Cost Estimates of Dropping Out of High School in Canada

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Executive Summary

In Canada, as in other jurisdictions, an "adequate education" is generally considered at minimum to include a high school diploma. Since the 1990s, increasing high school completion[1] rates has been identified as a key policy priority, essential to the future productivity of the Canadian economy.

It is generally accepted that high school completion benefits individuals and Canadian society as a whole (Canadian Council on Learning, 2007). Similarly, the OECD's *Education at a Glance 2006* reports that "[e]vidence of the public and private benefits of education is growing" (2006a: 4). Awareness of the various negative consequences of low educational attainment is also increasing. A growing body of evidence is demonstrating that dropping out of high school is a major social problem that can often have devastating effects. Indeed, as Oreopoulos argues, "…high school drop-outs fare much worse later in life than those who obtain more education" (2005, p. 1).

Despite advances in knowledge made to date, few people recognize the full extent to which low educational attainment affects society. Educational inequity is an issue of justice and fairness; however, it is also an issue with significant economic costs to the state, which are associated with lost opportunities for those who fail to complete high school.

Directly or indirectly, high school non-completion has enormous fiscal implications in terms of expenditures on health, social services and programs, education, employment, criminality, and lower economic productivity. As Levin et al. observe: "An individual's educational attainment is one of the most important determinants of their life chances in terms of employment, income, health status, housing and many other amenities" (Levin, Belfield, Meunnig, & Rouse, 2007, p. 2).

The goal of this study is to present a portrait of economic costs—to the state and to the individual—associated with high school non-completion in Canada. Accordingly, the single variable—failure to graduate high school—is examined across a variety of related policy sectors.

Methodology

This research draws on the methodology used by a collection of US studies that examine the financial costs to society of high school non-completion (Levin et al., 2007; Levin, 2005). This study presents annual and lifetime (aggregate) tangible costs—to the individual and to the state—associated with high school non-completion in the areas of health, social assistance,

[1] Throughout this report, high school graduation, high school completion, high school diploma, and completion of secondary school are used interchangeably.

crime, labour and employment. However, it should be noted that not each cost category is available for all policy sectors. In addition, it includes intangible costs — that is, the non-market effects of schooling such as pain, suffering and reduced quality of life — using the well-established methods of Haveman and Wolfe (1984). All cost estimates are presented in 2008 dollars.

While aspects of the public (state) and private (individual) costs and returns on high school education have been previously calculated in Canada, the revised and new data presented in this study are made possible because of numerous research advances. First, the relationship between education and a variety of social outcomes is now better understood. As one example, in Canada and elsewhere, recent studies have concluded that the causal impacts of education on income may be larger than previously believed (Riddell, 2006). Second, estimations of high school dropout rates have become more accurate. Finally, costing methodologies have evolved, especially in the US context, to increase the reliability of data interpretations and related economic calculations.

Limitations

Because most government data used in costing studies are not specifically designed for such purposes and because there are always gaps in available research, a number of assumptions were made in the final cost calculations. These are clearly laid out with respect to each policy sector discussed in the report. It is especially important to note that in the cost category areas of health and crime, important costs were excluded due to research and data limitations. For example, in terms of health, it was not possible to calculate direct, annual public health costs; and in the area of crime, following the methodology of Moretti and Lochner (2004), costs were not calculated for the female population.

Another challenge in costing is "to fully identify the causal impact of education on various outcomes" (HRDC, 2000, p. 43). The issue of causality is addressed by drawing on a broad base of literature, rigorous scientific evidence, and leading-edge costing methodologies in the field of educational attainment. When possible, costs were calculated using the latest available Census (2001) and the Survey of Labour and Income Dynamics (2004); however, where it was possible to do so, final calculations were based on Census data. We turned to leading studies in determining the private and public rates of return in labour and employment for the purposes of comparison. However, in all final calculations, only the most conservative cost calculations were used.

Table 1. Estimated Tangible Costs of High School Non-Completion in Canada (2008 dollars)

Tangible Costs	Estimated cost per dropout		Aggregated total in Canada	
	Annual	Lifetime	Annual	Lifetime
Health (private[a])	$8,098	$211,471[b]	$23.8 billion	$623 billion [b]
Social Assistance (public)	$4,230		$969 million	
Crime (public)	$224		$350 million	
Labour and Employment				
Earning loss (private)	$3,491	$104,222[c]	$10.3 billion	$307 billion [c]
Tax revenue loss (public)	$226	$6,882	$378 million	$11.5 billion
Revenue loss in employment insurance premium (public)	$68	$2,063	$201 million	$6.1 billion
Employment insurance cost (public)	$2,767		$1.1 billion	

[a] Data on public costs are not available.

[b] "Lifetime" costs related to health reflect costs over a span of 35 years.

[c] "Lifetime" costs related to income reflect earning loss over a 35-year span (assuming lifetime earnings start from age 20 through 54).

Where possible, throughout the report, costs have been broken down by province, gender and Aboriginal status. Although it would have been ideal to provide a breakdown of costs associated with other populations (e.g. those living in rural areas, special needs persons and immigrants) in order to identify where educational interventions may be most effective, data limitations prevented such disaggregation.

Estimated Savings Achieved if the Canadian Population had One-Percentage-Point More High School Graduates

An ideal policy outcome would be that all Canadians, including those most at risk, complete high school. However, even an increase in the number of Canadians with a high school diploma equivalent to 1 percent of the Canadian population would result in considerable cost savings both to the state and to individuals. This number of additional high school graduates would be 332,901 (0.01 * 33,290,133[2] = 332,901.33).

In short, these calculations suggest that the costs of dropping out borne by individuals and society are considerable and that significant savings could be made by increasing Canada's number of high school graduates even by a small fraction. Cost savings in other categories are estimated in a similar fashion and are listed in the second column of the table below.

[2] The Canadian population in 2008 was 33,290,133 (CANSIM, V466674 Canada).

Table 2. Estimated Savings Achieved if the Canadian Population had One Percentage-Point More High School Graduates (2008 dollars)

	Estimated cost per dropout		Estimated Savings Achieved if the Canadian Population had One Percentage-Point More High School Graduates (2008 dollars)	
Tangible Costs	**Annual**	**Lifetime**	**Annual**	**Lifetime**
Health (private)	$8,098	$211,471	$2.3 billion	$70 billion
Social Assistance (public)	$4,230		$1.4 billion	
Crime (public)	$224		$74 million	
Labour and Employment				
Earning loss (private)	$3,491	$104,222	$1.2 billion	$34 billion
Tax revenue loss (public)	$226	$6,882	$75 million	$2.3 billion
Revenue loss in employment insurance premium (public)	$68	$2,063	$22 million	$686 million
Employment insurance cost (public)	$2,767		$921 million	

An estimate of overall cost savings in 2008 resulting from a one-percentage-point increase in the Canadian graduation rate can be obtained by adding only the cost savings for the categories for which "per dropout" costs are annual (e.g. social assistance, crime, annual earning loss, annual tax revenue loss, annual revenue loss in employment insurance, employment insurance cost, and intangible costs). The aggregate estimated cost savings to Canada would be over $7.7 billion for 2008.

The findings in this report represent the most accurate and up-to-date estimates possible. Despite the acknowledged data gaps, these findings reveal the negative repercussions to the country's economic, social and civic fabric that result from inadequate educational attainment; and underscore the need for comprehensive, proactive solutions. In so doing, this research contributes to the existing body of knowledge in two key ways. First, it transcends previous studies by striving to calculate, in a more complete fashion, public and private costs. Second, this study is more comprehensive in that it considers costs in a variety of policy sectors, whereas most studies in the Canadian context have focused primarily on income earnings (HRDC, 2000). The way in which outcomes associated with high school non-completion are perceived, framed, measured, and quantified have direct consequences for education and public policy.

Introduction

Purpose and Rationale of the Research

The new emergent economy requires "a world of knowledge in which human capital, skills, innovation and technology are more necessary than ever in order to be competitive" (Baldwin and Beckstead, 2003, p. 2). In the knowledge economy, formal education is essential to success. Individuals with high literacy and numeracy skills, analytic abilities, and adaptability have better prospects for employability and professional success. According to Michael Bloom of the Conference Board of Canada: "knowledge is the currency of our economy and learning is key to maintaining productivity, competitiveness and prosperity" (Conference Board of Canada, 2004, p. v). Speaking at the 2006 *National Dialogue on Students at Risk Conference*, Charlie Coffey, Executive Vice President, Government Affairs and Business Development, RBC Financial Group stated "[e]ducation is the foundation of Canada's economic well-being and the prerequisite to sustaining our quality of life. Quite simply, dropping out of high school doesn't pay."

While a high school education may not necessarily be enough to gain meaningful employment, it is now widely accepted among OECD countries that it represents the minimum educational requirement to access the labour market and lifelong learning (Bushnik, Barr-Telford & Bussière, 2004; Levin et al., 2007; HRDC, 2000). As Levin et al. note, "[h]igh school graduation is usually a prerequisite for re-engaging in further training and education as well as relatively stable employment and occupational advancement" (2007, p. 1). That is why, in the Canadian context, it has been recognized that "finishing high school may be the single most important challenge for youth over the next 10 to 20 years" (Campbell, 2000, p. 29).

A strong interest in education emerged in the 1990s when education was identified as "one of the most significant public issues facing Canada" (Lafleur, 1992, p. 1). Indeed, in its 1991 throne speech, the federal government set out its intention to develop Canada-wide education goals for the year 2000, which included the goal of ensuring that 90% of Canadians attain high school diplomas or the equivalent by age twenty-five. During this time, close to 20% of all Canadians aged 20-24 were not completing high school, a higher percentage than numerous other OECD countries. In response, data collected by Statistics Canada (e.g. *School Leavers Survey*, *The School Leavers Follow-up Survey*), and numerous policy reports began to focus on the issues of high school dropouts, seeking to better understand and respond to the challenge of school non-completion

One notable example of this focus was a landmark study undertaken in 1990 for Employment and Immigration Canada and Statistics Canada in which Price Waterhouse conducted 27 focus groups across Canada to help determine why students left school. This qualitative study also touched on a variety of outcomes associated with dropping out of school. The research reported that "[t]hose who had been out of school several years were more likely [than those who had stayed in school] to describe a sense of regret that they had dropped out. They

mentioned not graduating with friends, losing some friends after dropping out, their desire for an education, and difficulty getting a job without a high school diploma" (Price Waterhouse, 1990, p. 14). The report also indicated that "[a]lcohol and drug use became prevalent among some respondents after they dropped out. Crime (including theft, robbery and drug-related activities) also became a problem activity for some respondents after they left school" (1990, p. 15).

Presently, Canada enjoys relatively high levels of educational attainment.[3] However, students who do not complete high school remain a source of concern, especially because certain groups appear to be at disproportionately higher risks of not completing high school. At present, the majority of dropouts are young men and dropout rates also remain substantially higher among the Aboriginal population and other vulnerable populations such as students who reside in rural communities.[4]

Research has documented the numerous consequences associated with dropping out, including reduced lifetime earnings, poor health, increased unemployment, delinquency, crime, substance abuse, early childbearing, economic dependency, and reduced quality of life, and an increased incidence of marital instability (Dryfoos, 1990; OECD, 2006a). According to the first data results of Canada's *Youth in Transition Survey*,[5] "three–quarters of those who had dropped out later expressed regret over their decision" (Bowlby & McMullen, 2002, p. 16). This is not altogether surprising given recent research by the Canadian Council on Learning (CCL) showing that high school education pays life long dividends. According to the CCL, "high school graduates are more employable, are employed more regularly, and earn more than those who leave school without graduating. They have better knowledge of the factors contributing to a healthy lifestyle, and they make fewer visits to physicians" (CCL, 2005).

However, the extant literature suggests that the scope of the financial implications associated with high school non-completion —"the overall unrealized potential of youth, which translates into market and non-market losses for individuals and society" (HRDC, 2000, p. 3)— are only starting to be well understood and accurately documented. This is evidenced by the fact that while the Canadian belief in education is general and deep (Foreign Affairs, 2003), there have been few Canadian studies focused exclusively on the economic burden associated with high school non-completion. And to date, there have been no comprehensive studies on the economic costs of high school non-completion that have attempted to estimate costs across sectors, in terms of public and private costs, both tangible and intangible.

[3] The OECD reports that on average, 84% of Canadian adults have completed high school, a figure only surpassed by the Czech Republic, Norway, the Slovak Republic, Switzerland, the United States and Russia (OECD, 2006a).
[4] The concern with gaps in educational attainment for Aboriginal students has in fact been a priority for a number of years. The 2004 government throne speech for instance committed the government to supporting Aboriginal youth to stay in school.
[5] The *Youth and Transition Survey* is a longitudinal survey designed to collect a broad range of information on the education and labour market experiences of youth.

In the Canadian context, the topic has, on balance, been under-researched, although the need to better understand the relationships between education, literacy, income, and health status has been recognized (Ungerleider & Burns, 2002). Research published in the United States in the last few years also underscores the considerable academic and policy interest in the costs of non-completion and benefits of high school graduation. Being able to estimate the economic costs associated with not completing high school has a number of wide-ranging policy benefits. Such a study reveals the financial toll of this problem on all of society. It uncovers the extent to which it affects both the private and public spheres of our lives. This can lead to a better understanding of the ways in which the costs of dropping out intersect all policy areas. Evaluating these costs also reveal that failure to complete high school carries immediate and long-term consequences. This evidence can be used to argue that education and educational policies should be given high priority on the policy agenda.

The economic costs associated with high school dropouts also have political significance for continuing future economic evaluation studies. Being able to assess the associated costs of high school non-completion is a prerequisite for cost-benefit, and cost effectiveness studies. The effectiveness of remedies, as well as options for new initiatives, policies, and programs can be determined using such economic evaluations. Identifying the most effective and efficient means of delivering prevention and intervention programs and services can lead to potential cost savings for society in terms of health care dollars, social service, and justice spending. Such results can also inform the education sector itself, especially in terms of the cost efficiencies resulting from investing in high school education. As Moretti explains, "[t]he exact magnitude of the social return on education is crucial in determining the efficient amount of public investment in education" (2005, p. 1). Beyond the financial savings, however, are benefits to school leavers themselves, their communities, families, and friends. These are often non-monetary effects that are more difficult to quantify that are nonetheless crucial to the lives of those affected by low educational attainment.

Resources are scarce and policy decision-makers are routinely expecting research-based evidence of programs' and services' costs, effectiveness, and benefits. Undertaking an investigation of the economic costs of high school non-completion is, in short, both appropriate and necessary in our Canadian policy environment.

Current Dropout Rates in Canada

Dropouts are people in a specified age group who have left high school without graduating at a given point in time. There is no single agreed upon method of calculating dropout rates. Estimates "vary in their timeliness and reliability, and in their underlying concepts, such as the age and the definition of high school completion" (HRDC, 2000, p. 11). The challenges of accurately determining rates of high school non-completion are considerable. This is because young people may dropout more than once, they may return after dropping out, and they may move between schools. Moreover, students may take longer to complete high school or achieve high school equivalency through alternative training and education. In reality, leaving

school is often described as a lengthy, gradual process of withdrawal (Bowlby & McMullen, 2005; Price Waterhouse, 1990).

Recent calculations demonstrate that there has been a decline in dropout rates. The proportion of high school leavers who are not attending school among 20-24 years olds was 21% for men and 16% for women in 1990/1991. In 2004-2005, this rate declined to 14% and 9% respectively (Raymond, 2008, p. 9). This figure differs slightly from that of Bowlby & McMullen (2005) who reported that the overall dropout rate was 9.8% in 2004-2005 because the authors excluded those without a high school diploma who have completed a post-secondary education diploma from the numerator of the rate. According to other estimates, approximately 17% of the adult population aged 20 years and over in Canada are high school dropouts (Mang, 2008). For the purposes of this study, high school dropouts are defined as those persons between 20-54 years of age with some high school education or less. According to a custom run using Census (2001), this amounts to 2,944,235 dropouts. A custom run using SLID (2004) resulted in an estimate of 1,672,393 dropouts.

Characteristics of Dropouts

A considerable body of literature has documented the causes for school non-completion and identified the characteristics of vulnerable students. The process of leaving school is long and complex, and certain segments of the population appear to be particularly at risk. According to Levin, at-risk students are “ones whose past or present characteristics or conditions are associated with a higher probability of failing to attain desired life outcomes” (2004, p. 6) including graduation, positive labour force attachment, higher income, less involvement in crime and better health. The risk factors for non-completion are related to socio-economic status, family structure, school type, geographic locale, excessive employment, and psychological variables such as low self-esteem and aggression (for further discussion see Audas & Willms, 2001; Bowlby & McMullen, 2005; Bushnik et al, 2004; HRDC, 2000).

