) studies the effect of raising the high school graduation

Next section provides a brief history of compulsory schooling in Canada. Section III describes the data sources used in the paper. Section IV shows the methodology for identifying the effects of compulsory schooling. The first set of results in Section V show the estimates for the effects of compulsion on school enrolment and grade attainment. Section VI uses predicted grade attainment from these school laws to measure the effects of compulsory schooling on would-be-dropouts' earnings, income, unemployment, and other labour market outcomes. I conclude in section VII.

II. History of Compulsory Schooling in Canada

Interest in public and non-denominational schooling grew in the last half of the nineteenth century from a mix of circumstances and motives. Many affluent farmers, merchants, lawyers, and other professionals favoured the expansion of public education to promote learning for those without privileged background. Other politicians saw public schooling as a means to cultivate a sense of citizenship and loyalty. Some prominent Canadians attributed the rise in economic power and prosperity of the United States to the development of its public education system and argued for its emulation. Parents with large families from rural communities, the vast majority of Canadians in the late nineteenth century, may also have been predisposed to the campaign for public education. While farmers typically hoped their children, especially their sons, would eventually take over the homestead, there was not enough farmland to ensure the economic viability of everyone in the next generation. Public schooling could provide opportunity to secure economic security through other occupational pursuits, while being offered nearby.

requirement in Newfoundland in 1983-84 by one year. Lewis (2002) explores the impact in Quebec from introducing intermediate college education for high school graduates.

A gradual increase in industrial development, road construction, and the establishment of representative government, especially at the local level, made the logistics of introducing public schooling possible. Prince Edward Island introduced the first province-wide common schooling system in 1852. By 1873, all provinces but three funded their schools through taxation. Alberta and Saskatchewan adopted a free-school act in the early half of the twentieth century. Newfoundland began legislation in 1942.

Even as schooling became more available, school attendance was often sporadic and infrequent. At the end of the nineteenth century, 70 percent of the Canadian population still lived in rural areas. The needs of the farm often dictated the frequency and timing of school attendance. Teachers and administrators expressed concern over the irregular turnout. Some families sent one child to school for a few weeks and then another [Phillips, 1957]. In the winter, when children were least needed at home, attendance remained low because leisure was often preferred over sitting still in cramped and cold schoolhouses. The average daily attendance rate (among those enrolled) for the whole of Canada was 61 percent in 1900. The number of years typically spent in school were also few. Both boys and girls often left by ages nine or ten to begin work in factories or at home.

Teachers, inspectors, and politicians were among the first to argue for school compulsion. One argument was that weak attendance disrupted the class and prevented any meaningful learning from occurring. For example, a local superintendent in Ontario in 1971 claimed, “irregularity of attendance is the bane and curse of the public schools; it is a log and chain upon the progress of instruction for it blasts and withers the noblest purposes of the best of teachers’ [Axelrod, 1997, p 51]. Another argument was that students were being kept home for trifling reasons, or that poor families resisted sending their children to school, when doing so would help them avoid poverty as adults. Authorities felt the reasons for introducing public education were being compromised by poor attendance. As an inspector for the school system of Prince Edward Island in 1869 stated,

“Neither the building of School-houses, the furnishing of them, nor the payment of the taxes that go to make up the Teachers’ Salaries is left to voluntary effort. Government enforces the payment of taxes. A majority of householders compels the minority to share the expense of building the School-house. Why then, it is asked, should the attendance of pupils at School, -- that point at which the machinery of our Educational System ought most prominently be brought to bear – be left to the caprice or the negligence of parents?” [Phillips, 1957, pp. 165-166].

Figure 3 summarizes the compulsory school laws in Canada over the last hundred years. The figure highlights the minimum school leaving ages of each province, and the ages which children must begin school.

Ontario took the first step of introducing compulsory school laws in 1871. Parents were obliged by threat of fine to have children attend school for at least four months a year between the ages of seven and twelve. Legislation in 1891 raised the limits to eight and fourteen and required a child to remain at school, even after reaching fourteen, until the end of term. The new law was more definite in stipulating penalties for parents who refused to comply and for employers who hired children who should have been at school. But, as with many of the new compulsory school laws first introduced by the other provinces, many exceptions were allowed, and authorities failed to enforce, especially in rural areas. Aside from sickness, the main exception involved living more than 2 miles away from school for a child under age 10, and 3 miles away if over age 10 unless transportation was provided. The Adolescent School Attendance Act increased the age of compulsory attendance in 1921 to sixteen in urban areas, but any adolescent was exempted with a home permit or an employment certificate signed by a parent. Employed fourteen and fifteen year-olds were required to attend part-time evening classes, but only in municipalities that provided such instruction. In 1954, the Schools Administration Act imposed a minimum school leaving age of 16 for all children in Ontario, but allowed adolescents over fourteen to work on a

family farm, at home, or elsewhere if doing so was necessary for subsistence. By 1970, these exemptions were removed.

British Columbia began compulsory schooling in 1873, one year after introducing free public education. Children were required to attend between ages seven and fourteen for periods to be determined by local trustees. School regulators complained, not long after, that trustees were reluctant to pass such laws or to enforce them if passed. A further attempt to improve attendance was made in 1874 by making teacher's pay dependent on attendance, though this legislation did little to help enrolment and much to enrage teachers. In 1876, the Public Schools Act was again amended to order trustees to enforce attendance over six months a year for students between seven and twelve. A further amendment to the Act in 1901 raised the age of compulsory schooling from seven to fourteen in cities for the full year, and in 1912 this was extended to all municipal districts. In 1921, the minimum school leaving age increased again to fifteen.

Prince Edward Island amended its Public Schools Act in 1877 to include a compulsory clause stating that every child between ages eight and thirteen remain in school at least twelve weeks in every year, six weeks of which must be consecutive. In 1920, P.E.I. mandated the annual time in school extended to sixty percent of the days on which public school was in operation. Children in Charlottetown and Summerside were required to attend school 100 percent of the time by 1930, unless exempt. In 1938, the minimum school leaving age for all students was raised to fifteen.

Most other provinces introduced compulsory attendance before 1910. In Nova Scotia from 1883, a two-thirds majority vote in favour of compulsory attendance in any school section sanctioned its application to children aged seven to twelve, with the usual penalty of a fine and the usual exemptions of children living two miles from a public school or attending a private school. Nova Scotia restricted employment of children less than sixteen years to only those who passed a grade seven equivalent examination in 1922. Adolescents over thirteen that needed to work were exempt, if deemed so by a principal. In 1933, the school-leaving age was raised to

fourteen for children in rural areas and to sixteen for children in urban schools. A child could be exempted after thirteen if a parent or guardian argues successfully to the Board of Education that necessity requires the child to work, or if a child attains grade nine equivalent standing. In 1946, any child attaining the minimum school leaving age became required to finish the school year. A child could still obtain an employment certificate that states it is necessary for her to work in 1954.

School trustees in New Brunswick began in 1905 voting every year until resolution for compulsory schooling for children ages six to fourteen in cities and incorporated towns, and ages seven to twelve in other rural areas. In 1946, the province changed compulsory schooling requirements to ages seven and sixteen inclusive for students in cities and to seven and fourteen inclusive for student in rural areas. In 1966, it changed the minimum school leaving age to sixteen for everyone.

Saskatchewan started compulsory schooling in 1909. Children between the ages of seven and thirteen years inclusive were required to attend school for one hundred days, sixty of those consecutive. The School Attendance Act, introduced in 1917, expanded on these laws, compelling children between ages seven and fourteen to attend school for the whole year in session. Children attaining grade eight equivalent were exempted. In 1922, the minimum school leaving age was raised to fifteen and in 1965, Saskatchewan raised the school leaving age again to sixteen. The grade eight equivalent exemption remained until 1975.

Alberta introduced the Truancy and Compulsory School Attendance Act in 1910. The Act compelled children between ages seven and fourteen to attend school for the full term. The school leaving age was amended to fifteen in 1918, with children attaining grade eight exempted. Children reaching age fourteen and employed were also exempted. The amended Act in 1922 removed these exemptions. The requirement that children age fifteen must stay until the end of the term was changed to apply only to those whose birthday occurs in the second term. The school leaving age was raised to sixteen in 1966, and the maximum school entry age lowered to

age six in 1970. The requirement that a child finish the end of term before leaving school was dropped in 1975.

The original Public Schools Act of Manitoba contained a compulsory attendance provision, but was ultimately deleted before passing because of a concern that it might lead to the entire proposal being declared unconstitutional [Henley, 1993]. The province prohibited funding for funding of separate Catholic schools, and feared that forcing Catholic parents to send their children to non-denominational schools would cause substantial political backlash. As a compromise between Catholic school supporters and those that argued for compulsion, the province introduced child labour laws in 1907 restricting the employment of children under age twelve during school hours. That age was raised to fourteen in 1914, but was not enough to calm the growing campaign for compulsory legislation. The province finally introduced legislation compelling children ages seven to fourteen to attend school in 1916. In 1962, it raised the minimum school leaving age to sixteen.

In only two provinces was the enactment of compulsory attendance postponed until the second quarter of the twentieth century. The issue of compulsory education aroused much public debate in Quebec. The first bill was submitted to the legislature in 1892, but it was defeated. A second, in 1901, met the same fate. In 1912 the Protestant Committee, convinced that the Roman Catholics would not concur, recommended obligatory school attendance for Protestant children only. This proposal, too, was defeated. One argument against compulsory schooling at the time was that it was unnecessary on the basis that child labour laws already restricted employment of youths. Legislation restricted children under the age of sixteen from working without knowing how to read and write. Those that did not were required to attend night school if they wanted to continue their occupation. Many avoided school from these exceptions and weak enforcement. While Quebec enjoyed relatively high average daily attendance rates in school in the early part of this century, its growth in secondary school enrolment failed to keep pace with the other provinces. Finally, in 1943, after a lengthy inquiry by the Roman Catholic Committee, the

legislature adopted an Act making school attendance compulsory between the ages of six and fourteen, until the end of the school term. Children completing elementary school were excused, but this exemption was removed shortly afterwards. In 1961, the school leaving age was raised to fifteen.

Newfoundland enacted compulsory schooling late, the same year it legislated free education in 1942. Compulsory ages were set between age seven and fourteen. The province raised the school leaving age to fifteen in 1951. Students attaining fifteen during the school year had to wait until the end of the school term before having the option to leave.

After 1963, all provinces enforced a minimum school leaving age of either fifteen or sixteen. These limits remained for many years. In 1980, Prince Edward Island raised the limit to sixteen. Newfoundland also raised the limit to sixteen in 1987, Quebec in 1988, British Columbia in 1990, and Nova Scotia in 1996. New Brunswick was the first province to implement a minimum school leaving age above sixteen in 2000, raising it to eighteen.

In addition to compulsory schooling, many provinces also introduced child labour legislation near the beginning of the twentieth century. The initial laws were primarily designed to protect children from working under excessive conditions rather than to encourage learning in school.³ Many provinces imposed restrictions on the age a child could begin work in a mine or factory. Night work under the age of eighteen was strictly forbidden in most provinces. Children were limited in the number of hours they could work, generally not more than 10 hours a day and 60 hours a week.

There were other types of employment laws that shared a closer connection with compulsory schooling. Employment certificates, for example, exempted children from the minimum school leaving age law. Some certificates were obtained by passing a grade seven or eight equivalence test. Others required only evidence of reading and writing skills. For certain

³ The Dominion Bureau of Statistics' 1925 Survey of Education provides a useful summary of the details and complexities of early Child Labour Laws by province.

occupations, employment certificates were required for children over the minimum school leaving age, mainly mining.

Another type of labour law allowed children to work below the minimum school leaving age if doing so was necessary for subsistence. In Nova Scotia, and other provinces, allowed children to work if doing so was deemed necessary for subsistence. By 1933, all provinces had removed these exemptions.

In certain provinces employers were also not allowed to hire children during school hours. This condition was usually incorporated into compulsory school legislation. For virtually every case, the minimum working age restriction (during school hours) corresponded with the minimum school-leaving age restriction. The purpose of restricting employment below the minimum school leaving age was to place liability on employers, in addition to the liability already imposed on parents and guardians through compulsory schooling. Most provinces implemented these laws the same time as other amendments, designed to strengthen compulsory school laws, were being made.

In short, child labour laws in Canada either reinforced existing compulsory school legislation or provided opportunities to avoid it. They were designed to work together. Children were allowed to work earlier than the minimum school leaving age if they had already obtained a satisfactory minimum level of education, or if they were from poor households. But many school authorities believed these exemptions provided unnecessary loopholes used to avoid the school leaving age law without reasonable cause. By 1942, all provinces except Saskatchewan removed these exemptions. Saskatchewan abandoned its Grade 8 exemption in 1974.

III. Data Description and Sources

Data on compulsory schooling and child labour laws were compiled directly from provincial Statutes and Revised Statutes containing all original Acts of legislation and

amendments since inception. Additional sources helped verify the compilation. In particular, the Dominion Bureau of Statistics (later renamed Statistics Canada) published a near annual survey of education beginning in 1921 detailing revisions to Education Acts and summarizing compulsory school legislation (and occasionally child labour laws) for each province. The Appendix lists the Acts, the education surveys, and all additional sources used to create the variables in this paper.

I created five variables to summarize compulsory school attendance rules, coded by year of legislation for each province from 1900 to 2000:

1. Maximum age of compulsory schooling in towns and cities (town dropout age)
2. Maximum age of compulsory schooling in rural areas (rural dropout age)
3. Minimum age of compulsory schooling (entry age)
4. Indicator for whether employment certificates provided exemptions to the dropout age
5. Indicator for whether employers faced penalties for hiring children below the dropout age

In addition, I constructed a variable for the number of years in school a child would have to attend if she entered school at the age that compulsory attendance laws required and left immediately after reaching the minimum school leaving age (minimum number of years in school). Acemoglu and Angrist (2000) and Lleras-Muney (2001) use a similar variable for their United States analyses.

These variables were matched to aggregate school elementary and secondary enrolment data, by province and year, using near annual education surveys from the Dominion Bureau of Statistics from 1921 to 1970. The surveys contained information by province on total enrolment and average daily attendance, calculated by summing the number of students attending school each day and dividing by the number of school days. Average daily attendance data was published until 1960. In addition, the surveys recorded enrolment by age and province, but not as

frequently as the aggregated elementary and secondary school data. Missing years were linearly interpolated. The fraction enrolled by year and province was computed using Canadian population estimates from Statistics Canada. Details of the enrolment data are discussed more in the appendix.

To explore the effects of compulsory schooling on other measures of education attainment, and on subsequent social-economic outcomes, the schooling law variables were also matched to the 1971, 1981, 1986, 1991, and 1996 Censuses.⁴ The Censuses provided information on gender, province-of-residence, province-of-birth, age, labour market status, income and wages, and education attainment. I kept all individuals born in a Canadian province that were 14 years of age between 1920 and 1970. The sample aged 14 before 1920 are older than 65 in the 1971 Census, and compulsory schooling laws were sometimes weakly enforced during that period compared to afterwards. School-leaving age changes after 1980 may have affected high school dropouts differently compared to changes that occurred during the 1920 to 1970 period, when education attainment and enrolment rose substantially. For these reasons, I limited my analysis of the effects of compulsory schooling over this fifty year period.⁵ During this period, all provinces experienced rapid increases in average education attainment. The remarkable increases by province and year aged 14 are shown in Figure 2. Note that, together, Figures 1 and 2 can generate similar estimates of the effects from the compulsory school on average grade attainment, even though discontinuities at the years when the laws change do not appear visible. We should not expect large discontinuities, because the education attainment variable used here (grade attainment) does not correspond precisely with the law changes (age requirements). Raising the school leaving age may increase the length of time spent in school, but may not raise education attainment for those retained a grade.

⁴ The 1976 public use census sample excludes earnings information and was omitted.

⁵ The post 1970 changes are not examined here, but will be in another paper.

The Census recorded highest grade attained, highest degree completed, and an indicator for high school certificate attainment (from the 1991 and 1996 samples only). I focused on the grade attainment variable, since the school laws before 1970 did not constrain children to finish high school. A child that entered Grade 1 at age 6 and advanced one grade per year reaches Grade 11 at age 16. I examined whether compulsory schooling affected high school completion or education levels beyond high school with the other variables.⁶

Different provincial grade requirements for high school graduation complicated the use of grade attainment variables to examine the effects of compulsory schooling on earnings. By 1960, for example, Nova Scotia, Quebec, and Newfoundland allowed graduation after Grade 11. Newfoundland did not offer schooling beyond this grade until 1984.⁷ The other provinces allowed graduation after Grade 12. Ontario and British Columbia offered a senior matriculation year with Grade 13 that generally reduced by one year the time required for a university degree. Almost 50 percent of 14 year olds in 1960 attended Grade 13. Compelling children to attain Grade 11 likely had different implications depending on the province they were in.

The explore whether differences in high school graduation dates, or other unrelated factors affecting upper levels of education, affect the results, I also estimated the regressions for only those attaining grade 11 or less. If compulsory schooling had a minimal impact on those attaining grades beyond 11, this sample omits a large population of students unaffected by the laws, but whose outcomes may by have differed by province for other reasons. We should not expect the estimated effects of compulsory schooling on adult labour market outcomes to differ if

⁶ Children compelled to take additional years of high school may also be more likely to graduate since the number of years until completion after gaining the option to drop out declines. If the perceived costs of completing the remaining years after attaining an extra grade are considered smaller, students that would have dropped out under less restrictive compulsory school laws may choose to continue beyond the maximum age of compulsion. Compulsory legislation might also affect children wanting to leave after the school leaving age. Lang and Kropp (1986) suggest that individuals intending to complete one or two additional years of schooling after the minimum leaving age requirement may acquire additional education after legislation raises the limit to avoid signalling to employers they are in the same category as those who leave school at soon as possible.

⁷ See Sweetman (2001) for a discussion on the effects from increasing the high school curriculum in Newfoundland by one year before graduation.

the laws impact only high school dropouts or early school leavers. Section VI shows this hypothesis generally holds.

I matched individuals to the compulsory school laws that were in place in their province of birth when they 14 years old.⁸ Acemoglu and Angrist (2000), Lleras-Muney (2001), that Schmidt (1996), and Goldin and Katz (2003) followed the same procedure for the United States. Schmidt (1996) examined this assumption and found the effect compulsory school laws in the United States were largest when matching to individuals at this age.

Finally, I also matched individuals with characteristics of their province-of-birth when they were 14 years old: number of schools per student, number of teachers per student, total per capita education expenditure, and average per capita personal income by province and year. The next revision will include results after adding these control variables.

IV. Methodology for estimating the effects of compulsory school on education and adult outcomes

I first examine the impact of compulsory schooling on enrolment and education attainment. From the enrolment data, I estimate the following equation:

$$(1) \quad ENR_{pt} = \gamma CL_{pt} + e_p + e_t + e_{pt},$$

where ENR_{pt} is the enrolment rate for province p in year t , CL_{pt} is a vector of provincial compulsory schooling law and child labour law variables, e_p and e_t are provincial and year

⁸ Individuals that moved provinces before reaching high school were mismatched. Children did not likely move provinces because of a change in compulsory school legislation, so such laws changes are unlikely correlated with error.

fixed effects respectively, and e_{pt} is the error term. The errors are clustered by province and they are corrected for heteroskedasticity using Huber-White's estimator.