There are marked gender differences in dropouts. In 2004-2005, 135,000 of the 212,000 dropouts in Canada, or 64%, were male (Bowlby & McMullen, 2005). Aboriginal youth, those with disabilities, and those who work in excess of 20 hours while in school are also more likely to dropout (Applied Research Branch 2000, iii: Aboriginal Peoples Survey). Currently, 43% per cent of Aboriginal people aged 20 through 24 have less than a high school education, well above the average rate of school leavers in the general population of Canada (2001 Census). Obstacles to completing a high school education also persist for students who live in geographically remote or isolated areas. Dropout rates are highest in rural areas and small towns, most notably in the provinces of Quebec, Manitoba, and Alberta (CCL, 2005).

Consequences of Dropping out of High School

A number of jurisdictions have examined the economic costs associated with school non-completion. Most leading studies have however been undertaken in the United States and have considered costs in the areas of labour and employment, social services, crime, literacy, and health. In one of the most cited early studies, the main findings of which are summarized in Table 3 below, Havemen and Wolfe (1984) identified and developed costs for a number of private (individual) and public (state) education outcomes.

Table 3. Impacts of Education (Haveman and Wolfe, 1984)

Channel of impact of schooling	Economic nature of impact	Nature of existing research on magnitude of impact
1. Individual market productivity	Private; marketed; human capital investment[6]	Extensive research on the magnitude of market earnings impact, by demographic group and type of schooling
2. Non-wage labour market remuneration	Private; marketed and non-marketed; human capital investment	Some research on differences in fringe benefits and working conditions by education level
3. Leisure	Private; non-marketed; consumption	Wage rate differences in (1) form shadow prices which could be used to value leisure, but seldom are
4. Individual productivity in knowledge production	Private; non-marketed; human capital investment	Some evidence that schooling increases productivity in the production of human capital investment
5. Non-market individual productivity	Private; non-marketed; human capital investment(e.g. do-it-yourself)	Some evidence of education-induced reduction in female home production time, but increase in quality; no evidence for males
6. Intra-family productivity	Private; some external effects; both marketed and non-marketed; human capital investment	Relationship between wife's schooling and husband's earnings, apart from selectivity, is well-established
7. Child quality through home activities	Private; some external effects; both marketed and non-marketed; human capital investment	Substantial evidence that child quality in several dimensions (health, cognitive development, education, occupation status, future earnings) is positively and significantly related to mother's and father's education
8. Own health	Private; modest external effects; partially marketed; human capital investment and consumption	Evidence that own schooling positively and significantly affects health status and, on an aggregate level, that more education decreases mortality

[6] A fundamental distinction in economics exists between “market” and “non-market” goods and services. Free market goods and services have a market value as they are sold for prices that reflect a balance between the costs of production and what people are willing to pay. A non-market good or service is something that is not bought or sold directly. Therefore, a non-market good does not have an observable monetary value. “Human capital” refers to the stock of productive skills and technical knowledge embodied in labour.

Channel of impact of schooling	Economic nature of impact	Nature of existing research on magnitude of impact
9. Spouse and family health	Private (within household); modest external effects; partially marketed; human capital investment and consumption	Evidence that own and spouse's schooling positively and significantly affects health status and, on an aggregate level, that more education decreases mortality
10a. Fertility (viz. Attainment of desired family size)	Private (within household); non-marketed; consumption	Research on contraceptive use and techniques suggests that efficiency in contraceptive and attainment of desired family size is related to education
10b. Fertility (viz. Changed tastes for children)	Private (within household); some external effects; non-marketed; consumption	Evidence suggests that schooling reduces desired family size
11. "Entertainment"	Private; non-marketed; consumption	Education appears to be consumed for its intrinsic value, and possibly to broaden forms of entertainment enjoyed
12. Consumer choice efficiency	Private; some external effects; non-marketed; human capital investment	There is evidence that education alters budget allocations in the same direction as income, implying the existence of positive efficiency effect
13. Labour market search efficiency (including migration)	Private; some external effects; non-marketed; human capital investment	Some evidence that job search costs reduced with improved information and knowledge, and job and regional mobility increased
14. Marital choice efficiency	Private; minor external effects; non-marketed; consumption	Some evidence of improved sorting in the marriage market and assortative mating by intelligence
15. Crime reduction	Public good	Evidence that education is, ceteris paribus, positively associated with reduced criminal activity
16. Social cohesion	Public good	Impressionistic evidence of a positive relationship with education
17. Technological change	Public good	Limited evidence that education influences economic behaviour in terms of research and development
18. Income distribution	Public good	Evidence on the direction of impact on education on income equality is mixed
19. Savings	Private; some external effects; marketed productive factor	Holding constant income and other savings determinants, education appears to be positively associated with savings rates
20. Charitable giving	Both private and public; non-marketed	Evidence that education increases both money and time donations

Other studies have included Chaplin and Lermar (1997), who calculated private market costs of dropping out in the US over the course of the lifetime as being between $90,000 and $600,000 US per dropout. They report that these earnings losses reflect lost tax revenues for society of between $30,000 and $200,000 per dropout. Cohen (1998), on the other hand, estimated lifetime earning differential between high school and non-high school graduates as ranging between US$470,000 and US$750,000 (in 1997 dollars).

More recent interest in the topic is evidenced by the recent cover of *Time* magazine – "Dropout Nation" (April 9, 2006), the report of the Gates Foundation entitled *The Silent Epidemic* (2006), which focuses on the reasons that dropouts leave school, and a recent series of papers emerging from the Social Costs of Inadequate Education symposium held at Columbia University in 2005.

Some of the more recent and relevant key findings of US-based research on the subject of school dropouts are summarized below (note that all estimated costs reported in this section are US dollars).

Labour

- Lower earnings among dropouts could cost the United States approximately $158 billion in lost earnings and $36 billion in lost state and federal income taxes for each class of 18-year-olds (Rouse, 2005, p. 22).
- For each cohort of 18-year-olds that fails to complete high school, the United States loses 1.6 percent of its GDP – the equivalent of $192 billion at the time of estimating (Rouse, 2005, p. 24).
- High school graduates, on average, earn $9,245 more per year than high school dropouts (Employment Policy Foundation, 2001).
- A high school dropout earns approximately $260,000 less over his or her lifetime than a high school graduate, and pays about $60,000 less in taxes (Rouse, 2005, p. 24).
- The US Census estimates that high school dropouts will earn $270,000 less than high school graduates over their working lives (Cheeseman, Day & Newburger, 2002).
- The average lifetime benefit in terms of additional taxes paid per expected high school graduate is $139,100 (Levin et al., 2007).
- If the students who dropped out of the class of 2006 had graduated, the US economy would have benefited from an additional $309 billion in income over their lifetimes (Alliance for Excellent Education, 2007).
- The estimated tax revenue loss from all males between 25-34 years of age who did not complete high school would be approximately $944 billion (Thorstensen, 2004).

Social Services

- Single mothers who are high school dropouts represent more than one in four welfare recipients. Having them complete high school would potentially save the public assistance rolls about $1.5 billion dollars a year (Richard, 2005).
- The United States could save between $7.9 billion and $10.8 billion annually in spending on "temporary assistance for needy families", food stamps and housing assistance by improving the education attainment of high school dropouts (Waldfogel, Garfinkel, & Kelly, in Levin, 2005, p. 17).

Crime

- The average lifetime crime-related cost reduction per expected high school graduate is $26,000 (Levin et al., 2007).

- Increasing the high school completion rate by one percent for all men aged 20 to 60 could save the US up to $1.4 billion a year in reduced costs related to crime (Moretti, 2005, p. 9).
- Each extra year of schooling gained for the population as a whole reduces murder and assault by 30 percent, motor vehicle theft by 20 percent, arson by 13 percent and burglary and larceny by about 6 percent (Moretti, 2005, p. 6).
- The lifetime cost to the nation for each youth who drops out of school and later moves into a life of crime and drugs ranges from $1.7 to $2.3 million (Snyder & Sickmund, 1999).

Health

- The average expected lifetime public health savings per high school graduate (achieved through reduction in Medicare and Medicaid costs) is $40,500 (Levin et al., 2007, p. 12).
- In the United States, health related losses for the estimated 600,000 high school dropouts in 2004 totalled at least $58 billion, or nearly $100,000 per student (Muennig, 2005).
- High school dropouts have a life expectancy that is 9.2 years shorter than that of graduates (Levin, 2005).
- Nearly 80% of dropouts depend on government health care assistance (Rouse, 2005).
- Dropouts have been shown to have higher rates of cardiovascular illnesses, diabetes, and other ailments, and require an average of $35,000 in annual health care costs, compared with $15,000 for college graduates (Muennig, 2005).
- Increasing attainment from grade 11 to high school graduation would reduce health care related costs by $41.8 billion (Muennig, 2005).

In the United States, there is a particular concern with the proportion of poor and minority students who fail to complete high school. According to the Civil Rights Project at Harvard University, while the graduation rate for White students is 75%, it is only about 50% for Black, Latino and Native American students. Moreover, dropout rates are reported as being much higher among immigrant and limited English proficiency populations. There is reason to suspect, in short, that the negative impact of not graduating from high school is more widespread and possibly even more pronounced among minority groups (Civil Rights Project, 2005).

Impact of Educational Attainment in Canada

In Canada, a number of studies have examined the rates of return to education and concluded that these are positive (see Bélanger & Lavallée, 1980; Constantatos & West, 1991; Cousineau, 1984; Cousineau & Vaillancourt, 1987; Crean, 1972; Dodge & Stager, 1972; Mehmet, 1977; Podoluk, 1968; Stager 1968, 1989; Vaillancourt, 1995; Vaillancourt, Carpentier & Henriques, 1987; Vallancourt & Henriques, 1986). For example, Vaillancourt concluded that “the highest rates of returns, private and public, for both men and women, result from the completion of

high school" (1995, p. 548). Those who included postsecondary education in their analysis also found it contributed significantly to the benefits associated with educational attainment.

One of the most widely referenced studies that examined economic costs in relation to educational attainment includes a study undertaken by Lafleur in 1992 for the Conference Board of Canada. This research focused on societal costs and individual student costs (see Table 4 below for a list of factors examined in the report). According to the findings of this report, "Canada [would have lost] more than $4 billion in present value terms over the working lifetimes of the nearly 137,000 youths who dropped out of high school instead of graduating with the class of 1989" (Lafleur, 1992, p.1).

According to this report, $2.7 billion of the total costs were incurred by the students and $1.3 billion by society. These costs included market and non-market related costs. For individuals, market costs included lower lifetime earnings while non-market costs were described as "decreased opportunities for mobility and training, the lower probability of actually finding work, lower returns on personal investment portfolios, and propensity to have less highly educated offspring, and lower level of personal health and longevity" (Lafleur, 1992, p. 5). In particular, high school dropouts were also shown to incur substantial personal losses. For males, the losses were calculated at $129,000 while for female dropouts, the losses were $107,000 in 1992 dollars (Lafleur, 1992). While cited extensively since its release, this report has been critiqued for providing an overestimate of costs because it utilized overly high dropout rates in its cost calculations (HRDC, 2000).

Table 4. Examples of factors associated with dropping out

Individual student	**Rest of society**
Market factors	
Lower lifetime after-tax earnings of dropout	Lower tax collections
Savings in costs to student associated with staying in school: - books, tuition - income foregone while attending school	Savings in costs to society to educate students to graduation: - school board expenditures
Non-market factors	
Lower non-wage benefits of work - working conditions - status	Decreased participation in the electoral and political process
Lower level of personal health	Higher administration costs of welfare programs
Decreased opportunity for mobility and training	Higher costs associated with crime prevention and detection
Decreased probability of finding a job	Decreased level of charitable giving
Lower return on investment portfolio	Decreased social cohesion
Less highly educated offspring	
Decreased financial security	

Individual student	Rest of society
Decreased cultural enjoyment	

Source: Lafleur and the Conference Board of Canada (1992).

In 1995, Vaillancourt published findings on the private and total returns to education using 1986 Census data and concluded that the highest rate of return are for the completion of high school. In 2000, Vaillancourt and Bourdeau-Primeau estimated the private and total rates of return of a high school diploma in Canada and the provinces using 1996 Census data of 1995 income for those 15 years and older. They concluded that "[f]or graduates relative to those that dropped out at Grade 10, the private rates of return are 41 and 54 percent respectively for young men and women" (Vaillancourt & Bourdeau-Primeau, cited in HRDC, 2000, p. 33). Moreover, they found the social rates of return to be 17% for male and female graduates relative to those who dropped out in Grade 10.

Another noteworthy study was released by Human Resources Development Canada in 2000. This study concluded a modest gap in earnings between those who complete high school and those who do not. According to this study, dropouts with less than a high school education earn from 70% to 85% of what graduates earn (HRDC, 2000). Specifically, "estimates of the net present value of additional private income associated with high school completion are over $100,000 for Canadian high school graduates over the lifetime relative to those that dropout at Grade 10, when the discount rate is 3 percent" (HRDC, 2000, p. 3). These calculations also revealed a notable gender gap, in that female dropouts earned 20% less than their graduate counterparts (HRDC, 2000).

Estimating the Costs of Dropping out of High School

Research Design

There is much discussion and debate in all costing studies about appropriate methodologies, including the range of costs to be calculated and approaches to their disaggregation. This is no different in the case of educational attainment and more specifically high school dropouts. As previously noted by Human Resources Development Canada, "[t]here are several conceptual and measurement problems in developing quantitative estimates of the overall social costs and benefits of education. These problems can be discussed under three main headings:

1) Measurement of education – only formal education – what about informal?
2) Variation in the benefits of education – wide variation in earnings of dropouts and graduates; and
3) Estimating the effects of education on different outcomes" (2000, p. 28).

The conceptual and methodological challenges were addressed through phase I of the project. Appendix A provides details on the development of the research design, which included consultation with international experts in the field.

Methodological Approach

The present study draws predominantly on the methodologies and concomitant assumptions used in a series of papers by prominent economists and other social science researchers prepared for the symposium entitled "The Social Costs of Inadequate Education" held by The Campaign for Educational Equity at Columbia University's Teachers College on October 24-26, 2005. Specifically, researchers explored the financial cost to society when young people do not graduate from high school by presenting data on "lost income and tax revenues and increased health expenditures, as well as on increased costs in the areas of public assistance and criminal justice activities that can be directly linked with failure to attain a high school degree" (Levin, 2005, p. 16). We also draw on a follow-up report based on aforementioned research entitled "The Costs and Benefits of an Excellent Education for America's Children" (Levin, Belfield, Muennig, & Rouse, 2007). This last study, in particular, is considered to be groundbreaking because "it has been conducted by economists of the first rank, using sophisticated approaches, that, if anything, understate the potential value of investing up front in education" (Centre for Benefit-Cost Studies of Education, 2007). Finally, this study applies the findings of Ferrer and Riddell (2001) for making costs calculations in labour and employment.

The research methodology developed for the present study draws upon a wide range of internationally recognized studies and follows accepted, conventional economic procedures. A prevalence-based methodology is used to present many of the final calculations. This approach estimates all opportunity costs to the economy which have resulted from current or previous high school dropouts in 2008. Where lifetime calculations are made, the figures are presented using present value – that is how much a future benefit is worth in 2008 dollars. The study only focuses on educational attainment and does not account for quality of education, an important factor in educational outcomes.

Definition of Costs

In most economic costing projects, a distinction is made between tangible and intangible costs.

Tangible Costs

For the purposes of quantifying high school non-completion, this study calculates tangible costs that are categorized as direct and indirect costs, incurred by either the state or the individual.

Direct costs are considered the actual dollar expenditures related to high school non-completion. Such costs represent the value of resources that could be allocated to other uses in the absence of this problem. Indirect costs consist of morbidity costs due to short-term and long-term disability, and mortality costs due to premature death. Morbidity costs represent the value of lost output due to reduced or lost productivity caused by morbidity associated with high school non-completion. Mortality costs are the value of lost output (expected value of an individual's future earnings with age and sex taken into account) due to premature death.