The general methodology for identifying the impact of compulsory schooling on individuals goes beyond comparing different provinces with different laws. Average differences in enrolment by province and year are accounted for. Identifying the effects from the laws comes from difference in the timing of the changes in these laws across provinces. The analysis is therefore similar to difference-in-difference estimation, but with more than one intervention and more than one 'treatment group'. The methodology does not identify the true impact of these laws on enrolment if other provincial factors that influence enrolment change coincidentally at the same time as the laws themselves. Several specification checks are carried out to examine this possibility.

For the census data, I first generate cell means for all variables by census year, gender, birth cohort, and province. This improves the manageability of the dataset, and avoids heteroskedasticity at the individual level.⁹ I estimate the following equation:

$$(2) \quad EDUC_{pcgya} = \gamma CL_{pc} + e_p + e_c + e_g + e_y + e_a + e_{pcgya},$$

where $EDUC_{pcgya}$ is the average education attainment level for the group born in province p , from birth cohort c , with gender g , from census year y , responding to the survey at age a . Multiple years of cross-section data allow for simultaneous age, birth cohort, and survey year fixed effects. Two of these fixed effects must be assumed the same. I assume the effects for the earliest two birth cohorts are the same. Alternative assumptions are inconsequential. The regressions weight all cell means by their sample size and cluster by province with Huber-White

⁹ After weighting the cell mean data, the coefficient estimates, compared with those from the micro data, are the same in expectations.

standard errors. I investigate the impact the different laws had on education attainment for the full sample, and for different time periods and province combinations.

I estimate the returns to compulsory schooling on earnings and other social economic outcomes by substituting actual education attainment with predicted education attainment from compulsory schooling differences across province and time. The baseline instrumental variables equation is:

$$(3) \quad Y_{pcgya} = \overline{\overline{\delta EDUC}}_{pcgya} + u_p + u_c + u_g + u_y + u_a + u_{pcgya},$$

where Y_{pcgya} is the average outcome for the group born in province p , from birth cohort c , with gender g , from census year y , with age a , and $\overline{\overline{EDUC}}_{pcgya}$ is predicted education for the group after estimating equation (2).

V. The Impact of Compulsory Schooling on School Enrolment and Education Attainment

Table 1 presents the predicted effect of the compulsory school variables on enrolment between 1920 and 1970 from estimating equation (1), weighted by provincial population of 5 to 16.¹⁰ Column 1 shows the coefficients for the effects from facing different school-leaving ages. The omitted dropout age is age 12 or less (or no dropout age), and the omitted school entry age is 8 or none. Raising the minimum school leaving age to 14, compared to any lower limit is associated with an 8.1 percentage point increase to a province's school enrolment rate. The mean

¹⁰ It is worthwhile mentioning that unweighted estimates produce similar results.

of this variable is .95, and the standard deviation is .116.¹¹ Column 1 also estimates that raising the school leaving age further to 15 increases national enrolment by another 7.8 percentage points. However, the effect from increasing the limit again to age 16 is negative, compared to provinces with a school leaving age of fifteen. The lower estimate occurs consistently with other specifications. As shown in the next tables, this finding may, in part, be due to enrolment patterns in Quebec after 1950. A school leaving age of 16 impacts education attainment about the same or more than a leaving age of 15 after excluding Quebec from the analysis, or restricting the sample before 1950. School entry laws do not affect national enrolment significantly. Neither do employment certificate exemptions.

School leaving age limits seem to play a large role affecting enrolment rates of 14 to 16 years olds. Column 6 estimates the enrolment rate rises by 6.0 percentage points for this group from raising the school leaving age to 14 (though the standard error of this estimate is high). A dropout age of 15 is associated with a further 16.9 percentage point increase in the rate. Raising the dropout age again to 16, however, predicts a fall in enrolment. Mandatory ages for school entry are not significantly related to enrolment changes. The point estimates for the effect of allowing children to leave school for employment reasons indicate an insignificant and negative impact. The summary variable in the last column shows a one-year increase in the number of mandatory total years in school relates to a 2.8 percentage point increase in school enrolment of 14 to 16 year-olds.

Table 2 shows similar regressions, but using grade attainment variables from the Census. The first set of columns shows results using the full sample of Canadian born individuals who were 14 years old between 1920 and 1970, and who were between 20 and 65 years old when they completed their survey. The second set displays outcomes only among those with less than Grade 11 attainment. Column 1 indicates a substantial average grade attainment increase associated

¹¹ Some values exceed one because the numerator (total enrolment) and denominator (population between ages 5 and 16) come from different sources.

with higher school leaving ages. Average grade attainment is 0.24 points higher with a dropout age of 14 compared to a lower or no dropout age, after controlling for average provincial differences during the data's time span, average birth cohort differences and census year fixed effects. Raising the dropout age to 15 exhibits an even larger increase in average grade attainment (.63 points). After controlling for province and birth cohort fixed effects, raising the dropout age to 16 is associated with a lower grade attainment level than that under a school leaving age of 15, but still a higher attainment level compared to a school leaving age of 14. This finding is consistent with the coefficient on the dropout age 16 indicator for the effect on enrolment, shown in Table 1. The standard errors around this estimate are notably high. Unlike the influence on enrolment, exemption by employment certificate at a particular dropout age is associated with a significant and substantial reduction in average grade attainment (.26 points). The point estimate on this coefficient remains about the same with the inclusion or exclusion of other compulsory education variables. Lower entry ages are also associated with higher grade attainment. Average grade attainment for adults that faced a school entry age of 7, versus no entry age or an entry age of 8, is .27 grades higher. However, provinces with the entry age to 6 experiences a .14 reduction in average grade attainment. The standard error on this point estimate is somewhat high. Generally, the relative effects of the compulsory schooling variables are the same when restricting the sample to only those with less than Grade 12 attainment.

The estimated impact from introducing a child labour law that prohibits employers from hiring children below the school leaving age during school hours is to significantly lower grade attainment, on average. Introducing legislation designed to encourage enforcement of the minimum school leaving age seems likely to increase average grade attainment, if at all. The other compulsory school variables have the predicted signs. For the rest of the analysis, I drop the variable indicating a province with a restrictive child labour law.

The summary variable for compulsory schooling identifies a strong link between grade attainment and the minimum number of years required to remain in school before being allowed

the option to leave. A one year increase in the number of mandatory school years is associated with .177 increase in grade attainment, on average. Lleras-Muney (2002) produced a similar variable for the United States. She found a one year increase in mandatory number of years in school, from the school entry age to the earliest age allowed to obtain a work permit, increased the number of years of schooling by 0.051 years. This estimate is notably smaller than the effect from a one year increase to mandatory years of schooling in Canada. The measures, however, span different years, and the U.S. estimate includes an additional control for whether a student must attend continuation school after working.¹²

Average grade attainment increased from 8.1 in 1920 to 11.3 in 1970. The mean years of mandatory schooling rose by 3.8 years, from 5.8 to 9.6. Table 2 implies that the changes in provincial compulsory school laws can explain an increase in grade attainment of .67 years. Thus, about 21 percent of the increase in grade attainment over the fifty year period from 1920 to 1970 can be accounted for by changes in compulsory school legislation. The calculation for the fraction of the increase in enrolment of 14 to 16 year olds in Canadian schools explained by compulsory schooling changes arrives at a similar estimate. The fraction enrolled during these ages increased from .63 in 1923 to .87, while the mean years of mandatory schooling rose by 2.1 years (for the enrolment sample, weighted by the provincial-year population of 5 to 16 year-olds in school). The .028 coefficient on the estimated effect of mandatory school years on enrolment, from Table 1, implies compulsory schooling changes during this period raised enrolment by .057 ($.24 * 2.07$), or 24 percent of the total change. Goldin and Katz (2003) find somewhat lower impact of compulsory school changes on grade attainment in the United States from 1910 to 1939. They estimate compulsory schooling and child labor laws explain about 5 percent of the year increase in U.S. average schooling from the 1896 to 1925 birth cohorts.

¹² The U.S. regressions also include a number of state-year control variables, such as per capital expenditures and demographic status. The forthcoming revision will add province-year controls.

Table 3 compares the estimates of the effects from the compulsory school law variables on different levels of education using the full sample. One specification check for whether other factors underlie the relationship between these laws and the outcome variables is to examine if changes in the laws are associated with changes in higher levels of education attainment. We should not expect the laws to substantially affect education attainment beyond high school. We should also not expect early dropout ages to impact on later grades. Table 3 shows the predicted effects of compulsory school law variables on different levels of education attainment generally hold. Raising the dropout age to 14 does not significantly affect higher levels of education. The point estimates are precisely estimates at zero for Grade 12 attainment or higher, but the standard errors for the estimates of the effect on lower levels of education are high. Raising the dropout age to 15 does not significantly affect education attainment beyond Grade 10. Allowing work permits to exempt students from staying in school lowers education attainment at all levels of high school, but does not affect schooling beyond high school. Finally, school entry age differences generally impact Grade 7, Grade 8, and Grade 9 attainment. The school entry laws are associated with more high school completion, and more university. With this exception, however, the coefficients are strikingly in the direction and magnitude implied by the predicted effects of the corresponding laws. The results strongly corroborate the predicted zero effect for compulsory schooling on education attainment beyond high school.

Table 4 shows the estimated influences of compulsory schooling on grade attainment for different time periods. The coefficients on the indicator variable for whether facing a dropout age of 15 remain generally the same over the different 30 year periods examined. The effect from allowing employment certificates appears largest for earlier years of the data, both for the full sample, and the sample including only high school dropouts. The coefficient on the indicator variable for whether facing a school entry age of 7 (versus non or 8) is strangely negative for the 1950 to 1980 period, but only for the full sample. The dropout age 16 indicator variable performs poorly for the 1920 to 1950 sample. Grade attainment, controlling for province and birth cohort

is lower, on average, under this dropout age compared to a dropout age of 15 or 14. The standard errors for this variable are quite high. In general, the Table indicates that the estimated compulsory schooling effects are not driven by changes in one particular period. The estimated effects from the compulsory school variables are similar over entirely different time periods (1920 – 50 versus 1950 – 80), in particular for the dropout age 15 indicator variable, the employment certificate indicator variable, and the school entry ages.

The results presented in Table 5 show minimal change from excluding some certain groups of provinces from the estimates. Results are generally the same from estimating the compulsory schooling variable effects, whether excluding the Maritime provinces, Quebec, Ontario, and the Western provinces. Table 5 also shows the results from excluding Ontario and Quebec combined. The full sample weights these provinces, by population, much more than the other provinces. The coefficient on the indicator variable for a dropout age of 14 (versus no dropout age) rises considerably when Quebec is excluded, and the dropout age of 16 indicator variable rises. Excluding any other group of province generally does not alter the magnitude of the coefficients significantly.

The estimates are very similar when separating the results for males and females, shown in Table 6.

VI. The Returns to Compulsory Schooling on Earnings and other Outcomes

Last section examines how changes to compulsory schooling legislation, from 1920 to 1970, impacted average education attainment. This section investigates what happened to those who were affected by these changes, in terms of their earnings, income, and other outcomes measured in the Census. Table 7 shows returns to schooling estimates from instrumenting grade attainment with predicted grade attainment by compulsory schooling legislation faced when aged 14. The Table compares these estimates with least-squares results that use the full sample of

adults aged 20 to 64 who were aged 14 between 1920 and 1970, and results that restrict the sample to those with less than Grade 11 attainment. From Column 3, children compelled to take another grade of school end up with about 7.4 percent higher annual income, on average, than children not restricted to stay in school longer. Interestingly, this estimate is considerably higher when restricting the sample to only high school dropouts. The estimated return to compulsory schooling on income and earnings is about 13.5 percent. The discrepancy between these estimates is surprising because earlier tables showed no substantial differences for the predicted influences of compulsory schooling law variables on education attainment using both samples, and no impact of these variables on levels of education beyond high school. The higher return to schooling estimate from the dropouts sample indicates a possible difference in income trends between persons with Grade 12 or more and persons with less that corresponds with changes in compulsory school legislation. More work is needed to uncover why this difference holds consistently when examining these instrumental variables estimates for the returns to schooling on income, earnings, and household income.

Using the full sample, the return to compulsory schooling on earnings is lower than the least-squares estimate that estimates the association with an extra grade attained and earnings, on average. But using the high school dropouts sample, the return to compulsory schooling estimate is lower than the least-squares estimate. Instrumental variables estimates that measure the returns to schooling often find higher estimates than compared with those using OLS, despite the likelihood that OLS estimates for the returns to schooling are downward biased. Several recent papers attempt to explain why the IV approach may arrive at higher returns to schooling estimates than OLS. One explanation is that IV estimates, if specified correctly, are without omitted variables bias, and without measurement error bias. Mis-measured independent variables may attenuate estimates and bias results downwards. A second explanation is that the IV estimates measure the returns to schooling for only those affected by compulsory school law changes.

Clearly, characteristics underlying the types of individuals influenced by these laws differ from the average characteristics of those in the entire sample.

To assess the robustness of these results, I re-estimate the instrumental variables equations under different time period restrictions, and province exclusions. Table 8 shows the IV estimates with the full sample and dropouts sample using different time periods. Table 8 shows the regressions using smaller thirty-year periods all arrive at positive and strongly significant estimates, similar to those using the full sample ones. For example, the returns to compulsory schooling estimates range from about 8.7 percent to 13.5 percent for any thirty-year period beginning in 1920 until 1980, with the sample of early high school leavers.

Table 9 shows the instrumental variables estimates for different regions. Excluding the Maritime provinces, Ontario, Quebec, or the Western provinces does not substantially change the returns to compulsory schooling estimates for annual income. These findings indicate the results are not driven by region specific trends in income or education attainment. Excluding Ontario and Quebec substantially alters the weighting of the sample, yet does not change the estimated returns by very much.

Finally, Table 10 displays the returns to compulsory schooling on other outcome variables. The estimates imply obliging youths with compulsory schooling to take an additional grade lowers the likelihood of reporting being unemployed and looking for work, and raises the likelihood of reporting working fulltime. The IV results also predict additional schooling lowers the probability of working in a manual occupation, and raises the likelihood of working in clerical service. Those compelled to take an extra grade are 7.9 percentage points less likely to fall below Statistics Canada's Low Income Cut-off, and more likely to report being fluent in both English and French. Finding that occupational composition changes and self-reported language skills improve from one more grade of compulsory schooling seems to indicate real skills are acquired during the extra years of school.

VII. Conclusion

Education levels rose dramatically between 1920 and 1970. The national average grade attainment rose from 8.1 to 11.3 during this time. Provinces also implemented or tightened many compulsory school limits during this time. I estimate changes in these limits had a significant and substantial impact on the rise in grade attainment, accounting for about 20 percent of the rise. For those affected, compulsory schooling improves earnings and income by about 13.5 percent (8 percent if using the full sample). Compelling would-be-dropouts to take additional education also lowers the chances for unemployment, decreases the chances of working in a manual occupation, and raises the fraction reporting speaking both English and French. These other variables provide further support that additional skills are gained from school compulsion.

The results presented here reinforce remarkably similar estimates of the benefits from compulsory schooling found in the United States and United Kingdom. Taken together, they suggest compelling early school leavers to stay on longer generates real gains. These gains imply enormous increases in lifetime wealth and possibly well-being. Why, then, would high school dropouts, faced with these anticipated benefits, choose not to stay longer when given the option to do so? In Oreopoulos (2003), I argue that the one-year costs (financial and otherwise) from attending school are unlikely to offset these estimated benefits. Other explanations that imply inefficient school choices may help explain these results. For example, students may face social pressures to leave school early, or may not adequately anticipate the future consequences of their decision and regret their choice later. Any explanation involving sub-optimal school choice suggests policies that promote school compulsion may increase lifetime welfare.

Compulsory attendance laws have existed for more than a hundred years, and policies to mandate further education continue to be discussed. The implications of raising the minimum

school leaving age further are not well understood. Evidence presented here suggests additional restrictions potentially can provide a very effective (and cheap) means to raise lifetime welfare. To potential to improve a large set of social and economic lifetime outcomes almost certainly merits further investigation.

References

- Acemoglu, Daren and Joshua Angrist. "How Large Are Human Capital Externalities? Evidence from Compulsory Schooling Laws," NBER Macroannual, 2000, pp. 9-59.
- Acemoglu, Daron and Joshua Angrist, "How Large are the Social Returns to Education? Evidence from Compulsory Schooling Laws," NBER Macroeconomics Annual, 2001.
- Angrist, Joshua D., and Alan Krueger. "Does Compulsory School Attendance Affect Schooling and Earnings?" *Quarterly Journal of Economics*, Vol. 106, No. 4, pp. 979, 1014, 1991.
- Becker, Gary S. "Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education," Columbia University Press for the National Bureau of Economic Research, second edition, New York, NY, 1975.
- Chiswick, Barry R. "Minimum Schooling Legislation and the Cross-Sectional Distribution of Income," *The Economic Journal*, Vol. 79, No. 315. (Sep., 1969), pp. 495-507.
- Goldin, Claudia, and Lawrence F. Katz. "Mass Secondary Schooling and the State: The Role of State Compulsion in the High School Movement," mimeo, 2003.
- Harmon, Colm, and Ian Walker. "Estimates of the Economic Return to Schooling for the United Kingdom," *American Economic Review*, December 1995, pp. 1278-86.
- Henley, Richard, "The School Question Continued: The Issue of Compulsory Schooling in Manitoba," Chapter 2 in 'Issues in the History of Education in Manitoba: From the Construction of the Common School to the Politics of Voices,' Rosa del C. Bruno-Jofre (ed.) Edwin Mellen Press, Queenston, Ontario, 1993.
- Lang, K. and D. Kropp. "Human Capital vs. Sorting: The Effect of Compulsory Attendance Laws," *Quarterly Journal of Economics*, Vol. 101 (August 1986), pp. 609-624.
- Lemieux, Thomas and David Card, "Education, Earnings, and the 'Canadian G.I. Bill.'," *Canadian Journal of Economics* 34(2), May, 2001, pp. 313-44.
- Lewis, Mark Johnson. "Estimating the Value of Community College: Evidence from Quebec's CEGEPs," mimeo, 2002.
- Lleras-Muney, Adriana. "Were Compulsory Attendance and Child Labor Laws Effective? An Analysis from 1915 to 1930," *Journal of Law and Economics* 45 (October), 2002, pp. 401-35.
- Oreopoulos, Philip. "Do Dropouts Drop Out Too Soon? Evidence from Changes in School-Leaving Laws," mimeo, 2003
- Phillips, Charles E. "The Development of Education in Canada," W.J. Gage and Company Limited, Toronto, 1957.
- Prentice, Alison L. and Susan E. Houston. "Family School and Society in nineteenth century Canada," Oxford University Press, Toronto, 1975.

Schmidt, Stefanie, "School Quality, Compulsory Education Laws, and the Growth of American High School Attendance, 1915-1935," MIT Ph.D. Dissertation 1996.

School Leaving Age Task Force, "High School Graduation: The New School Leaving Age: Findings and Recommendations of The School Leaving Age Task Force," Province of New Brunswick mimeo, 1998.

Sweetman, Arthur, "What if High School Were a Year Longer? Evidence from Newfoundland," mimeo, 2000.

Data Appendix References

“Advance Statistics of Education,” Dominion Bureau of Statistics, Ottawa, 1967-1979.

Axelrod, Paul Douglas. “The Promise of Schooling,” University of Toronto Press Incorporated, Toronto, 1997.

Statutes and Revised Statutes for the Province of Ontario, “Adolescent School Attendance Act,” The Government of Ontario, Toronto, Various years.