In seeking to estimate the total social costs of high school dropouts in Canada, the present study follows the methodologies of Levin et al. (2007) and Levin (2005) and only includes effects and consequences linked to high school education that are substantiated by strong, scientific, explanatory evidence. Because educational attainment intersects with numerous policy areas, public and private direct and indirect costs were categorized according to the following policy areas:

- health (indirect mortality and morbidity costs)
- social assistance (direct costs to state)
- crime (direct costs to state)
- labour/employment (direct costs to individual and state)
- education/research (direct costs to state)

Intangible Costs

Attempts to quantify intangible consequences of social problems can be found in the economic costing models of crime conducted by Miller and Cohen (1995) in the United States and in the more recent study by Leung (2004) in Canada. Unlike tangible losses, pain and suffering and reduced quality of life do not have a natural market price and cannot be bought and sold. Such psychological and emotional losses, however, are real. Some economists have argued that intangible costs far surpass all other direct and indirect costs combined. For instance, Miller has argued that "serious errors can occur if policy analysts ignore the intangible costs when allocating resources" (1996, p. 12).[i] While it is important to highlight explicitly the intangible human costs associated with high school dropouts, quantifying these tends to devalue such losses. At the same time, placing a dollar figure on these human losses is essential to broadening our perception of the scope and magnitude of their impact. As Wolfe and Haveman argue in the context of education, "schooling has substantial benefits beyond those usually tabulated" (2001, p. 11).

Tangible Costs by Policy Sectors

Health

Even when controlling for factors such as income and socio-economic status and regardless of the specific health measurements used, epidemiological and social science studies have found compelling associations between education and health. The evidence suggests that regardless of country context, staying in school makes people healthier. Moreover, educational attainment is widely acknowledged as an important determinant of socio-economic status and income, which are both key determinants of health (Federal/Provincial/Territorial Advisory Committee on Population Health, 1994; Lleras-Muney, 2005; PHAC 2004). Given such evidence, the landmark Romanow Commission on the Future of Health Care in Canada reported that investing in education is "part of the solution leading to a healthier Canada" (2002, p. xx). Thus, government policies that keep people in school and prevent them from dropping out of high school may help increase population health (Cutler & Lleras-Muney, 2006).

The literature suggests three potential explanations for the positive relationship between education and health:

1) Better health enables one to invest more in education;
2) Common factors, such as genetic endowment, social background or time preferences, affect health and education in a similar way, and
3) Education leads to better health (Groot & van den Brink, 2004).

It is in fact now widely accepted that there is a positive correlation between educational attainment and overall health status (Groot & van den Brink, 2004; Grossman & Kaestner, 1997; Grundy & Sloggett, 2003; UNDP 2003; Wolfe & Zuvekas, 1997), as well as disease morbidity (Pincus, Callahan & Burkauser, 1987). According to Levin et al, "the average 45-year-old college graduate is in better health than the average 25 year old high school dropout" (2007, p. 35). Moreover, review of the scientific literature shows strong associations between education and health across a range of illnesses including coronary heart disease (Davey Smith et al., 1998; Dryfoos, 1990; Winkleby, 1992); high blood cholesterol (Dryfoos, 1990); cancers, Alzheimer's, some mental illnesses, diabetes (Dryfoos, 1990; Nilsson, Johansson & Sundquist, 1998); depression (Adler & Matthews, 1994; Liem, Dillon & Gore, 2001; Mirowsky & Ross, 1998); stress (Quantum Sufficit 2006; Taylor, 2002); lung capacity (Welle, Eide, Gulsvik & Bakke, 2004), and obesity (Dryfoos, 1990).

The 1996 Report on the Health of Canadians also reported an association between lower educational attainment and a greater likelihood of presenting with high blood pressure and high blood cholesterol as well as of being overweight, all of which are commonly known to be risk factors to the maintenance of long-term health.

Perceptions about one's level of health also appear to be related to educational attainment (Bobák, Hertzman, Skodová & Marmot, 2000; Carlson, 2004; Cooper, 2002; Groot & Massen van den Brink, 2004a; Huisman, Kunst & Mackenbach, 2003; Ross & Wu, 1995). For example in 2000-2001 in Canada, people who reported not completing high school were twice as likely to rate their health as fair/poor (19%), compared with people who had completed some form of postsecondary education (8%). Moreover, those with less than high school education were twice as likely to report problems with their functional health (27%) compared with people who had received postsecondary education or higher (13%).[7]

A significant amount of research has also examined the relationship between health-related negative behaviours including substance use/abuse, cigarette smoking and drug use and educational attainment. (See for example Aitken, De Santis, Harford, Fe Caces, 2000; Aloise-Young, Cruickshank & Chavez, 2002; Arellano, Chavez & Deffenbacher, 1998; Crum, Ensminger, Ro & McCord, 1998; Crum, Juon, Green, Robertson, Fothergill & Ensminger, 2006; Feinstein, Hammond, Woods, Preston & Bynner, 2003; Feinstein, Sabates, Anderson, Sorhaindo & Hammond, 2006; FPT Advisory Committee on Population Health, 1994; Guagliardo, Huang, Hicks & D'Angelo, 1998; Kiecolt-Glaser, McGuire, Robles & Glaser, 2002; Kogan, Luo, Brody, & Murry, 2005; Meara 2001; Muennig, 2005; Obot & Anthony, 1999, 2000; van Lenthe, Droomers, Schrijvers & Mackenbach, 2000; Winkleby et al., 1992; and Wu & Howard, 2007). According to data published by Health Canada in 2002, Canadians with less than a high school education were nearly twice as likely to be current smokers (24%) as Canadians with a university education (13%).[8]

Research also suggests that educational attainment has a notable on other aspects of health management and disease prevent, such as: compliance with the treatment and management of illness/health-related conditions (see Adler & Matthews, 1994; Baker et al. 2002; Barton, Clarke, Sulaiman & Abramson, 2003; FPT Advisory Committee on Population Health, 1994; Goldman & Lakdawalla, 2001; Goldman & Smith, 2001; Hammond, 2003; Kiecolt-Glaser, McGuire, Robles & Glasser, 2002; Lleras-Muney & Lichtenberg, 2001; Link & Phelan, 1995; Meara 2001); changes in pregnancy rates among adolescents (see Black, Devereux & Salvanes, 2005; Dryfoos, 1990; Harding 2003; Manlove 1998; National Campaign to Prevent Teen Pregnancy 2001; Wolfe, Wilson & Haveman, 2001); and suicidality (see Daniel et al. 2006; Silverman & Felner 1995; Thompson, Eggert, Randell & Pike 2001).

Mortality

According to a number of leading international researchers, there is solid evidence that differences in life expectancy may be attributable to education (Cutler & Lleras-Muney, 2006;

[7] Statistics Canada (2003). Canadian Community Health Survey 2000-2001 Public Use Microdata File. Analysis by Canadian Population Health Initiative.

[8] Health Canada (2002). Smoking and education, age 15+ years, Canada, 2002. Supplementary tables CTUMS Annual 2002.Canadian Tobacco Use Monitoring Survey. See http://www.hc-sc.gc.ca/hecs-secs/tobacco/reserach/ctums/2002/annual_table10.htm.

Deaton & Paxson, 2001; Feinstein et al. 2003; Grossman & Kaestner, 1997; Groot & van den Brink, 2004; Lleras-Muney, 2005; Mackenbach, Cavelaars, Kunst & Groenhof, 2000; UNDP, 2003;). Known pathways to health have in fact been reported in a number of key studies:

- According to Wong, Shapiro, Boscardin and Ettner (2002), persons with a high school education live between 6-9 years longer than high school dropouts. In fact, these authors conclude that those without a high school education stand to lose 12.8 potential life-years per person.
- The Alliance for Excellent Education reports the US death rate for those with fewer than 12 years of education is 2.5 times higher than the rate for those with 13 or more years of education (Alliance for Excellent Education, 2003).
- In her study of the relationship between education and adult mortality in the United States, Lleras-Muney concludes "that education has a causal impact on mortality, and that this effect is perhaps larger than has been previously estimated in the literature" (2005, p.189). Specifically, she reports that an additional year of education lowers the probability of dying by 3.6 percentage points.
- Cutler and Lleras-Muney (2006) conclude one more year of education increases life expectancy by 0.18 years. Using a 3% discounting rate and using Cutler's estimate (2004) of $75,000 for one year of health valuation results in approximately $13,500 in present value.

Some studies have examined causal pathways in the relationship between education and health partly in response to the tendency to conflate robust associations with presumptions of causality. The issue of causality has not been fully resolved (Young, Kane & Nicholson, 2006) and the causal relationship between education and health has been challenged on both conceptual and empirical grounds accompanied by claims that the role of confounding, co-existing determinants have not been explored adequately or that the bi-directional relationship of education and health are not well understood (Chandola, Clarke, Morris & Blane, 2006; Mirowky & Ross, 1998).

At the same time, a strong evidence base is emerging to support the causal effects of education on health. For example, in their meta-analysis of the literature examining the relationship between education and health, Groot and van den Brink argue that "our reading of the literature is that the effect of education on health represents a genuine causal effect, that the reverse effect running from health to education is relatively small (at least for adults)" (2004, p. 1). Moreover, Adams (2002) similarly argues that after correcting for any endogeneity bias, education remains positive and significant.

It is based on this emerging base of evidence that Muennig (2005) recently published his groundbreaking research entitled *Health Returns to Education Intervention.* Drawing on the available scientific literature and conducting a secondary analysis of the 2002 Medical Expenditures Panel Survey in the United States, Muennig (estimated that each high school

graduate will gain 1.4 additional QALYs (years of perfect health), valued at approximately $160,000 from a societal standpoint.

Basic Assumptions for Economic Calculations

The present study uses the quality-adjusted life year (QALY) methodology employed by Muennig (2006) and reported by Levin *et al.* (2007) to calculate morbidity and mortality costs. The QALY combines life expectancy and morbidity into a single outcome measure. The QALY contains two components: health related quality of life (HRQL) and years of life gained. One QALY is a year of life spent in perfect health. These authors calculated the morbidity (HRQL) component by predicting changes in health related quality of life by educational attainment using regression models. They conservatively monetized QALYs using the FDA (1999) estimate for the value of a single year of life as equivalent to US$110,000. This estimate is conservative both because it falls on the low-end of other estimates and because the valuation is not adjusted for HRQL (a year of life in perfect health should be valued higher than an unadjusted year of life).

Calculations

In his study, the direct health cost of not completing high school is estimated using the following formula:

Cost of health = QALYs gained x QALY valuation

The estimated QALYs were provided by Peter Muennig based on the methodology employed in his earlier study (Muennig, 2006). To estimate QALYs in the Canadian context, the odds ratio for mortality was obtained from the sample size weighted average of odds ratios used in studies on Manitoba and Nova Scotia (see Roos et al., 2004 and Veugelers et al., 2001). Veugelers and colleagues evaluated the odds of mortality by educational attainment within Nova Scotia using individual- and multi-level logistic regressions. Similarly, logistic regressions were used to compare the influence of individual and contextual socioeconomic variables on mortality between Manitoba and Nova Scotia in Roos' article.

To be consistent with the discount rate utilized throughout this study, we estimated the 1.0369 QALY gain by completing high school based on the assumed discount rate of 3.5%. The 3.5% discount rate, a rate used to relate future dollars which is expressed as a percentage and used to reduce the value of future dollars in relation to present dollars. The 3.5% discount rate used

[9] This number was modeled using a Markov model, with HRQL scores, the annual probability of mortality by age, and the probability of belonging to any one group as inputs. For a more complete description of the model (with different discount rate and assumptions), please see Muennig and Wolf (2007).

throughout this study is consistent with the methodology of Levin et al. (2007) in making parallel calculations in the US context.

Using Muennig's estimate and the FDA (1999) of life figure, we obtain an estimate of 1.036 QALYs gained * USD110,000 adjusted to a 2008 value of CAD211,471 worth of life per additional high school graduate.[10]

The calculations were done as follows:

> *USD110,000/0.673 = CAD 63,447*
> *where 0.673 USD/CAD is an average exchange rate of USD for 1 CAD in 1999;*
>
> *Present value of CAD163,447 in 1999 is CAD 222,762 (CAD204,123= CAD 163,447 *1.025^9), which is the value of one QALY.*
>
> *The value of life per additional high school graduate is CAD204,123*1.036QALY=CAD211,471.*
>
> *Using Census (2001) data we include the aggregate or sum total of costs of CAD623billion (2,944,235 dropouts* CAD211,471).*

An annual equivalent of the health costs figures is calculated as follows:

> *Annual health costs = Lifetime health costs* $/ \sum_{t=0}^{35} \frac{1.015^t}{1.035^t}$.
>
> *where t indexes years.*

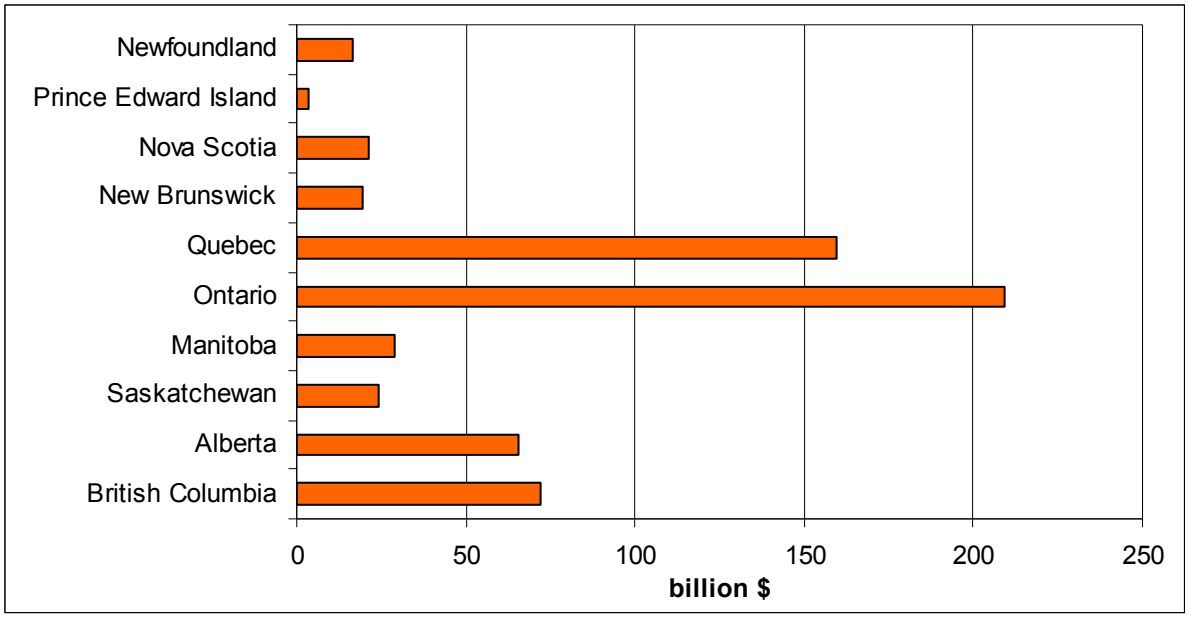
We assume that the estimated lifetime health cost is the sum of present values of equivalent annual figures over 35 years based on a 1.5% productivity growth per year and 3.5% discount rate.

Therefore, the annual equivalent is $8,098 per dropout or $23.8 billion in aggregated terms.

It is important to not that these calculations do not include costs that are incurred directly by the health care system that would be associated with increased morbidity such as physician visits, hospitalization, treatment programs, counseling or pharmaceutical use.

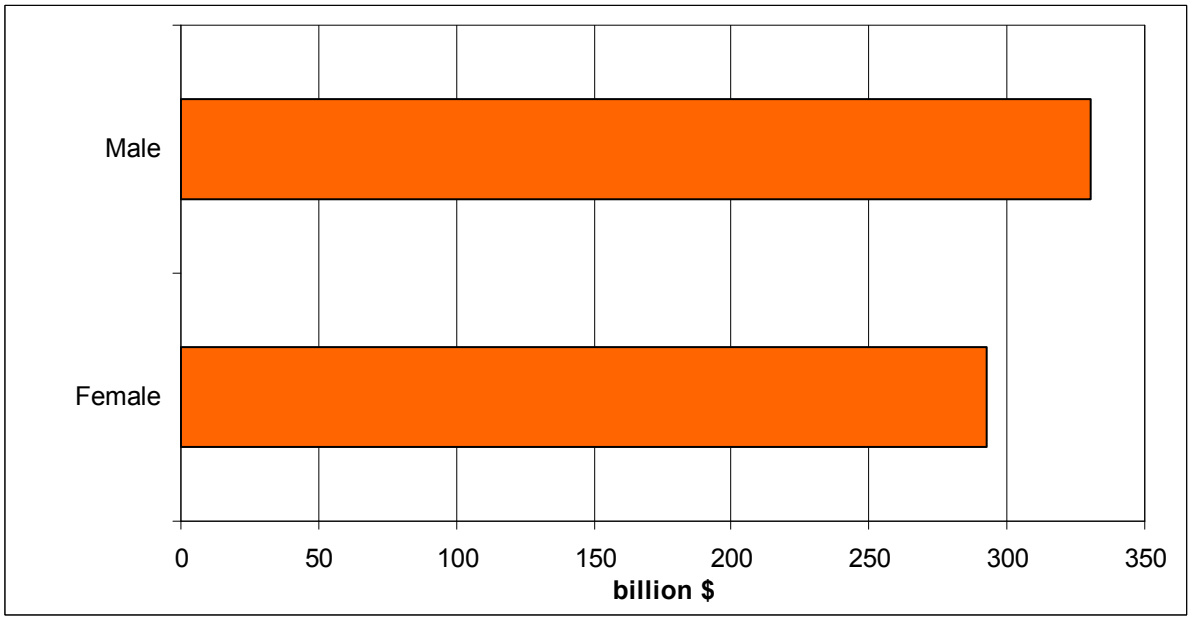
[10] In this study whenever we prorate past monetary figures to 2008 we use an average annual inflation rate of 2.5%, which was observed in Canada between 1999 and 2008.