Statutes and Revised Statutes for the Province of Quebec, “An Act Respecting Compulsory School Attendance,” The Government of Quebec, Québec, Various years.

Statutes and Revised Statutes for the Province of Quebec, “An Act Respecting Industrial Schools,” The Government of Quebec, Québec, Various years.

Statutes and Revised Statutes for the Province of Alberta, “An Act Respecting School Attendance,” The Government of Alberta, Edmonton, Various years.

Statutes and Revised Statutes for the Province of Manitoba, “An Act Respecting School Attendance,” The Government of Manitoba, Winnipeg, Various years.

Statutes and Revised Statutes for the Province of Saskatchewan, “An Act Respecting School Attendance,” The Government of Saskatchewan, Regina, Various years.

Statutes and Revised Statutes for the Province of Saskatchewan, “An Act Respecting the Employment of Children,” The Government of Nova Scotia, Halifax, Various years.

Statutes and Revised Statutes for the Province of Alberta, “An Act Respecting Truancy and Compulsory School Attendance,” The Government of Alberta, Edmonton, Various years.

Statutes and Revised Statutes for the Province of British Columbia, “An Act to Control the Employment of Children Act,” The Government of British Columbia, Victoria, Various years.

Statutes and Revised Statutes for the Province of Quebec, “Children’s Apprenticeship Act,” The Government of Quebec, Québec, Various years.

Statutes and Revised Statutes for the Province of Manitoba, “Child Welfare Act, The,” The Government of Manitoba, Winnipeg, Various years.

Statutes and Revised Statutes for the Province of Newfoundland, “Child Welfare Act, The,” The Government of Newfoundland, St. John’s, Various years.

Statutes and Revised Statutes for the Province of Nova Scotia, “Compulsory Attendance At School Act,” The Government of Nova Scotia, Halifax, Various years.

Statutes and Revised Statutes for the Province of Quebec, “Compulsory School Attendance Act,” The Government of Quebec, Québec, Various years.

Statutes and Revised Statutes for the Province of Nova Scotia, "Education Act, The," The Government of Nova Scotia, Halifax, Various years.

Statutes and Revised Statutes for the Province of Ontario, "Education Act, The," The Government of Ontario, Toronto, Various years.

Statutes and Revised Statutes for the Province of Quebec, "Education Act, The," The Government of Quebec, Québec, Various years.

Statutes and Revised Statutes for the Province of Saskatchewan, "Education Act, The," The Government of Saskatchewan, Regina, Various years.

"Education in Canada: A Statistical Review," Statistics Canada, Ottawa, 1973-2000.

"Elementary and Secondary Education in Canada," Dominion Bureau of Education in Canada, Ottawa, 1936-1958.

"Elementary & Secondary School Enrolment," Statistics Canada, Ottawa, 1978/79-1991/92.

Statutes and Revised Statutes for the Province of Nova Scotia, "Employment of Children Act," The Government of Nova Scotia, Halifax, Various years.

Statutes and Revised Statutes for the Province of British Columbia, "Employment Standards Act, The," Government of British Columbia, Victoria, Various years.

Statutes and Revised Statutes for the Province of British Columbia, "Factories Act," The Government of British Columbia, Victoria, 1911.

Statutes and Revised Statutes for the Province of Ontario, "Factories, Shops, Office Buildings Act," The Government of Ontario, Toronto, Various years.

"Financial Statistics of Education," Statistics Canada, Ottawa, 1980/81-1985/86.

"Historical Statistical Survey of Education in Canada," Dominion Bureau of Statistics, Ottawa, 1919-1933.

Statutes and Revised Statutes for the Province of Alberta, "Labour Act, The," The Government of Alberta, Edmonton, Various years.

Statutes and Revised Statutes for the Province of Nova Scotia, "Labour Standards Act," The Government of Nova Scotia, Halifax, Various years.

Statutes and Revised Statutes for the Province of Prince Edward Island, "Minimum Age of Employment Act, The," The Government of Prince Edward Island, Charlottetown, Various years.

Phillips, Charles E. "Development of Education in Canada" W.J. Gage and Company Limited, Toronto, 1957.

Statutes and Revised Statutes for the Province of British Columbia, "Public School Act, The," The Government of British Columbia, Victoria, Various years.

Statutes and Revised Statutes for the Province of Manitoba, "Public School Act, The," The Government of Manitoba, Winnipeg, Various years.

Statutes and Revised Statutes for the Province of Prince Edward Island, "Public School Act, The," The Government of Prince Edward Island, Charlottetown, Various years.

Statutes and Revised Statutes for the Province of Prince Edward Island, "Public Schools Act, The," The Government of Prince Edward Island, Charlottetown, Various years.

Statutes and Revised Statutes for the Province of Alberta, "School Act, The," The Government of Alberta, Edmonton, Various years.

Statutes and Revised Statutes for the Province of British Columbia, "School Act, The," The Government of British Columbia, Victoria, Various years.

Statutes and Revised Statutes for the Province of Prince Edward Island, "School Act, The," The Government of Prince Edward Island, Charlottetown, Various years.

Statutes and Revised Statutes for the Province of Saskatchewan, "School Act, The" The Government of Saskatchewan, Regina, Various years.

Statutes and Revised Statutes for the Province of New Brunswick, "Schools Act, The," The Government of New Brunswick, Fredericton, Various years.

Statutes and Revised Statutes for the Province of Alberta, "School Attendance Act, The," The Government of Alberta, Edmonton, Various years.

Statutes and Revised Statutes for the Province of Manitoba, "School Attendance Act, The," The Government of Manitoba, Winnipeg, Various years.

Statutes and Revised Statutes for the Province of Ontario, "School Attendance Act, The," The Government of Ontario, Toronto, Various years.

Statutes and Revised Statutes for the Province of New Brunswick, "School Attendance Act, The," The Government of New Brunswick, Fredericton, Various years.

Statutes and Revised Statutes for the Province of Saskatchewan, "School Attendance Act, The," The Government of Saskatchewan, Regina, Various years.

Statutes and Revised Statutes for the Province of Newfoundland, "School Attendance Act, The," The Government of Newfoundland, St. John's, Various years.

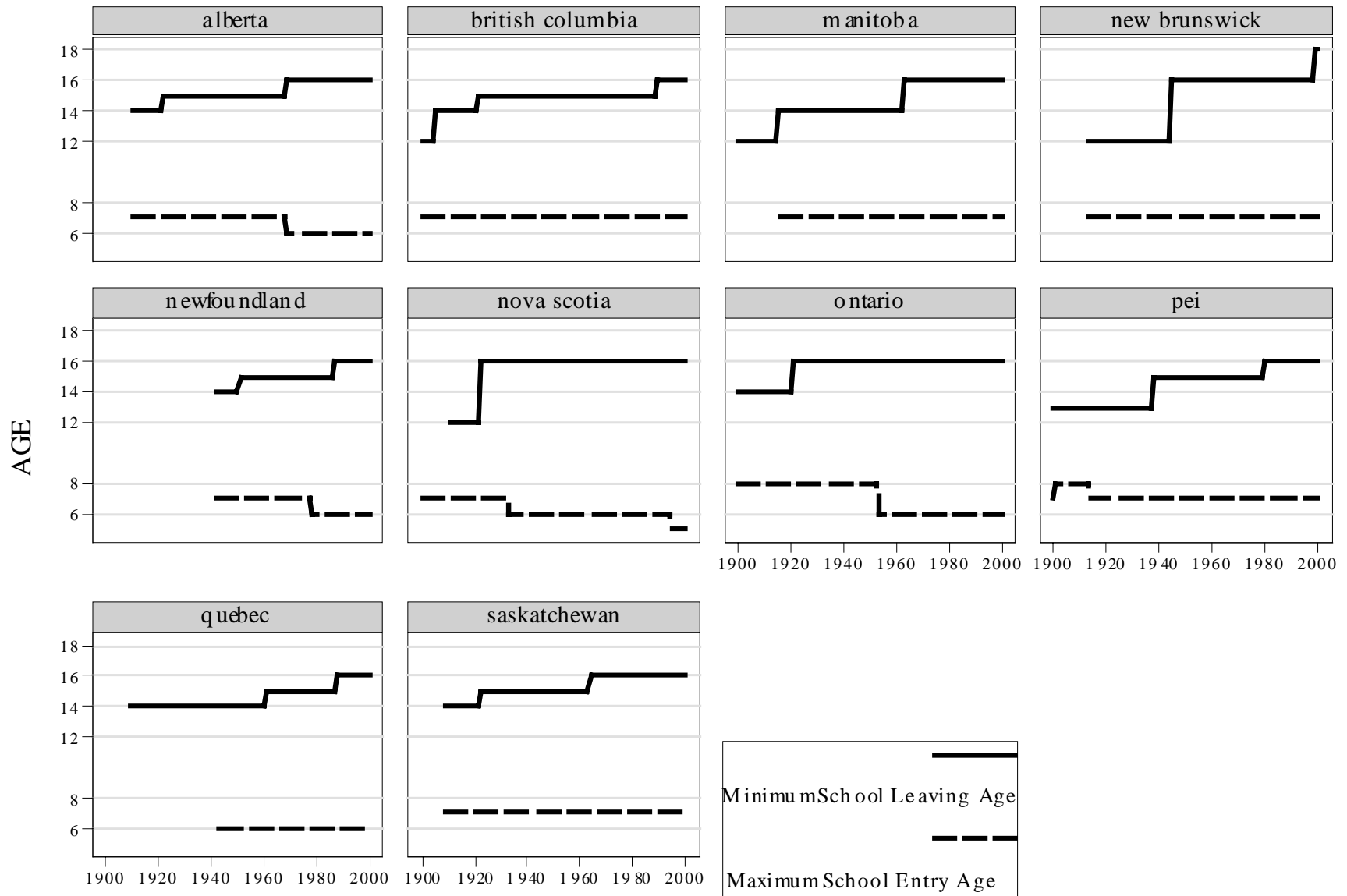
"Survey of Education Finance," Dominion Bureau of Statistics, Ottawa, 1961-1965.