Figure 1. Aggregate Cost of Health by Province (Estimated from Census 2001)



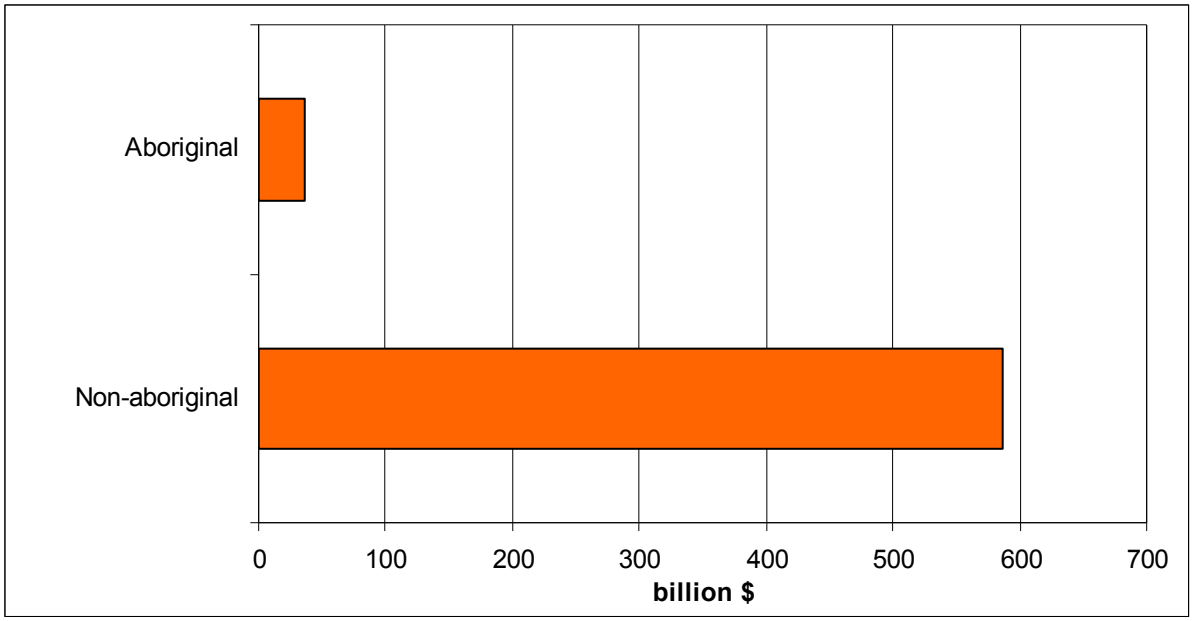
This pattern reflects the distribution of dropouts, with the highest aggregate health-related costs occurring in Ontario ($209,275,931,020) and the lowest in P.E.I. ($3,437,461,105).

Figure 2. Aggregate Cost of Health by Gender (Estimated from Census 2001)



Aggregate health care costs are higher for males ($330,284,923,995) than for females ($292,335,395,690).

Figure 3. Aggregate Cost of Health by Aboriginal Identity (Estimated from Census 2001)



Aggregate health care costs are higher for non-Aboriginals ($585,738,719,930) than Aboriginals ($36,881,599,755).

For comparison purposes, we also looked at SLID data. According to SLID 2004, the estimated number of dropouts was 1,672,393. Based on this estimate, aggregate healthcare costs were approximately $354 billion. Segregation of the aggregate costs of health can be found in the technical report.

Social Assistance

As Waldfogel et al. note, "[i]n modern economies, adequate education is a prerequisite for….achieving a basic standard of living" (2007, p. 1).When individuals fail to achieve sufficient education, they are at greater risk of reliance on a variety of social and public services and subsidies. This is not surprising given that dropouts are less likely to be employed. Moreover, as research from the labour and employment field illustrate, even when high school dropouts are employed, relative to high school graduates, their incomes are substantially lower over their lifetimes. Not surprisingly then, high school dropouts are twice as likely as graduates to slip into poverty from one year to the next (Iceland, 2003), which often leads to reliance on a host of state supports for survival. In Canada, social assistance programs at the provincial, territorial, and municipal levels, "provide financial assistance to cover the cost of basic living requirements and in-kind goods and services for an individual or family when all other financial resources (of that individual or family) have been exhausted" (HRDC, 2005, p. 3).
Because of the policy trend encouraging welfare-to-work, there is growing interest in the individual characteristics of welfare recipients (Jayakody, Danziger & Pollack, 2000). Research

has established that adults who do not complete high school are at elevated risk of being on some form of public assistance (Autor & Duggan 2003; Bane & Ellwood, 1994; National Center for Education Statistics, 1998; Resources humaines et travail Canada, 1993; Ross & Shillington, 1990; Waldfogel, Garfinkel & Kelly, 2006;) and this is particularly true in the case of lone mothers (Dooley, Gascon, Lefebvre & Merrigan, 2000; Hamil-Luker, 2005; Maynard, 1996; Quint, Bos, Polit 1997).[11]

Even though there will always be high school graduates who are in need of public assistance, the assumption can be made that there are considerable links between not graduating from high school and being on some form of assistance. In the United States, it has been determined that 40% of those lacking a high school diploma received some form of government assistance in 2001 (Harlow, 2003). Moreover, according to Rank and Hirschl, 64% of adult dropouts will have used food stamps compared to 38% of high school graduates (Rank & Hirschl, 2005).

Much attention has focused on examining the use of welfare by single mothers. Analysing the 1994-1995 National Household Survey of Drug Abuse and using a logistic regression model that controls for numerous demographic factors, Jayakody et al. (2000) determined that single mothers with a high school education are 55% less likely to be on welfare (Temporary Assistance to Needy Families - TANF) than those without a secondary education. Calculations by Waldfogel et al. (2007) produced lower figures. Their results, using the 2003 Current Population Survey, showed that "those with a high school degree are 24% less likely to be on welfare than those who are high school dropouts" (2007, p. 7). Most importantly, however, each study projected the reduction in TANF use that would result if all women who are dropouts would instead have a high school education. The estimates obtained by Jayakody *et al.* yield a 55% reduction, while Waldfogel's estimates yield a 40% reduction in use for savings ranging from US$1.5 to $3.5 billion annually.

In Canada, data from the *Institut de la statistique du Québec* (2004) show that 63% of all social assistance claimants are high school dropouts. Deriving their data from the Statistics Canada 1994 Survey of Labour and Income Dynamics (SLID), Warburton and Warburton report that high school dropouts compose 42.7% of welfare recipients (2004). They also report that 8.6% of high school dropouts use social assistance (vs. 4.3% high school graduates). Most income assistance (85%) is spent on people who have not completed high school: 33.6% of those who do not graduate from high school receive income assistance compared to 6.7% of those who graduate (Ungerleider & Burns, 2002). In the 1991 School Leavers Survey, more school leavers (18%) than graduates (8%) reported receiving social assistance or welfare (Gilbert, 1993). The risk of being dependent on social assistance is 18% higher for lone mothers without a high school education than for those who have completed secondary school (Kapsalis & Tourigny, 2002).

However, what is most relevant for this study is research by Coelli, Green and Warburton (2007), which reports that high school graduation would reduce the overall welfare receipt of

[11] This is partially due to the fact that welfare systems in the United States focus on lone parents. In comparison, the system in Canada is open to all individuals and family types.

dropouts by 50-75%. Moreover, they report that "[e]ffects are larger for individuals from troubled family backgrounds and low income neighbourhoods" (Coelli et al., 2007, p. 1369). An important aspect to be remembered about this study is that it is focused on the education outcomes of welfare recipients who were exposed to welfare as children. Thus, as the authors acknowledge, the results may be different from estimates for individuals from all backgrounds obtained in other studies. Nevertheless, the results represent the best available evidence to date on the effects of high school education on welfare reductions in Canada.

One cannot conclude that the lack of a high school education is the only explanation for the differences in welfare use between high school graduates and high school dropouts. And yet, as suggested in the research literature, "improvements in the educational attainment of American students hold the potential to sustain the declines in welfare utilization and produce significant savings to the public" (Waldfogel et al., 2007, p. 6). One could also assume that this would hold true in the Canadian context.

Basic Assumptions for Economic Calculations

As Coelli and colleagues note, "[t]he main difficulty in establishing the impact of education on welfare use…is determining the extent to which observed correlations reflect causal impacts" (2007). Moreover, despite producing compelling cost savings for public assistance resulting from improvements in education, Waldfogel and colleagues caution that "…it is likely that even after controlling for these differences there are unmeasured differences, such as ambition, motivation, and talent, that lead both to differences in high school completion and utilization of welfare programs" (2007, p. 10). Because available data sets do not have such measures, the estimates that can be calculated represented the best possible estimates of the net impact of high school education on welfare utilization.

For these calculations, a special data run was generated from the 2004 SLID survey which covers roughly 97% of the Canadian population excluding those who live in the territories, in institutions, on Indian reserves, or on military bases. Each panel of respondents, comprising approximately 15,000 households and 30,000 adults, is surveyed twice a year—once on labour market experiences, educational activity and family relationships, and once on income—for a period of six consecutive years. Because it has been reported that SLID undercounts social assistance expenditures by 20-50% (Kapsalis, 2001;Warburton and Warburton, 2004), using this database prevents any overinflated estimate. In fact, it likely results in an undercounting in this sector.

The annual social assistance costs attributable to high school dropouts were calculated by applying the lower bound of the estimate put forward by Coelli, Green and Warburton (2007). We count in our final calculations 50% of current government expenditures on social assistance for high school dropouts.

Calculations

The direct cost of social assistance for not completing high school is estimated using the following formula:

Cost of social assistance = 50% x average social assistance received by dropouts

According to SLID 2004 data, the aggregate amount of social assistance received by dropouts in 2004 was:
(number of social assistance recipients who are dropouts: 229,031) X
(average amount of social assistance received by dropouts: $7664.77)
= $1.76 billion.

The figures are prorated to $8,460.47 average assistance received per dropout, for an aggregate of $1.94 billion in 2008.

Given the estimated number of social assistance recipients who did not complete high school, the aggregate cost reduction in social assistance would be 50% of $1.94 billion or $968.9 million in 2008. Using the above formula, the cost of social assistance would be reduced by half of $8,460.4, or $4230.26 for each additional high school graduate.

Per Dropout Social Assistance Costs

The following three figures show the cost of social assistance per dropout by province, gender, and aboriginal status respectively. The cost of social assistance at other segregation levels can be found in the technical report. The costs per dropout were highest in Newfoundland ($884) and lowest in Manitoba ($357).

Figure 4. Social assistance costs per dropout by province (estimated from SLID 2004)

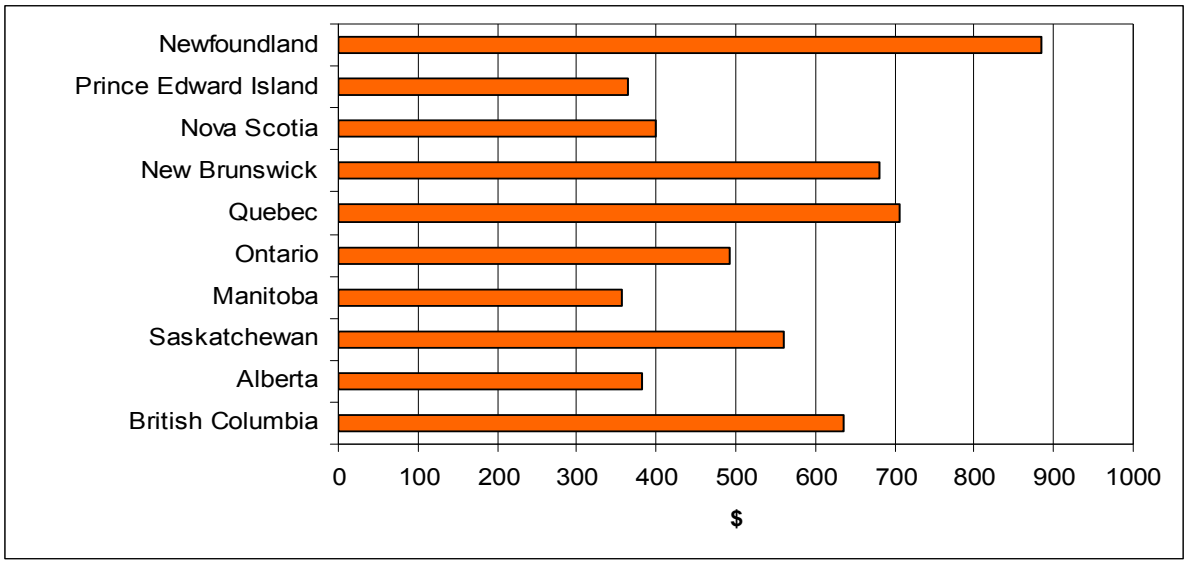
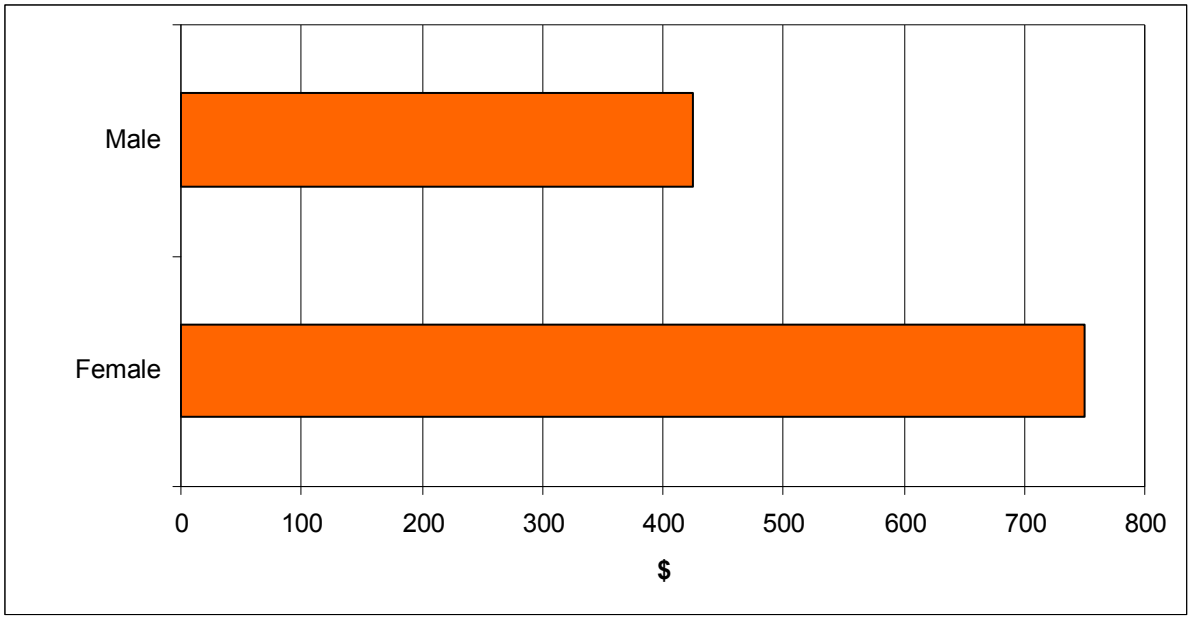
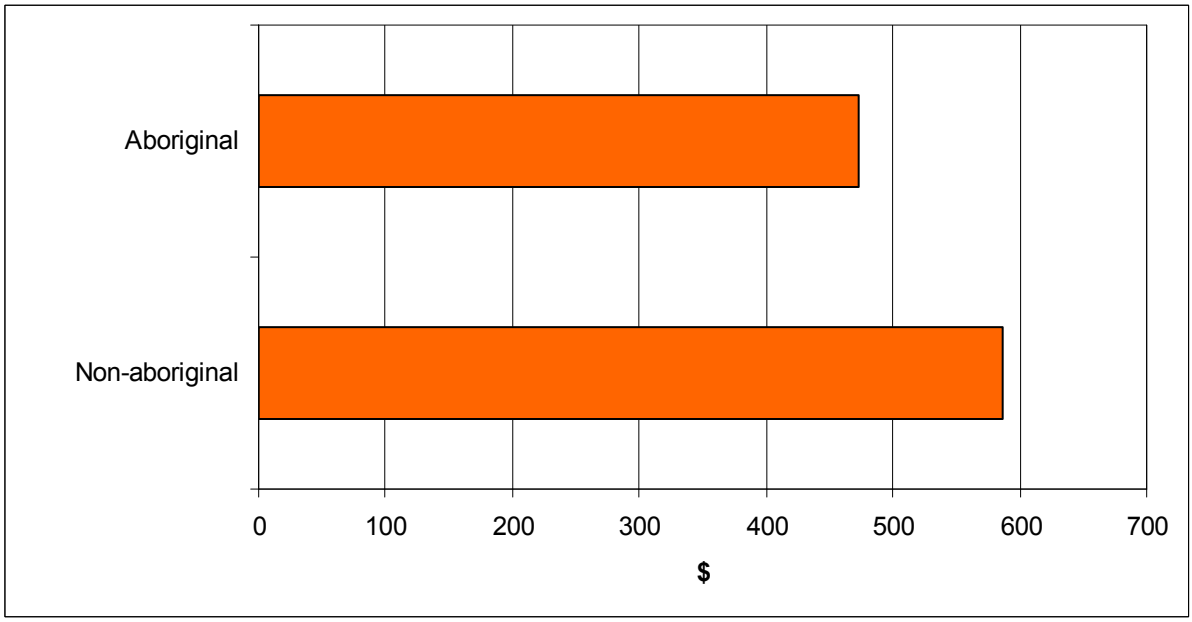


Figure 5. Social assistance cost per dropout by gender (estimated from SLID 2004)



The costs per dropout were higher for females ($751) than for males ($424).

Figure 6. Social assistance cost per dropout by aboriginal identity (estimated from SLID 2004)

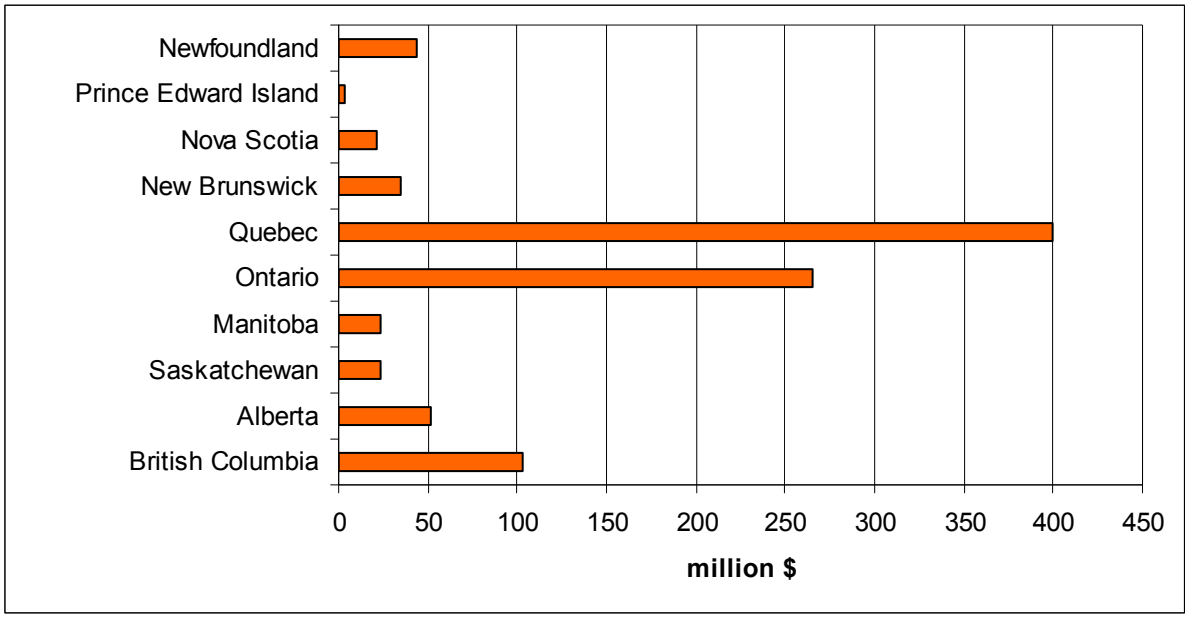


The costs per dropout were higher for non-Aboriginals ($585) than Aboriginals ($473).

Aggregate Social Assistance Costs

The following three figures show the aggregate cost of social assistance by province, gender, and aboriginal status respectively. The aggregate cost of social assistance at other segregation levels can be found in the technical report.

Figure 7. Aggregated social assistance costs by province (estimated from SLID 2004)



Aggregated social assistance costs were highest in Quebec ($399,551,486) and lowest in PEI ($3,124,161). Aggregated social assistance costs were higher for females ($548,320,009) than for males ($399,556,887).

Figure 8. Aggregated social assistance cost by gender (estimated from SLID 2004)

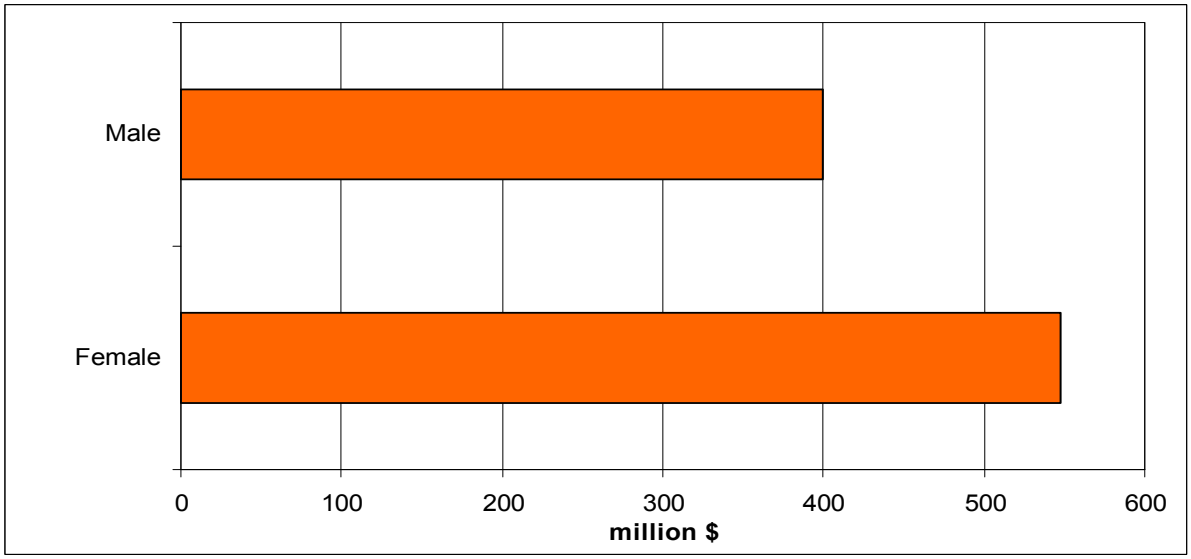
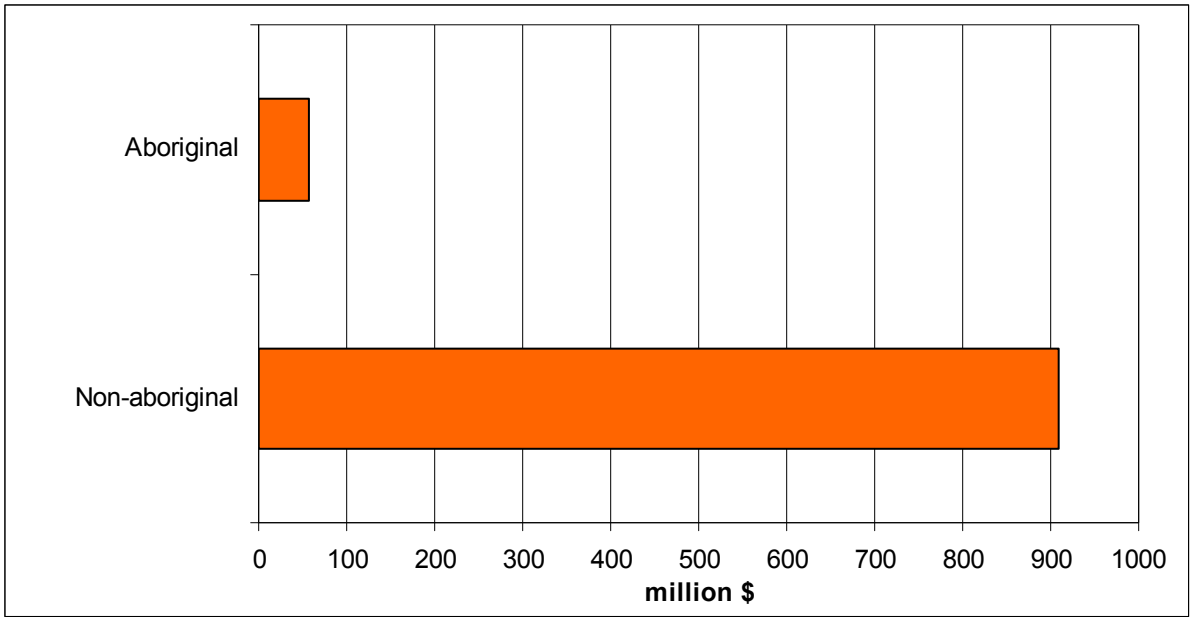


Figure 9. Aggregated social assistance cost by aboriginal identity (estimated from SLID 2004)



Aggregated social assistance costs were higher for non-Aboriginals ($908,204,901) than Aboriginals ($57,759,804).

For comparative purposes, and to get at more detailed population demographics, we intended to use social assistance information from the 2001 Census. However, the estimate of government transfer payment by high school dropouts obtained included other types of benefits (e.g. employment insurance benefit), making it impossible to separate out specific social assistance payments.

Crime

Compared to other areas, less is known about the relationship between schooling and criminal behaviour. From an economics perspective, crime is "a negative externality with enormous social costs" (Moretti, 2005, p. 1). Compelling reasons exist why education may reduce crime. According to Lochner and Moretti, "[b]y raising earnings, education raises the opportunity cost of crime and the cost of time spent in prison. Education may also make individuals less impatient or more risk adverse, further reducing the propensity to commit crimes" (2003, p. 27). Moreover, Levine, Emery & Pollack (2007) argue that because most crime is committed in early adulthood (leading to arrest and incarceration), the economic consequences are persistent and therefore high school graduation may present substantial savings (2007). At the same time, while studies have shown that high school dropouts are at increased risk of crime and deviance, others have only shown an inhibiting effect, and others yet, have rejected any meaningful relationship between dropping out of high school and criminal behaviour (Drapela, 2005).

The empirical evidence regarding the relationship between education and crime is strongest when considering rates of incarceration (Levine, Emery & Pollack, 2007). A number of studies have profiled the academic characteristics of incarcerated youth and adults identifying the high rate of high school dropouts among the prison population in the United States (Bonczar, 2003; Freeman, 1996; Harlow and Department of Justice, 2003; McCauley, 2002; Pettit & Western, 2004; The Sentencing Project, 2004). According to these studies, approximately 75 to 80% of America's state prison inmates were high school dropouts. High school dropouts have also been found to be 3.5 times more likely than high school graduates to be arrested in their lifetime (Alliance for Excellent Education, 2003). Although they represent less than 20% of the American population, they make up 37% of federal inmates, 54% of state inmates, 38% of local inmates, and 33% of persons on probation. In his analysis of high school dropouts, Barton argues that "[a] steadily expanding young prison population will be drawing disproportionately from this population and will be returning similarly undereducated young people back to society, where they will face the additional employment handicap of having been in prison" (2005, p. 40).

In the Canadian context, according to Correctional Services Canada, Grade 7 is the average education level of newly admitted offenders who are serving sentences of two years or more ("Literacy and Justice"). Non-graduates represent 34% of the population but make up 74% of the prison population (Ungerleider & Burns, 2002). The conclusions that can be made from these statistics are that high school dropouts are overly represented in the prison population both in the United States and Canada.

Research has also furthered the understanding of the link between education and crime by examining the relationship between crime and time spent in school. A number of key studies conclude that the latter does in fact significantly reduce criminal activity (Beauvais, Chavez, Oetting, Deffenbacher & Cornell, 1996; Farrington et al., 1996; Farrington, Gallagher, Morley & Ledger, 1986; Gottfredson, 1985; Tracey, Wolfgang & Figlio, 1990;). One Canadian study found that education is the second best predictor of incarceration[12] (Healey et al., 2003). A few studies have rejected any causal effect of dropping out of high school and subsequent crime (Krohn, Thornberry, Collins-Hall & Lizotte, 1995; Sweeten 2006; Sweeten, Bushway & Paternoster, 2005; Witte, 1997). Others yet report that a causal effect exists (Jarjoura, 1996, 1993; Lochner, 2003; Thornberry, Moore & Christenson, 1985).

These mixed results can be explained by a key research challenge: unobserved characteristics affecting schooling decisions are likely to be correlated with unobservables influencing the decision to engage in crime (Lochner & Moretti, 2003). Nevertheless, current research originating in the United States is convincingly a substantial impact of education on crime. This is being done by focusing on changes in state compulsory attendance laws across states over time, with the assumption that "changes in compulsory attendance laws can be used to isolate the causal effect of schooling on crime from all the other determinants of criminal behaviour that might pollute a simple correlation" (Moretti, 2005, pp. 1-2).

[12] The best predictor being whether a person has been in jail previously.

This approach is reflected in a recent study by Lochner and Moretti (2004). Through their analysis of individual data from the US Census, state level data on arrests from the Uniform Crime Reports, and self-reported data on crime and incarceration from the National Longitudinal Survey of Youth, Lochner and Moretti claim that schooling significantly reduces the probability of incarceration and the incidence of arrest for crimes such as murder, assault and motor vehicle theft. At the *Social Costs of Inadequate Education* symposium, Moretti argued that a one-year increase in the population's overall level of schooling reduces murder and assault by almost 30%, motor vehicle theft by 20%, arson by 13%, and burglary and larceny by approximately 6% (2005).[13]

Lochner and Moretti (2004) estimate that if the United States increased its high school graduation rate by 1% for all men 20-60 years old, the state would save as much as $1.4 billion a year in reduced costs from crime, or between $1,170- $2,100 per additional male high school graduate. This represents a positive externality, or external benefits of crime reduction of between 14-25% of the private return to high school education. These authors therefore conclude that "[g]iven the large social costs of crime, even small reductions in crime associated with education may be economically important" (Lochner & Morretti, 2004, p. 1).

Basic Assumptions for Economic Calculations

Because no similar research has been conducted in the Canadian context, we draw on Lochner and Morretti's finding.[14]

Calculations

According to Lochner and Moretti, the lower bound of the positive externality of crime reduction by completing high school is 14% of the private return to high school education in US. This figure is likely lower in Canada where crime and incarceration rates are lower. To account for this difference, we scaled Lochner and Moretti's figure by the ratio of per capital criminal justice expenditures in Canada and the U.S.

<u>Steps in the calculation</u>

1. Estimate the return to high school graduation.

- *Average income of graduates = $28,625 (adapted from Statistics Canada, special tabulation, unpublished data, Census 2001).*
- *Average income of non-graduates = $25,688 (adapted from Statistics Canada, special tabulation, unpublished data, Census 2001).*

[13] These estimates are not race specific; these were not available.

[14] It is important to keep in mind, however, that for comparative purposes, approximately 17% of the adult population aged 20 years and over in Canada are high school dropouts compared to 16% in the U.S. (Mang, 2008).

The difference in income between graduates and dropouts:

$28,625 - $25,688 = $2,937

Adjust the difference to 2008 dollar using 2.5% inflation rate:

$2,937 * 1.025^{7} = $3,491.17

2. Estimate the Canadian version of the 14% lower bound.

- *Criminal justice expenditures for Canada in 2003 = $13 billion (Department of Justice Canada, 2005)*
- *Canadian population (all ages both sexes) in 2003 = 31,676,077 (CANSIM, v4666668 Canada)*
- *Per capita criminal justice cost for Canada in 2003: $13 billion / 31,676,077 = $410.40*
- *Per capita criminal justice expenditure for US in 2003 = $638 (Hughes, 2006)*
- *2003 average exchange rate 1 USD = 1.4 CDN*
- *US per capita criminal justice cost in Canadian dollars: $893.20*

Lower bound of the positive externality of crime reduction by completing high school in the US is 14% (Lochner & Moretti, 2004).