"Survey of Elementary and Secondary Education," Dominion Bureau of Statistics, Ottawa, 1958-1963.

Statutes and Revised Statutes for the Province of Newfoundland, "Welfare of Children Act, The," The Government of Newfoundland, St. John's, Various years.

Statutes and Revised Statutes for the Province of Prince Edward Island, "Youth Employment Act," Government of Prince Edward Island, Charlottetown, Various years.

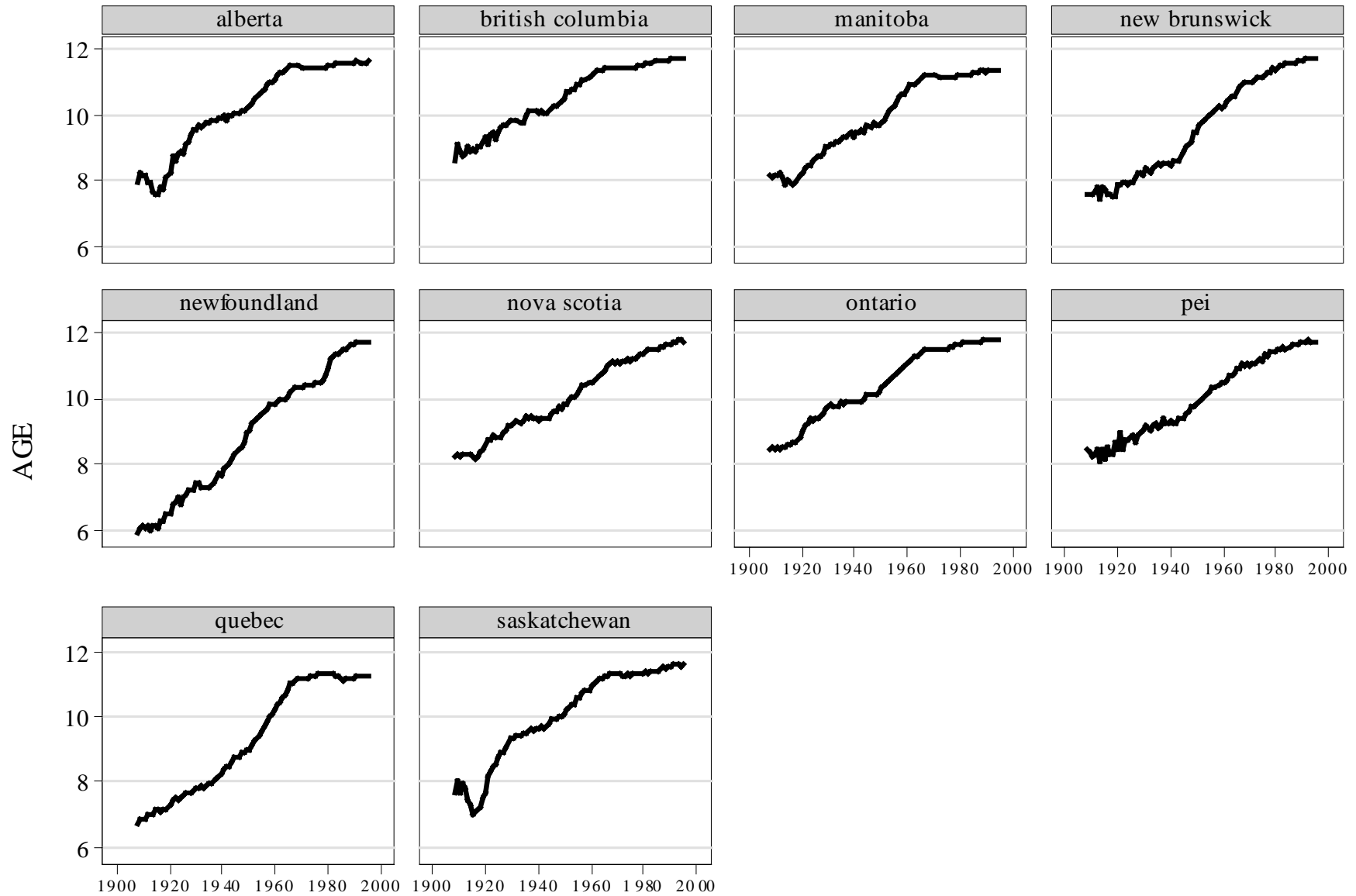
Figure 1: Minimum School Leaving Ages and Maximum School Entry Ages by Province, 1900 – 2000



Graphs by province

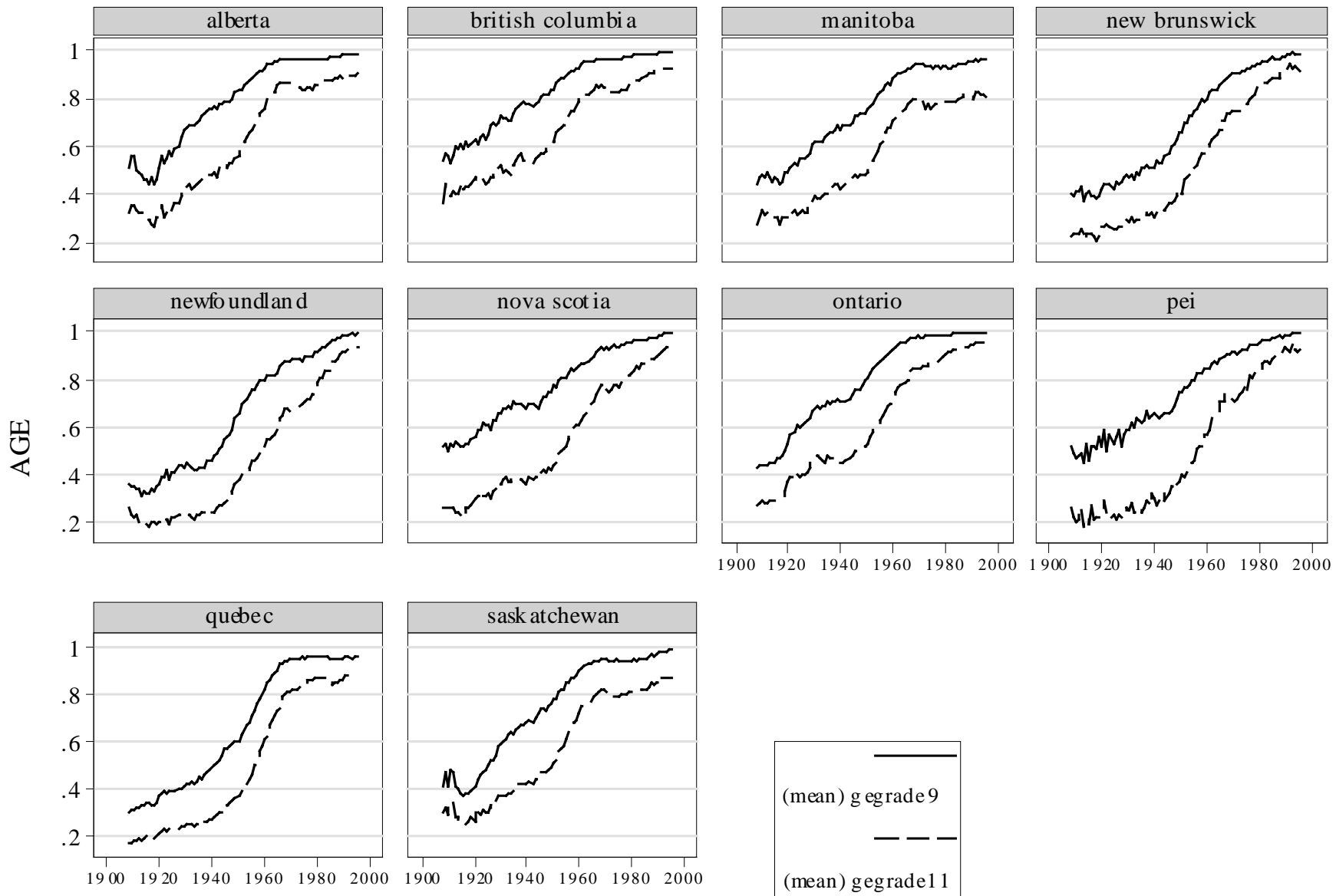
Notes:

Figure 2: Average Grade Attainment by Year Turned 14 Years-Old and Province, 1900 – 2000



Graphs by provname

Figure 3: Proportion of Adults with Grade 9 or More, Grade 11 or More, by Year when 14 Years-Old and Province



Graphs by provname

Table 1
Effects of Compulsory Schooling and Child Labor Laws on School Enrolment

	Fraction of 5 - 16 Year-Olds in School (mean = 0.954)					Fraction of 14 - 16 Year-Olds in School (mean = 0.828)				
School Leaving Age = 14	0.0814 [0.0183]***	0.0776 [0.0163]***	0.0677 [0.0157]***	0.0688 [0.0172]***		0.0598 [0.0551]	0.1016 [0.0602]	0.1225 [0.0640]*	0.1257 [0.0687]	
School Leaving Age = 15	0.0948 [0.0126]***	0.0889 [0.0092]***	0.0861 [0.0103]***	0.0881 [0.0125]***		0.2287 [0.0292]***	0.2663 [0.0505]***	0.267 [0.0428]***	0.2709 [0.0502]***	
School Leaving Age = 16	0.0357 [0.0042]***	0.0305 [0.0091]***	0.0262 [0.0153]	0.0216 [0.0160]		0.1493 [0.0101]***	0.189 [0.0364]***	0.1947 [0.0222]***	0.1925 [0.0198]***	
Exemptions to Leaving Age Allowed		-0.0061 [0.0062]	-0.0134 [0.0094]	-0.013 [0.0084]			0.0347 [0.0223]	0.0577 [0.0379]	0.0582 [0.0387]	
Restrictive Child Labour Law			-0.0047 [0.0140]	-0.0101 [0.0170]				0.0105 [0.0599]	0.0056 [0.0655]	
School Entry Age = 7				-0.027 [0.0230]					-0.0402 [0.0500]	
School Entry Age = 6				0.0017 [0.0097]					-0.0486 [0.0526]	
Number of Mandatory School Years					0.004 [0.0054]					0.028 [0.014]*
Grouped Observations	742	742	742	742	742	627	627	627	627	627
R-squared	0.96	0.96	0.96	0.97	0.95	0.88	0.88	0.89	0.89	0.79

Notes: All regressions include fixed effects for province and birth cohort. Huber-White standard errors are shown, clustered by province. One, two, and three asterix indicate coefficient is significantly different from zero at a 10 percent, 5 percent, and 1 percent confidence level. See text for details.