Public rate of return of crime reduction in Canada:

*14% * ($410.40/$893.20) = 6.43%*

3. Estimate of the decreased cost of crime reduction associated with completing high school in Canada.

*$3,491.17 * 6.43% = $224.48 per dropout*
Male dropout population in 2004 = 1,561,845 (CANSIM)

*In aggregate terms, we take $224.48 * 1,561,845 to estimate a cost of $350 million annually in the Canadian context.*

As in Lochner and Moretti (2004), females are excluded from these calculations although as in the United States, we assume that the educational positive externality for them would be smaller given that they commit, on average, fewer crimes in Canada.

Labour and Employment

As Levin et al. correctly note, "[o]ne of the best documented relationships in economics is the link between education and income: more highly educated people have higher incomes" (2007, p. 6). An international body of literature indicates a strong relationship between levels of

education, labour force status, and income (Ahituv & Tienda, 2004; Barrow & Rouse, 2005; Campbell, 2003; Card, 1999; Carneiro & Heckman, 2003; Easton, 2006; Fry & Pew Hispanic Center, 2003; Frank, 1997; Grelet, Mansuy, Thomas & Centre d'études et de recherches sur les qualifications, 2001; HRDC, 2000; Kaplan-Leiserson, 2004; Lafleur, 1992; Lamb, Dwyer, Wynn, 2000; Llagas & National Center for Education Statistics, 2003; McMillan & Marks, 2003; Oreopoulos, 2006; Prause & Dooley 1997; Ressources humaines et travail Canada, 1993; Rumberger & Lamb, 2003; Sadler, Nguyen, Doan, Au & Thomas, 1998; Scott, Bernhardt & Columbia University, 2000; Sum, Khatiwada, Pond, Trub'skyy, Fogg & Palma, 2003; Vanttaja & Järvinen, 2006;). In essence, the findings of these studies demonstrate that high school non-completers experience increased unemployment and decreased income earnings when compared to those persons who have completed a high school education.

The labour and employment outcomes have both public and private consequences and costs. In terms of the public realm, high school dropouts have lower incomes which translate into less tax revenues for the state and fewer contributions made to employment insurance premiums. In addition, due to their disproportionate rates of unemployment, they rely more on the system for employment insurance and pay less employment insurance premiums. Privately, high school dropouts have lower annual and life-time earnings which results from a lack of requisite knowledge and skills. They are not employed to their fullest potential and this is reflected in their ability to find jobs as well as the level of the compensation once they become employed (Rouse, 2005).

Researchers have developed numerous approaches to measure the causal effect of education on income and the evidence clearly demonstrates that controlling for all other factors, and in particular natural ability, the economic value of education is significant (Rouse, 2005).[15] Rouse, in her widely cited work *The Labour Market Consequences of an Inadequate Education* asserts that "[t]he empirical literature suggests that education has a causal effect on earnings" (2005, p. 21). According to Rouse, the mean difference in income between those with and without school degrees is "a fairly good approximation to the causal relationship" (2005, p. 2) between schooling and income.

Previous research points to comparable conclusions. For example, Carneiro and Heckman (2003) found the mean rate of return of one-year of schooling to be more than 10% percent and even as high as 17-20% for the individual. Ferrer and Riddell conclude that US research find that "an earnings premium of 9-13% in wages usually accompanies high school graduation" (2001, p. 6). The US Bureau of Census reported that in 2004 "high school dropouts made $9,671 less than high school graduates" (2005). Similar conclusions have been made by Levin et al.: "Empirical research has …established that the earnings benefits from education are genuine. That is, they are not attributable either to the possession of an education credential or to unmeasured characteristics such as ability or aptitude" (2007, p. 21).

[15] For a detailed overview of the three main approaches to estimate the causal effect of education on labour market outcomes, see Cecilia Rouse (2005).

In the Canadian context, it has been argued that "[a] serious consequence of dropping out is that it not only impedes labour market success, it cuts off future possibilities to improve labour market outcomes because dropouts do not have the skills or credentials to pursue further education and training" (HRDC, 2000, p. 42). Research provides strong support for the influence of years of schooling on wages. While many studies have focused on the effects of years of schooling and the impact of a university education (e.g. Bar-Or, Burbidge, Magee & Robb, 1995; Coté & Sweetman, 1997; Vaillancourt & Bourdeau-Primeau, 2000), some researchers have also captured the specific effects of high school education on earnings (Ferrer & Ridell, 2001; Lemieux, 2006; Oreopoulos, 2006, 2005; Vaillancourt & Bourdeau-Primeau, 2000).

The OECD reports that earnings of Canadian 25- to 64-year-olds with less than upper secondary education are 22% lower than those of upper secondary graduates (OECD, 2006a). Ferrer and Riddell report that "high school graduation is associated with an increase in weekly earnings of 4-6% relative to those who did not complete high school…" (2001, p. 20). Specifically, high school graduation increases male income by 4% and female income by 6% relative to those who do not graduate from high school (2001, p. 8). Moreover, they argue that previous studies that dismissed the effects of substantial earning gains associated with completed level of schooling such as a high school diploma lacked "sufficiently detailed data to estimate the magnitude of credentials" (2001, p. 11). Significantly, educational differences also explain approximately 30% of the occupational differences between Aboriginal and non-Aboriginal workers. Low education has been identified as the key factor in explaining the relatively weak performance of Aboriginal Canadians in the labour market (Comfort, DeJong & Kozij, 2005).

In the United States it has been reported that 40% of adults who dropped out of high school are employed as compared to 60% who completed high school (Alliance for Excellent Education, 2003). In Canada, Ross and Shillington reported that a male with less than a high school education has on average 5.8 years of unemployment during his 40-year work life in contrast to 3.6 years among males with grade 12 (1990). In 2004, the unemployment rate for people aged 25-44 who did not have a high school diploma was 12.2%, compared to 6.8% for those with a high school education (Bowlby & McMullen, 2005). According to the latest figures available from the OECD for Canada, only 57% of 25- to 64-year-olds with less than upper secondary school education are employed in 2004, compared to 77% for those with upper secondary or postsecondary non-tertiary education (OECD, 2006a).

Costs that are calculated in this policy sector are:

- Private annual and life time earnings (high school dropout vs. high school graduate)
- Annual and life time tax revenue loss to the state
- Annual and life time revenue loss to the state in employment insurance premiums
- EI payments by the state

Basic Assumptions for Economic Calculations

I. Private Annual Earnings

Educational attainment was divided into two categories, namely high school diploma and some high school or less. The population group was restricted to individuals aged 20 to 54. Workers 55 and over were excluded since their performance in the labour market may be affected by early retirement decisions (Morissette & Johnson, 2004; Morissette, Ostrovsky & Picot, 2004).

Following Rouse's assertion that the mean difference in income between those with and without school degrees "is a fairly good approximation to the causal relationship" (2005, p. 2), data from SLID (2004) and Census (2001) were used to examine the differences in income levels.

In addition, using the methodology of both Catterall (1987) and Cohen (1998), a 25% selection bias was adopted to account for the differences in earnings between high school graduates and dropouts. This figure, used in both studies, assumes that if current dropouts were to complete a high school education they would attend college at the same rate and complete the same years of schooling as current high school graduates. The costs were adjusted by costs savings – e.g. the income that dropouts earn while working rather than attending school and reduced by the value of part-time summer employment of graduates and costs of school books for students.

For comparative purposes, we also drew on Ferrer and Riddell's research that illustrates that "high school graduation is associated with an increase in weekly earnings of 4-6% relative to those who did not complete high school…" (2001, p. 20). We therefore assumed 5% of average wage earnings of dropouts multiplied by the number of dropouts. We compare these findings to the calculations using Rouse's more straightforward methodology.

II. Private Work Life Earnings

Using the above calculations, estimates of work life earnings were also made to illustrate the earnings differences between high school dropouts and those whose complete high school. These are illustrative and may not necessarily predict actual future earnings with complete accuracy.

An individual's work life earnings are the sum of each year's earnings over that person's hypothetical working life assuming uninterrupted labour force participation and full employment from the ages of 20-54. To be consistent with all other calculations, a 2.5% discount rate was used to calculate the value of future earnings.

III. State Tax and EI Costs

Based on these calculations, we were able to calculate annual and lifetime tax revenue losses to the government. In addition, losses to employment insurance contributions were also calculated.

Finally, a custom run was requested from Statistics Canada (SLID 2004)) to determine the proportion of EI recipients who are high school dropouts and what annual amount of money could be saved if all those who are high school dropouts in receipt of EI benefits were to become high school graduates. Because no reliable data exists on the effects of education on the receipt of employment assistance, we draw on the research findings documenting the effects of high school education on social assistance. We do this because of the substantial overlap in social assistance and employment insurance recipients. For example, referencing the Auditor General of Canada, McIntosh and Boychuk report that "[w]elfare statistics dating back to the beginning of the Canada Assistance Program show a strong link between the number of people on welfare and the number of people who are unemployed" (2000, p. 101).

Calculations

I. Private Annual Earning Loss

The annual earning loss for not completing high school is estimated using the following three equations:

Method 1:

> *Annual earning loss = average employment income of graduates – average employment income of dropouts*

This equation is based on Rouse's assertion of the mean difference in employment income between graduates and dropouts.

Method 2:

> *Annual earning loss = 75% x (average employment income of graduates – average employment income of dropouts)*

This equation is based on Catterall and Cohen's methodology of accounting for a 25% selection bias on the mean difference.

Method 3:

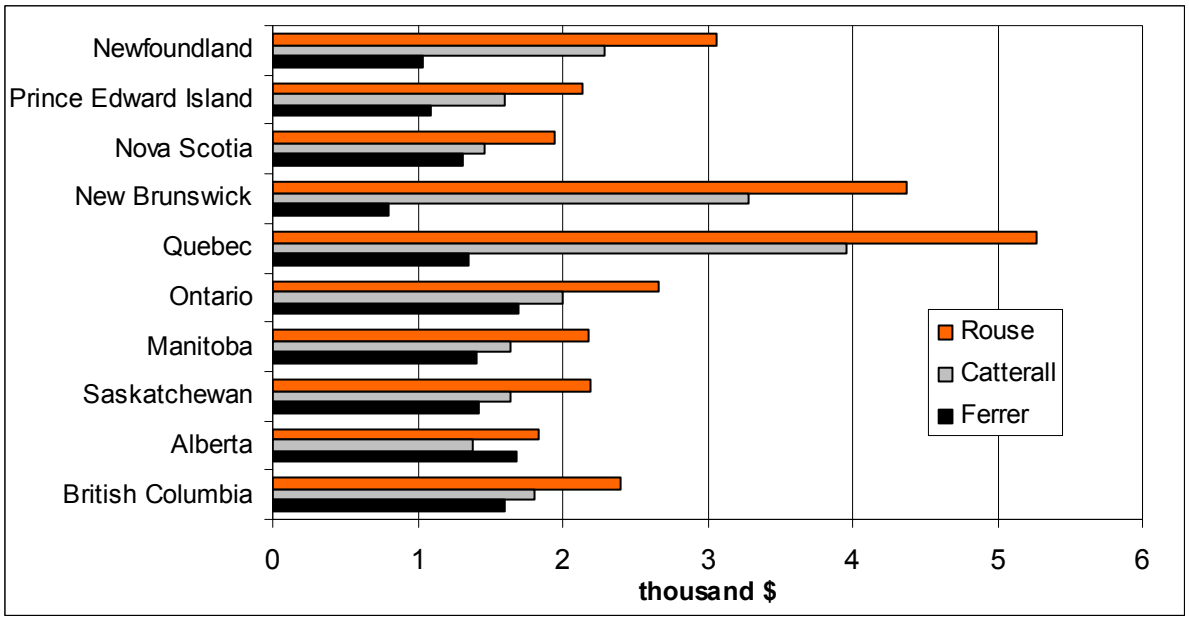
> *Annual earning loss = 5% x average employment income of dropouts*

This equation is based on Ferrer and Riddell's research.

Information on earnings was obtained from a Census 2001 custom run. We adjusted these 2001 earnings to 2008 values using an inflation rate of 2.5%. Referring to the first and second equations, the raw difference on annual earnings between graduates and dropouts was $3,491.17, which then translates into ($3,491.17 * 0.75) = $2,618.38 by taking the 25% selection bias into account. Based on the third equation, a dropout earns $1,526.85 less per annum for not completing high school. In aggregate terms, the estimated annual earning losses are approximately $10.3 billion, $7.7 billion, and $4.5 billion using the three equations.

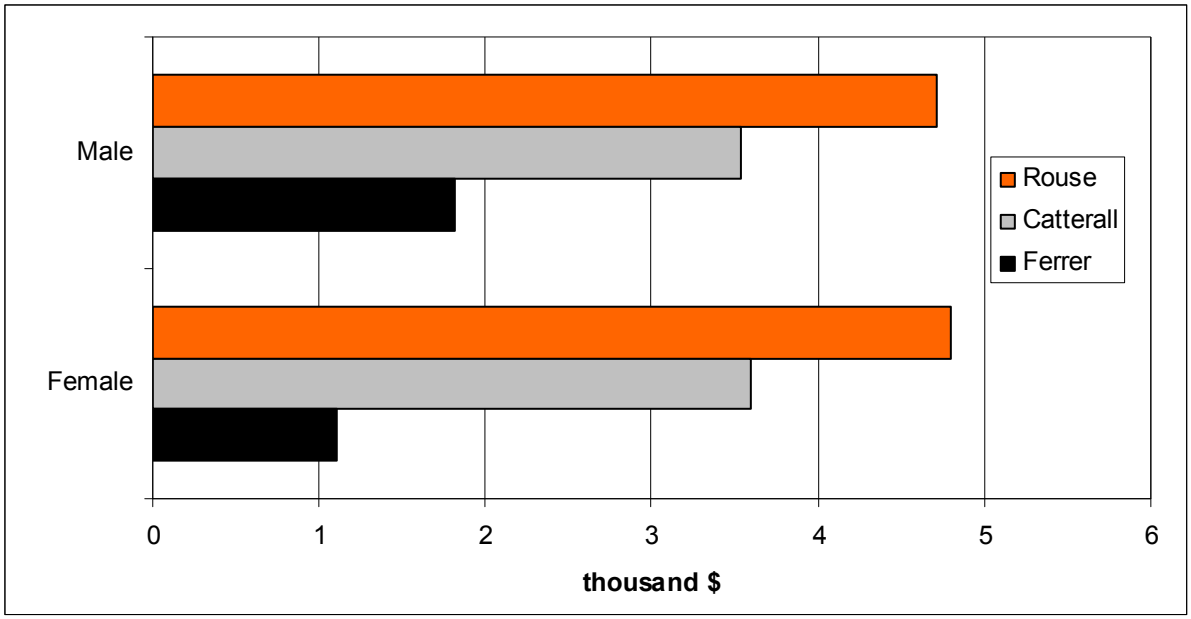
The following two figures show the annual earning losses by province and gender per dropout using each of the above equations. Estimates at other segregation levels can be found in the technical report.

Figure 10. Annual earning losses per dropout by province (estimated from Census 2001)



According to Rouse, the biggest earnings loss occurs in Quebec ($5,270) and the smallest loss in Alberta ($1,840). According to Ferrer, in turn, the biggest earnings loss occurs in Ontario ($1,698), and the smallest loss in Newfoundland ($1,041). Ferrer's estimate exhibits much less variation among provinces than Rouse's and Catterall's estimates.

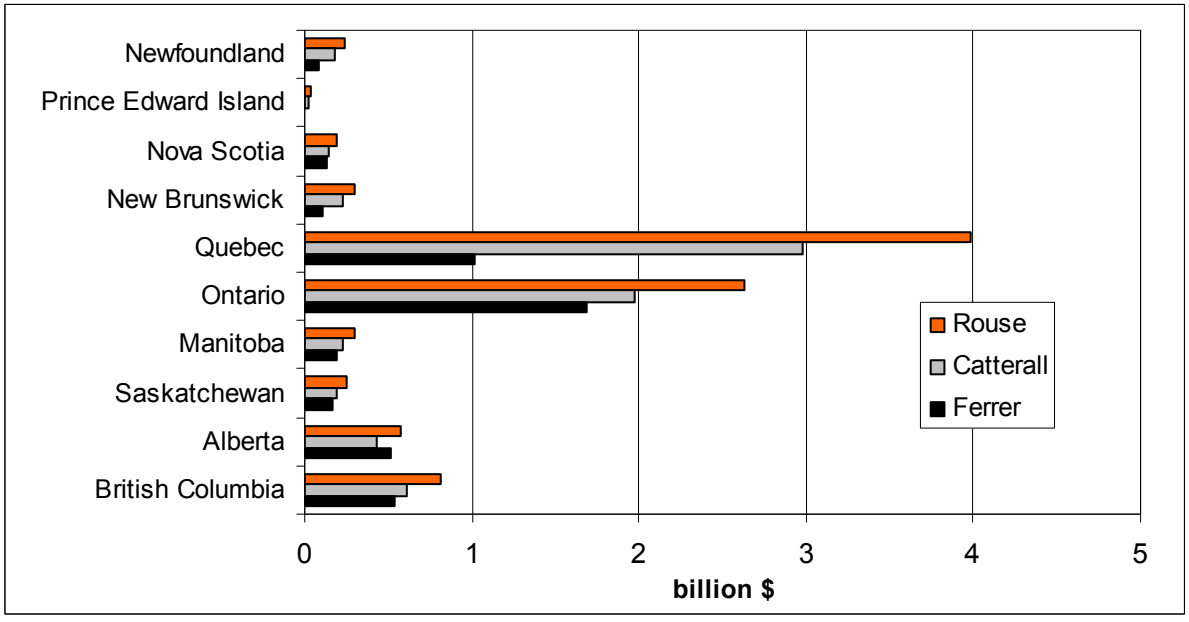
Figure 11. Annual earning losses per dropout by gender (estimated from Census 2001)



According to Ferrer, males have on average ($1,816) bigger earning losses than females ($1,107). According to Rouse, females ($4,792) suffer bigger earning losses than males ($4,716).

The following three figures show the breakdown of the aggregate annual earning losses by province, gender, and Aboriginal status using each of the above equations. Estimates at other segregation levels can be found in the technical report.

Figure 12. Aggregate annual earning losses by province (estimated from Census 2001)



According to Rouse, aggregate annual earning losses are largest in Quebec ($3,978,539,000) and smallest in P.E.I. ($34,706,000). Ferrer's method, in contrast, yields the largest aggregate earning losses for Ontario ($1,680,922,000) and the smallest for P.E.I. ($17,820,000).

Figure 13. Aggregate annual earning losses by gender (estimated from Census 2001)

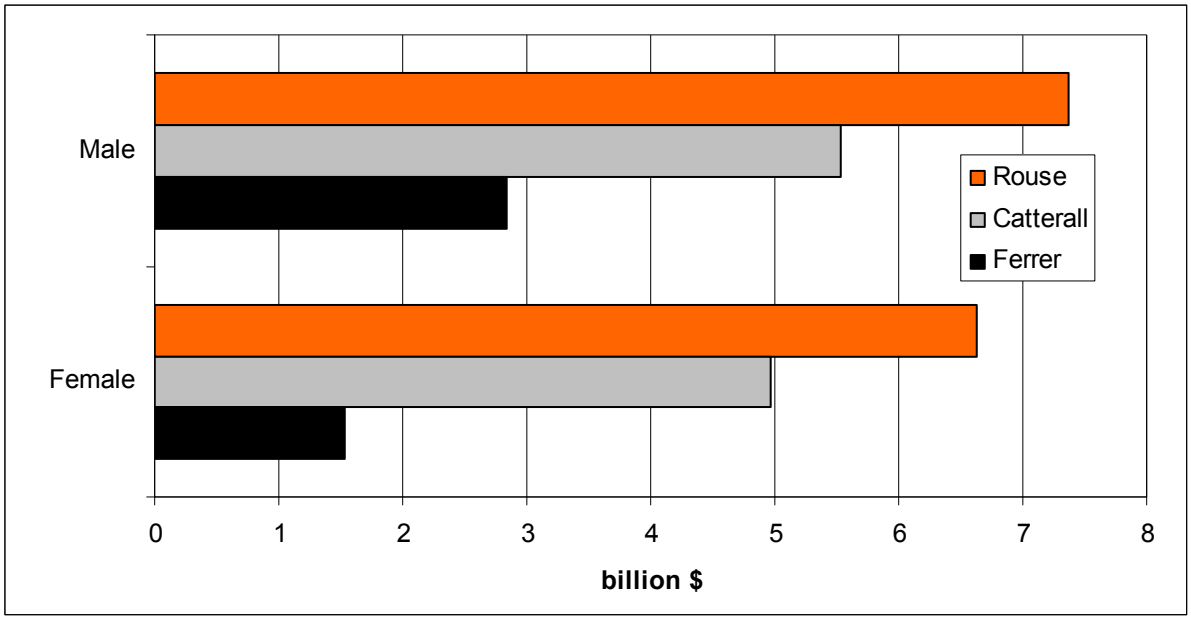
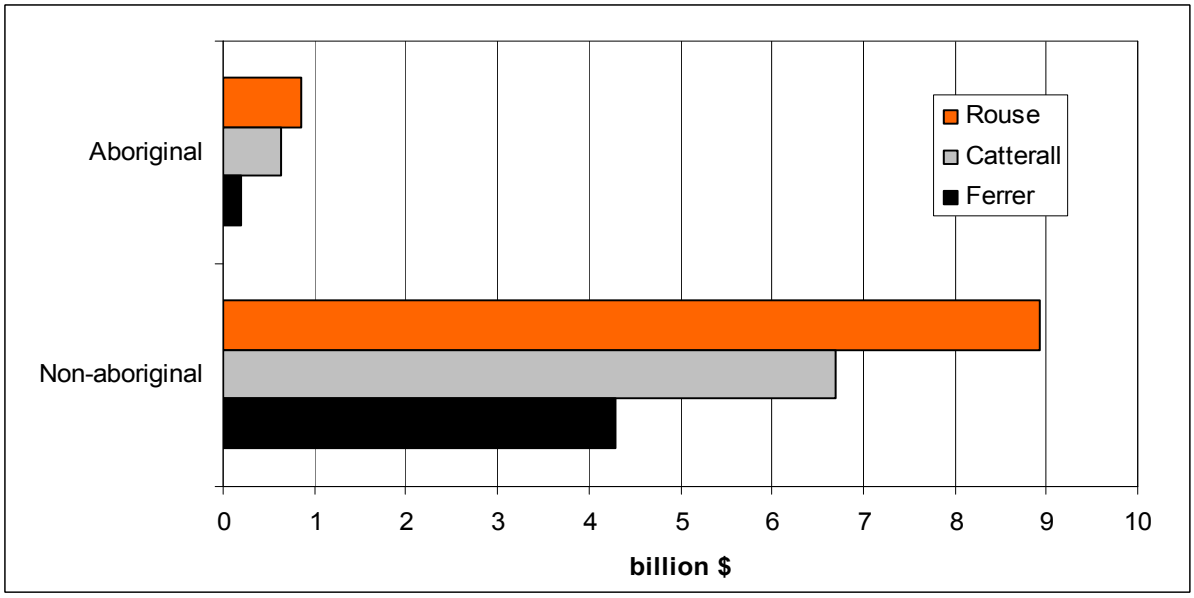


Figure 14. Aggregate annual earning losses by Aboriginal identity (estimated from Census 2001)



Based on SLID 2004 data and the above equations, the estimated annual earning losses are:

$24,147.29 - $21,984.03 = $2,163.26
*($2,163.26 * 0.75) = $1,622.45,*
and (5% x $21,984.03) = $1,099.20 per dropout in 2004.

Prorated amounts for 2008 yield losses of $2,387.83, $1,791.18 and $1,213.52. In aggregate terms, using SLID (2004), the annual earning losses are $3.62 billion, $2.71 billion, and $1.84 billion respectively, or $4 billion, $3 billion, and $2.03 billion respectively when prorated for 2008. Figures showing the breakdown of the aggregate annual earning losses by province and gender[16] and estimates at other segregation level can be found in the technical report.

II. Private Work Life Earnings

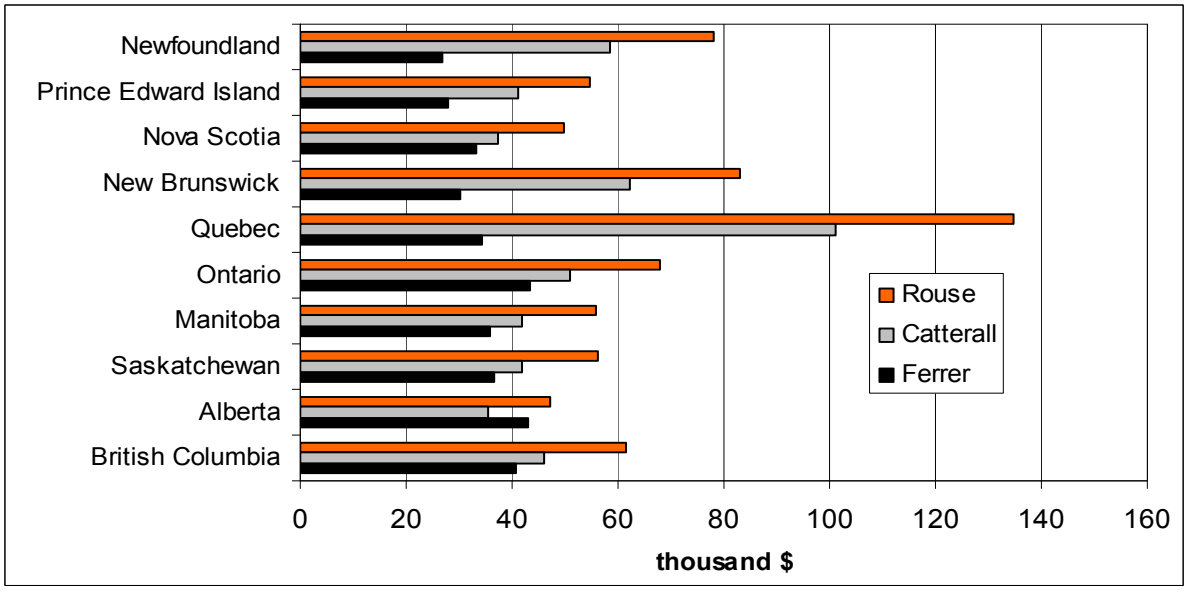
The estimated lifetime earning loss by not completing high school is the sum of the present value of additional earnings over 35 years (assuming lifetime earnings starting from age 20 and up to 54), shown by the following equation:

$$\textit{Lifetime earning loss} = \sum_{0}^{35} \frac{\text{Annual earning loss} \times 1.015^{t}}{1.025^{t}}$$

The estimated earning losses are adjusted by a 1.5% productivity growth per year and a 2.5% discount rate. Based on Census data, the estimated lifetime earning losses are $ 104,222.50, $78,167, and $45,579 per dropout. In aggregate terms, the estimated lifetime earning losses are $307 billion, $230 billion, and $134 billion.

The following three figures show the work life earning losses by province, gender, and aboriginal status per dropout using the three equations. Estimates at other segregation levels can be found in the technical report.

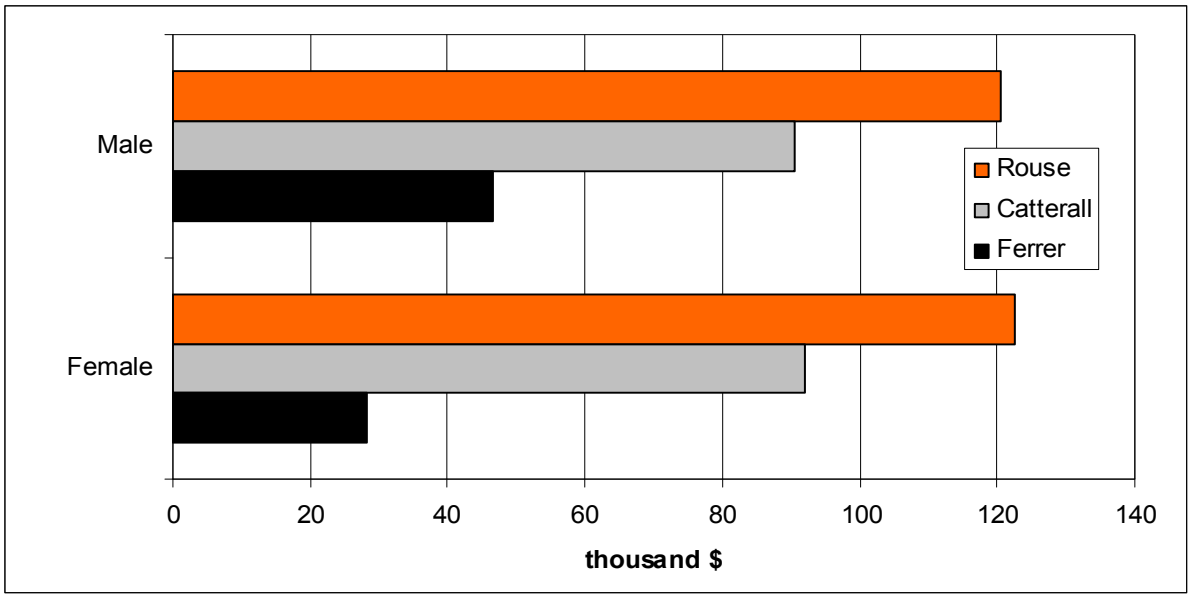
Figure 15. Worklife earning loss per dropout by province (estimated from Census 2001)



[16] Estimate of aggregate annual earning loss for aboriginal was not available.

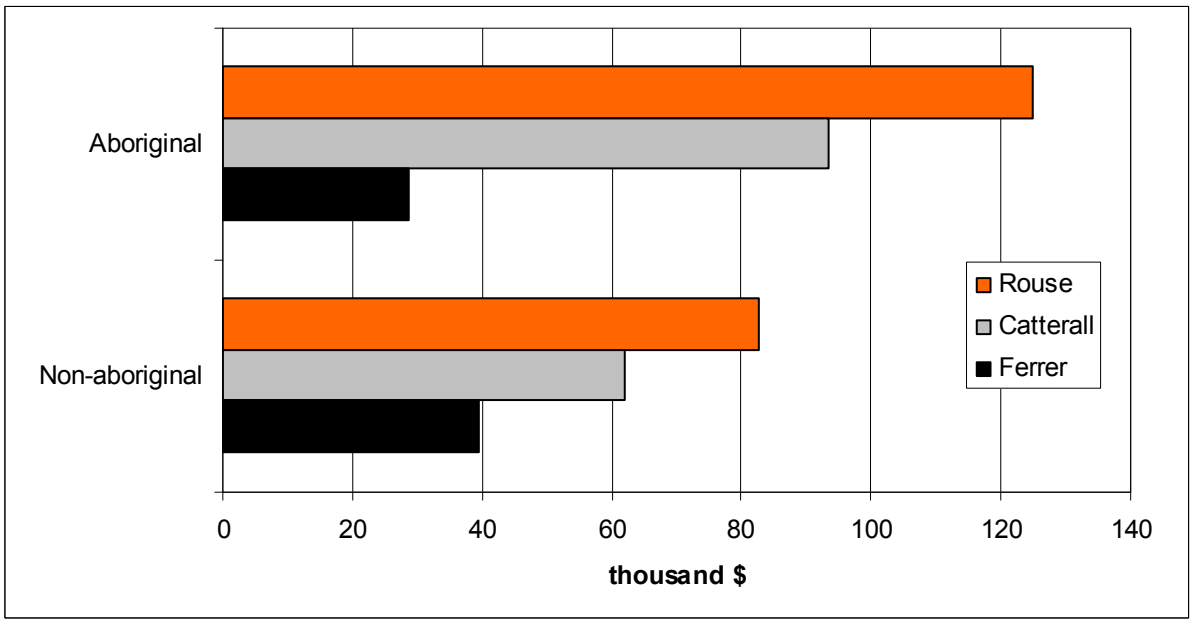
Both Rouse and Catterall estimate the biggest worklife earning losses for Quebec ($157,309 and $117,982), and the smallest loss for Manitoba ($65,117 and $48,838). Ferrer, in contrast, estimates the biggest loss occurs in Ontario ($50,703), and the smallest loss in Newfoundland ($31,075). Ferrer's estimate exhibits much less variation across provinces than Rouse's.

Figure 16. Worklife earning loss per dropout by gender (estimated from Census 2001)



Ferrer's estimate yields a larger worklife earning loss for males ($54,219) than female ($33,016), while Rouse estimates female worklife earning loss to be slightly higher for females ($143,045) than males ($140,774).