Table 2
Effects of Compulsory Schooling and Child Labor Laws on Education Attainment
Dependent Variable = Grade Attainment

	Full Sample (mean = 10.27)				Sample = Grade <=11 (mean = 8.83)					
School Leaving Age = 14	0.239 [0.2011]	0.2001 [0.2295]	0.4315 [0.2380]	0.4053 [0.2161]*		0.1655 [0.3930]	0.1793 [0.4448]	0.4143 [0.3425]	0.3334 [0.2972]	
School Leaving Age = 15	0.8447 [0.1712]***	0.6918 [0.2231]**	0.9375 [0.2511]***	0.903 [0.2281]***		0.9107 [0.3601]**	0.7891 [0.4286]*	1.052 [0.3380]**	0.9303 [0.2853]***	
School Leaving Age = 16	0.5196 [0.2138]**	0.3433 [0.2503]	0.5868 [0.2622]*	0.6305 [0.2461]**		0.1407 [0.3632]	-0.0294 [0.4163]	0.232 [0.3231]	0.3472 [0.2577]	
Exemptions to Leaving Age Allowed		-0.26 [0.0851]**	-0.2629 [0.0825]**	-0.2549 [0.0585]***			-0.2872 [0.1153]**	-0.2888 [0.1119]**	-0.2429 [0.0587]***	
Restrictive Child Labour Law			-0.273 [0.0794]***	-0.3256 [0.1215]**				-0.295 [0.1281]**	-0.4121 [0.0886]***	
School Entry Age = 7				0.2709 [0.0615]***					0.602 [0.1396]***	
School Entry Age = 6				0.1271 [0.0625]*					0.3 [0.0956]**	
Number of Mandatory School Years					0.1774 [0.0381]***					0.2288 [0.0494]***
Grouped Observations	43204	43204	43204	43204	43204	39190	39190	39190	39190	39190
R-squared	0.19	0.19	0.2	0.2	0.19	0.12	0.12	0.12	0.13	0.12

Notes: Regressions are on cell means from Census data, grouped by birth cohort, gender, province, census year, and grade. All regressions are weighted by cell sample size and include fixed effects for province, birth cohort, census year, and age. Huber-White standard errors are shown, clustered by province. One, two, and three asterix indicate coefficient is significantly different from zero at a 10 percent, 5 percent, and 1 percent confidence level. See text for details.

Table 3
Effects of Compulsory Schooling and Child Labor Laws on Various Education Attainment Level:

	<u>Gr. 7 Attained</u>	<u>Gr. 8 Attained</u>	<u>Gr. 9 Attained</u>	<u>Gr. 10 Attained</u>	<u>Gr. 11 Attained</u>	<u>Gr. 12 Attained</u>	<u>High School Cert.</u>	<u>College</u>	<u>College or More</u>	<u>University Degree</u>
School Dropout Age =14	0.0385 [0.0525]	-0.0073 [0.0567]	-0.0153 [0.0263]	-0.0368 [0.0254]	-0.0369 [0.0187]*	-0.0075 [0.0774]	-0.0098 [0.0109]	0.0072 [0.0115]	-0.0003 [0.0071]	-0.005 [0.0074]
School Dropout Age =15	0.0921 [0.0535]	0.117 [0.0538]*	0.0767 [0.0234]***	0.065 [0.0232]**	0.0298 [0.0199]	-0.0136 [0.0756]	-0.0198 [0.0120]	0.0166 [0.0104]	0.0074 [0.0058]	0 [0.0077]
School Dropout Age =16	0.0562 [0.0552]	0.0505 [0.0550]	0.0378 [0.0235]	0.0153 [0.0218]	-0.0138 [0.0205]	0.0067 [0.0735]	-0.0229 [0.0124]*	0.0002 [0.0086]	-0.0067 [0.0088]	-0.005 [0.0104]
Exemptions to Leaving A	-0.0551 [0.0120]***	-0.0658 [0.0124]***	-0.0266 [0.0109]**	-0.0209 [0.0071]**	-0.0171 [0.0054]***	0.0166 [0.0086]*	0.0089 [0.0057]	-0.0087 [0.0029]**	-0.0014 [0.0032]	-0.0039 [0.0030]
School Entry Age = 7	0.0649 [0.0242]**	0.0402 [0.0169]**	0.0392 [0.0243]	-0.0018 [0.0290]	-0.0135 [0.0277]	-0.1312 [0.0716]	0.0182 [0.0213]	0.0225 [0.0239]	0.0204 [0.0131]	0.0203 [0.0039]***
School Entry Age = 6	0.0295 [0.0122]**	0.0428 [0.0193]*	0.0313 [0.0141]*	0.0182 [0.0123]	0.0104 [0.0104]	-0.0328 [0.0223]	0.0337 [0.0050]***	-0.0087 [0.0033]**	0.0018 [0.0065]	0.0105 [0.0058]
Grouped Observations	44099	44099	44099	44099	44099	44099	27820	27819	27819	27819
R-Squared	0.09	0.14	0.14	0.16	0.14	0.16	0.22	0.51	0.33	0.24

Notes: Regressions are on cell means from Census data, grouped by birth cohort, gender, province, census year, and grade. All regressions are weighted by cell sample size and include fixed effects for province, birth cohort, census year, and age. Huber-White standard errors are shown, clustered by province. One, two, and three asterix indicate coefficient is significantly different from zero at a 10 percent, 5 percent, and 1 percent confidence level. See text for details.

Table 4
Effects of Compulsory Schooling and Child Labor Laws on Education Attainment for Different Time Periods
Dependent Variable = Grade Attainment

	Full Sample					Sample = Grade <=11				
School Dropout Age =14	0.1607 [0.2178]	0.7149 [0.0624]***				0.0522 [0.3931]	0.7714 [0.1024]***			
School Dropout Age =15	0.6505 [0.2129]**	0.7265 [0.1716]***	0.2551 [0.0887]**	0.5024 [0.0607]***	0.4441 [0.0626]***	0.6315 [0.3572]	0.7191 [0.1782]***	0.3773 [0.1087]***	0.6081 [0.0672]***	0.5627 [0.0711]***
School Dropout Age =16	0.3761 [0.2336]	-0.1067 [0.0505]*	0.1961 [0.0995]*	0.2802 [0.1472]*	0.2155 [0.1403]	0.027 [0.3282]	-0.2307 [0.0837]**	-0.2698 [0.0955]**	0.1567 [0.1672]	0.2297 [0.2033]
Exemptions to Leaving Age	-0.2506 [0.0613]***	-0.412 [0.0281]***	-0.2088 [0.0656]**	-0.142 [0.0391]***	-0.0538 [0.0211]**	-0.2343 [0.0623]***	-0.3694 [0.0247]***	-0.1774 [0.0731]**	-0.1531 [0.0649]**	-0.1772 [0.0842]*
School Entry Age = 7	0.2016 [0.0742]**	0.1801 [0.1199]	0.4276 [0.1060]***	-0.0165 [0.0612]	-0.6097 [0.0356]***	0.5133 [0.1174]***	0.1862 [0.1695]	0.6218 [0.1196]***	0.3061 [0.0928]***	0.3444 [0.0486]***
School Entry Age = 6	0.1367 [0.0651]*	0.1687 [0.1272]	0.2366 [0.0635]***	0.0804 [0.0488]	-0.0187 [0.0464]	0.3227 [0.1034]**	0.1754 [0.1616]	0.4103 [0.0824]***	0.2633 [0.0886]**	0.1123 [0.0660]
Grouped Observations	43204	18204	29033	36078	26336	39190	16489	26319	32760	23917
Years Included	All years	1920-50	1930-60	1940-70	1950-80	All years	1920-50	1930-60	1940-70	1950-80

Notes: Regressions are on cell means from Census data, grouped by birth cohort, gender, province, census year, and grade. All regressions are weighted by cell sample size and include fixed effects for province, birth cohort, census year, and age. Huber-White standard errors are shown, clustered by province. One, two, and three asterix indicate coefficient is significantly different from zero at 10 percent, 5 percent, and 1 percent confidence level. See text for details.

Table 5
Effects of Compulsory Schooling and Child Labor Laws on Education Attainment for Different Regions
Dependent Variable = Grade Attainment

	Full Sample						Sample = Grade<=11					
School Dropout Age =14	0.1607 [0.2178]		0.5561 [0.1309]***	0.2265 [0.1825]	0.7551 [0.0332]***	0.4908 [0.1563]**	0.0522 [0.3931]		0.4798 [0.2624]	0.1597 [0.3230]	0.8304 [0.0960]***	0.5212 [0.1695]**
School Dropout Age =15	0.6505 [0.2129]**	0.5262 [0.0745]***	0.7171 [0.1417]***	0.6035 [0.1777]***	0.8938 [0.0374]***	0.9952 [0.1520]***	0.6315 [0.3572]	0.606 [0.0616]***	0.8042 [0.3048]**	0.5897 [0.2863]*	1.0558 [0.1238]***	1.1803 [0.1015]***
School Dropout Age =16	0.3761 [0.2336]	0.3066 [0.1986]	0.6545 [0.1549]***	0.3287 [0.1960]	0.8775 [0.0793]***	0.0576 [0.0956]	0.027 [0.3282]	0.1833 [0.2159]	0.3828 [0.2495]	0.0522 [0.2629]	0.8539 [0.1007]***	-0.4216 [0.0664]***
Exemptions to Leaving Age Allowed	-0.2506 [0.0613]***	-0.2643 [0.0596]***	-0.043 [0.0255]	-0.3038 [0.0726]***	0.3645 [0.0546]***	-0.2872 [0.0418]***	-0.2343 [0.0623]***	-0.2998 [0.0571]***	0.0831 [0.0594]	-0.1777 [0.1272]	0.8265 [0.1285]***	-0.2618 [0.0476]***
School Entry Age = 7	0.2016 [0.0742]**	0.0148 [0.0968]	0.2138 [0.1220]	0.3295 [0.0578]***	0.2578 [0.0608]***	0.0461 [0.1632]	0.5133 [0.1174]***	-0.0862 [0.0474]	0.4441 [0.1773]**	0.6898 [0.1087]***	0.5899 [0.0955]***	0.3115 [0.1329]*
School Entry Age = 6	0.1367 [0.0651]*	0.144 [0.0671]*	0.0187 [0.0548]	0.3107 [0.0667]***	0.2343 [0.1061]*	0.0526 [0.0413]	0.3227 [0.1034]**	0.2704 [0.0789]**	0.0719 [0.0844]	0.583 [0.0946]***	0.5901 [0.0785]***	0.2573 [0.0902]**
Grouped Observations	43204	26730	38644	38652	34092	25586	39190	24318	35032	35040	30882	23180
Provinces Excluded	None	Maritimes	Quebec	Ontario	Quebec + Ontario	West. Prov.	None	Maritimes	Quebec	Ontario	Quebec + Ontario	West. Prov.

Notes: Regressions are on cell means from Census data, grouped by birth cohort, gender, province, census year, and grade. All regressions are weighted by cell sample size and include fixed effects for province, birth cohort, census year, and age. Huber-White standard errors are shown, clustered by province. One, two, and three asterix indicate coefficient is significantly different from zero at a 10 percent, 5 percent, and 1 percent confidence level. See text for details.

Table 6
Effects of Compulsory Schooling on Education Attainment
for Males and Females

	Grade Attained: Males		Grade Attained: Females	
	<u>Full Sample</u>	<u>Dropout Sample</u>	<u>Full Sample</u>	<u>Dropout Sample</u>
School Dropout Age =14	0.2416 [0.2301]	-0.0553 [0.1559]	0.1895 [0.3939]	-0.2608 [0.3338]
School Dropout Age =15	0.7226 [0.2283]**	0.441 [0.1396]**	0.7613 [0.3652]*	0.3218 [0.2881]
School Dropout Age =16	0.4183 [0.2558]	0.2222 [0.1574]	0.1576 [0.3567]	-0.2317 [0.2293]
Exemptions to Leaving Age Allowed	-0.2459 [0.0641]***	-0.2397 [0.0588]***	-0.2462 [0.0745]***	-0.2041 [0.0414]***
School Entry Age = 7	0.2287 [0.0637]***	0.1155 [0.1755]	0.5517 [0.1307]***	0.3883 [0.1459]**
School Entry Age = 6	0.1276 [0.0675]*	0.157 [0.0599]**	0.3414 [0.1087]**	0.2946 [0.0911]**
Grouped Observations	22098	21106	20094	19096

Notes: Regressions are on cell means from Census data, grouped by birth cohort, gender, province, census year, and grade. All regressions are weighted by cell sample size and include fixed effects for province, birth cohort, census year, and age. Huber-White standard errors are shown, clustered by province. One, two, and three asterix indicate coefficient is significantly different from zero at a 10 percent, 5 percent, and 1 percent confidence level. See text for details.

Table 7
OLS and IV Estimates for the Effect of Grade Attainment on Earnings and Income

	OLS		IV	
	<u>Full Sample</u>	<u>Dropout Sample</u>	<u>Full Sample</u>	<u>Dropout Sample</u>
Log Income	0.112 [0.002]***	0.097 [0.005]***	0.0744 [0.0099]***	0.134 [0.0144]***
Log Earnings	0.1 [0.003]***	0.085 [0.006]***	0.0769 [0.0101]***	0.1362 [0.0126]***
Log Income Males	0.11 [0.004]***	0.102 [0.004]***	0.0866 [0.0251]***	0.1232 [0.0220]***
Log Earnings Males	0.088 [0.004]***	0.076 [0.004]***	0.0909 [0.0170]***	0.1266 [0.0140]***
Log Household Income	0.115 [0.001]***	0.102 [0.004]***	0.04 [0.0151]**	0.1074 [0.0184]***

Notes: Instrumental variables regressions instrument grade attainment on school leaving ages, an employment certificate exemption indicator, and school entry laws (first stage shown in previous tables). Regressions are on cell means from Census data, grouped by birth cohort, gender, province, census year, and grade. All regressions are weighted by cell sample size and include fixed effects for province, birth cohort, census year, and age. Huber-White standard errors are shown, clustered by province. One, two, and three asterix indicate coefficient is significantly different from zero at a 10 percent, 5 percent, and 1 percent confidence level. See text for details.

Table 8
OLS and IV Estimates for the Effect of Grade Attainment on Earnings and Income
for Different Time Periods

	IV Full Sample					IV Sample = Grade<=11				
Grade Attained	0.0744 [0.0099]***	0.0753 [0.0185]***	0.0704 [0.0147]***	0.072 [0.0070]***	0.055 [0.0080]***	0.134 [0.0144]***	0.0865 [0.0232]***	0.1185 [0.0070]***	0.1349 [0.0119]***	0.0955 [0.0168]***
Years Included	All years	1920-50	1930-60	1940-70	1950-80	All years	1920-50	1930-60	1940-70	1950-80

Notes: Instrumental variables regressions instrument grade attainment on school leaving ages, an employment certificate exemption indicator, and school entry laws (first stage shown in previous tables). Regressions are on cell means from Census data, grouped by birth cohort, gender, province, census year, and grade. All regressions are weighted by cell sample size and include fixed effects for province, birth cohort, census year, and age. Huber-White standard errors are shown, clustered by province. One, two, and three asterix indicate coefficient is significantly different from zero at a 10 percent, 5 percent, and 1 percent confidence level. See text for details.

Table 9
OLS and IV Estimates for the Effect of Grade Attainment on Earnings and Income
for Different Regions

	IV Full Sample					IV Sample = Grade<=11				
	Maritimes	Quebec	Ontario	Quebec & Ontario	Western Provinces	Maritimes	Quebec	Ontario	Quebec & Ontario	Western Provinces
Grade Attained	0.0686 [0.0073]***	0.0984 [0.0448]*	0.0771 [0.0116]***	0.1216 [0.0342]***	0.0771 [0.0138]***	0.1249 [0.0085]***	0.1822 [0.0121]***	0.1345 [0.0166]***	0.1739 [0.0092]***	0.1305 [0.0180]***
Provinces Excluded	Maritimes	Quebec	Ontario	Quebec & Ontario	Western Provinces	Maritimes	Quebec	Ontario	Quebec & Ontario	Western Provinces

Notes: Instrumental variables regressions instrument grade attainment on school leaving ages, an employment certificate exemption indicator, and school entry laws (first stage shown in previous tables). Regressions are on cell means from Census data, grouped by birth cohort, gender, province, census year, and grade. All regressions are weighted by cell sample size and include fixed effects for province, birth cohort, census year, and age. Huber-White standard errors are shown, clustered by province. One, two, and three asterix indicate coefficient is significantly different from zero at a 10 percent, 5 percent, and 1 percent confidence level. See text for details.

Table
OLS and IV Estimates for the Effect of Grade Attainment on Various Outcomes

	OLS		IV	
	<u>Full Sample</u>	<u>Dropouts</u>	<u>Full Sample</u>	<u>Dropouts</u>
Unemployed; looking for work	-0.008 [0.001]***	-0.004 [0.001]***	0.005 [0.002]*	-0.01 [0.003]***
Working	0.039 [0.003]***	0.035 [0.002]***	0.013 [0.010]	0.057 [0.017]***
Manual Occupation	-0.047 [0.003]***	-0.027 [0.003]***	-0.008 [0.006]	-0.05 [0.004]***
Clerical Service Occupation	0.013 [0.001]***	0.016 [0.001]***	0.054 [0.013]***	0.056 [0.012]***
prof manager	0.042 [0.002]***	0.018 [0.003]***	-0.026 [0.010]**	-0.001 [0.007]
Skill or Trade Occupation	0 [0.000]***	0 [0.000]***	0.001 [0.000]**	0.002 [0.000]***
Bilingual	0.025 [0.017]	0.022 [0.017]	0.026 [0.007]***	0.013 [0.007]***
Below low income level	-0.041 [0.002]***	-0.039 [0.001]***	-0.051 [0.008]***	-0.079 [0.010]***
Unemployment Insurance Benefits	-0.009 [0.001]***	-0.002 [0.002]	0.009 [0.006]	0.005 [0.011]

Notes: Instrumental variables regressions instrument grade attainment on school leaving ages, an employment certificate exemption indicator, and school entry laws (first stage shown in previous tables). Regressions are on cell means from Census data, grouped by birth cohort, gender, province, census year, and grade. All regressions are weighted by cell sample size and include fixed effects for province, birth cohort, census year, and age. Huber-White standard errors are shown, clustered by province. One, two, and three asterix indicate coefficient is significantly different from zero at a 10 percent, 5 percent, and 1 percent confidence level. See text for details.