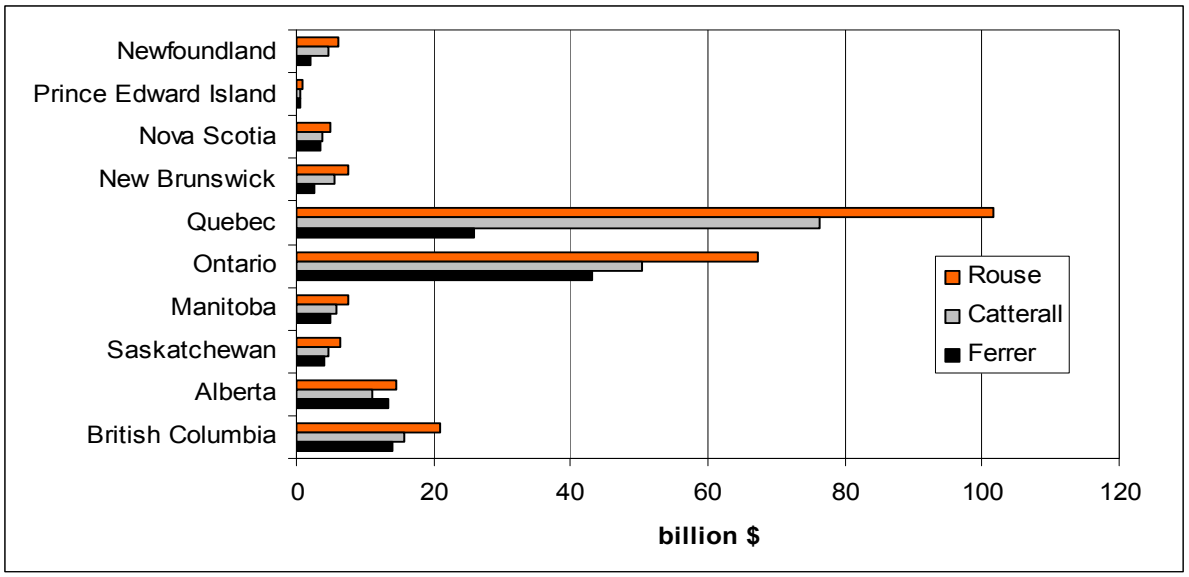
Figure 17. Worklife earning loss by Aboriginal identity (estimated from Census 2001)



Using Ferrer's method, non-Aboriginals ($46,183) have a larger worklife earning loss than Aboriginals ($33,416), while Rouse yields markedly larger losses for Aboriginals ($145,634) than non-Aboriginals ($96,309).

The following three figures show the breakdown of the aggregate worklife earning losses by province, gender, and aboriginal status using the three equations. Estimates at other segregation levels can be found in the technical report.

Figure 18. Aggregate worklife earning loss by province (estimated from Census 2001)



Aggregate worklife earning losses are estimated to be largest in Quebec ($118,760,912,000) and smallest in P.E.I. ($1,035,979,000), according to Rouse, and largest in Ontario ($50,176,170,000) and also smallest in P.E.I. ($531,948,000), according to Ferrer.

Figure 19. Aggregate worklife earning loss by gender (estimated from Census 2001)

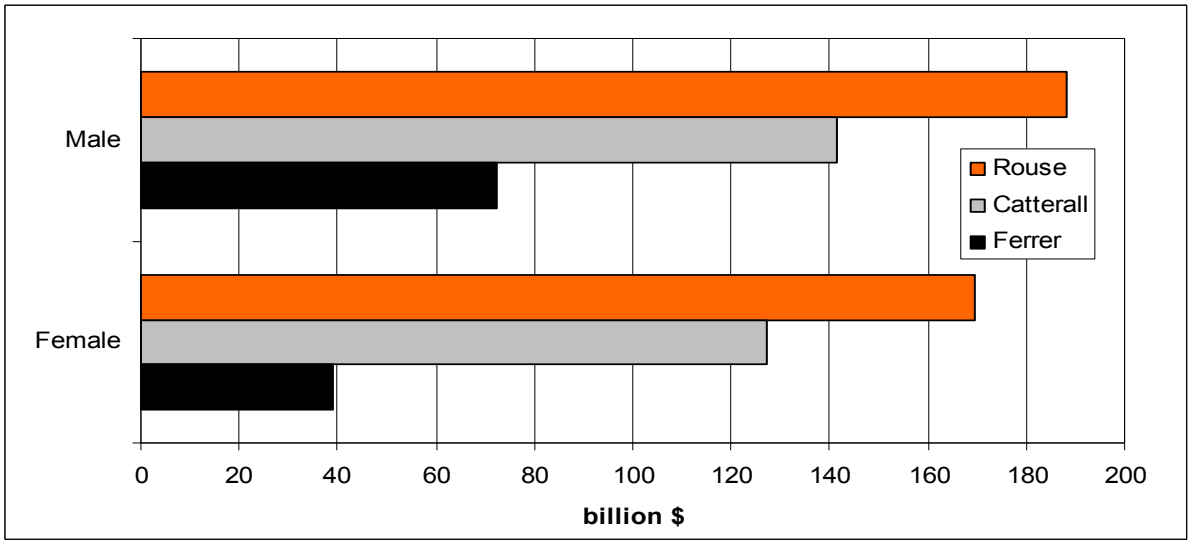
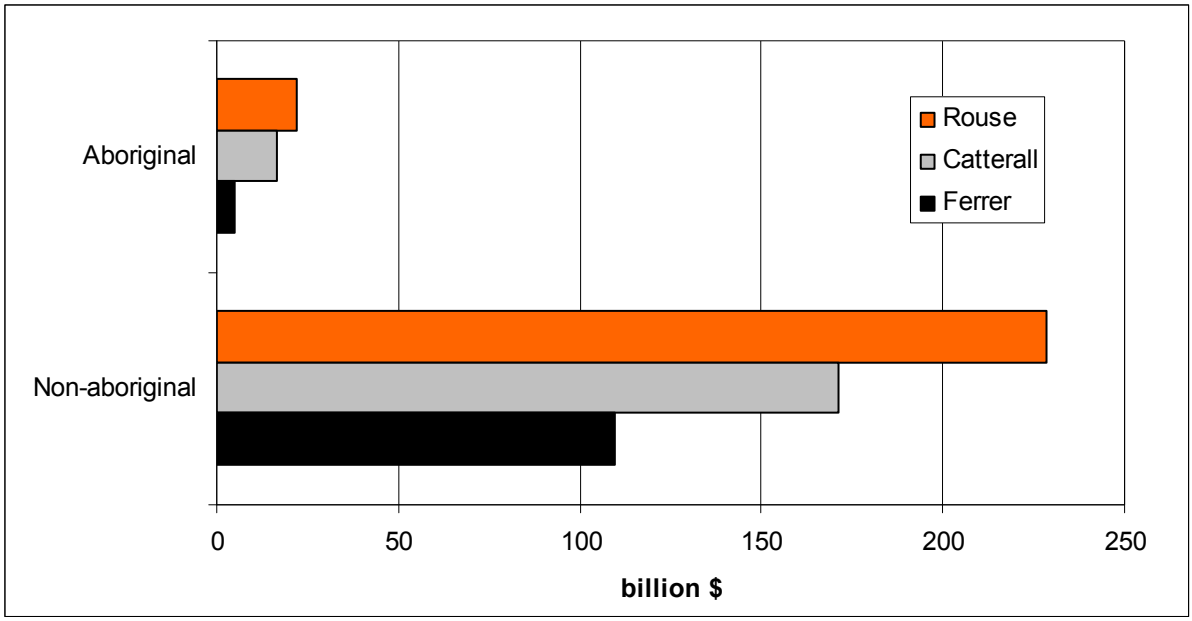


Figure 20. Aggregate worklife earning loss by aboriginal identity (Census 2001)



For comparison, using SLID data, the estimated lifetime earning losses in aggregate terms are $121.7 billion, $91.3 billion, and $61.9 billion. Based on SLID data, the estimated lifetime earning losses are $72,785.37, $54,589, and $36,985 per dropout. SLID figures show the worklife earning loss per dropout by province, gender, and aboriginal status using the three equations and estimates at other segregation level can be found in the technical report.

III. Public Annual and Lifetime Tax Revenue Loss to the State

The annual and lifetime tax revenue loss to the state for not completing high school are estimated using the following formulas:

*Annual tax revenue loss = Annual earning loss * average tax rate by high school completers*

$$\textit{Lifetime tax revenue loss} = \sum_{0}^{35} \frac{\text{Annual tax revenue loss} \times 1.015^{t}}{1.025^{t}}$$

The rationale for using the income tax rate of completers is that if a dropout completed high school and earned back the earning loss for not completing the high school, then this portion of income is basically earned by a completer such that the income tax rate of completers should be applied. As in lifetime earnings calculation, the estimated lifetime tax revenue loss is the sum of present values over 35 years based on a 1.5% productivity growth per year and 2.5% discount rate.

Since Census 2001 did not collect information on tax, the calculations on tax revenue loss are based on SLID 2004 data. The average income tax rate by high school completers is obtained from average after-tax income of completers divided by average total income before taxes by completers.

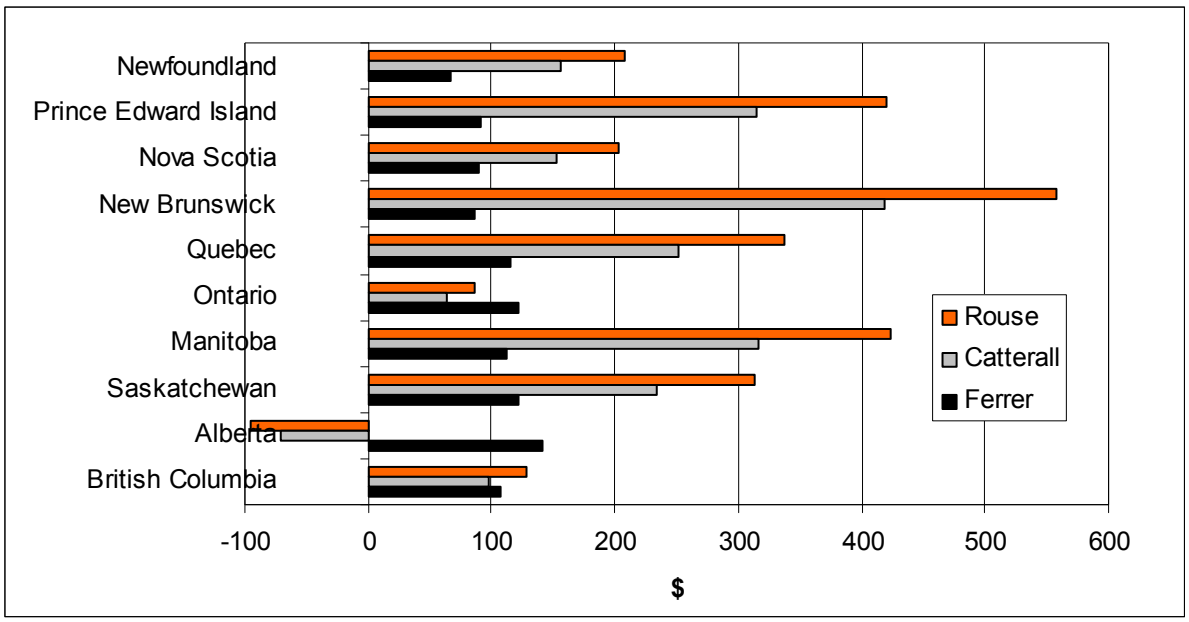
Using the estimated annual losses in earnings for not completing high school in the preceding section, we estimate the annual tax revenue losses to be (estimated annual loss in earnings for not completing high school) * (average tax rate by high school completers) = $225.77, $168.50, and $114.54 per dropout.

Lifetime tax revenue losses would be $6,881.86, $5,161.72, and $3,496.98 per dropout respectively.

In aggregate terms, annual tax revenue losses were $376.7 million, $282.5 million, and $191.4 million, and lifetime tax revenue losses were $11.51 billion, $8.63 billion, and $5.85 billion.

The following three figures show the annual tax revenue loss per dropout by province, gender, and aboriginal status using the three equations. Estimates at other segregation level can be found in the technical report.

Figure 21. Annual tax revenue loss per dropout by province (estimated from SLID 2004)



Rouse estimates yield the biggest annual tax revenue loss per dropout for New Brunswick ($557.27) and produce a gain for Alberta (-$95.81). In contrast, Ferrer estimates yield the largest losses for Alberta ($140.97) and the smallest loss for Newfoundland ($67.18).

Figure 22. Annual tax revenue loss per dropout by gender (estimated from SLID 2004)

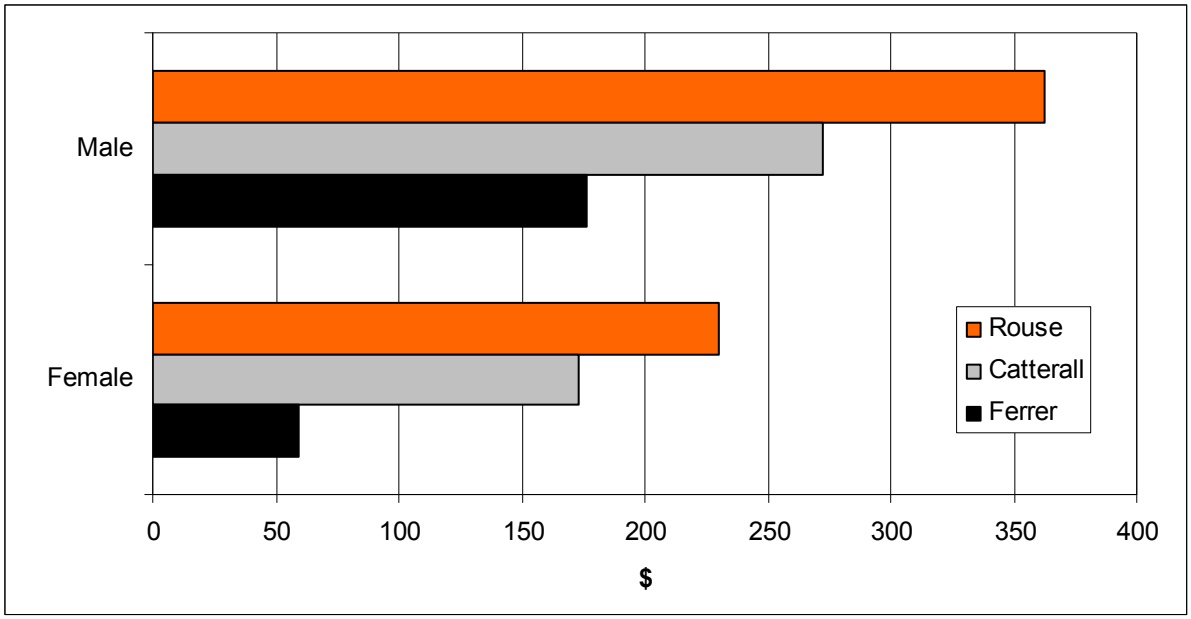
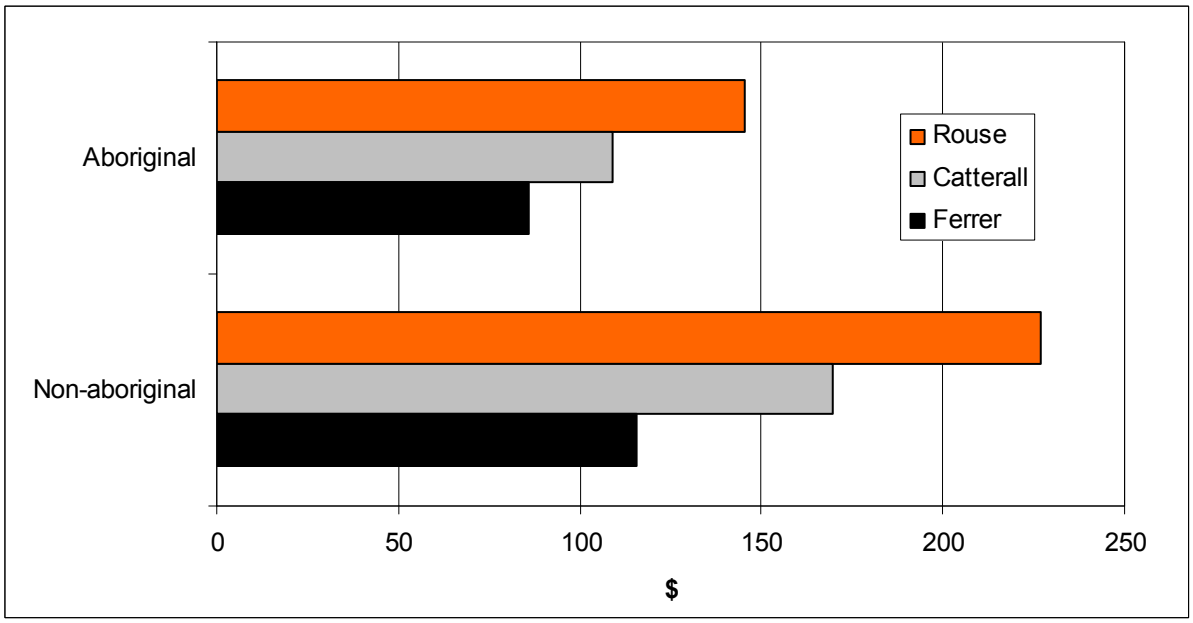
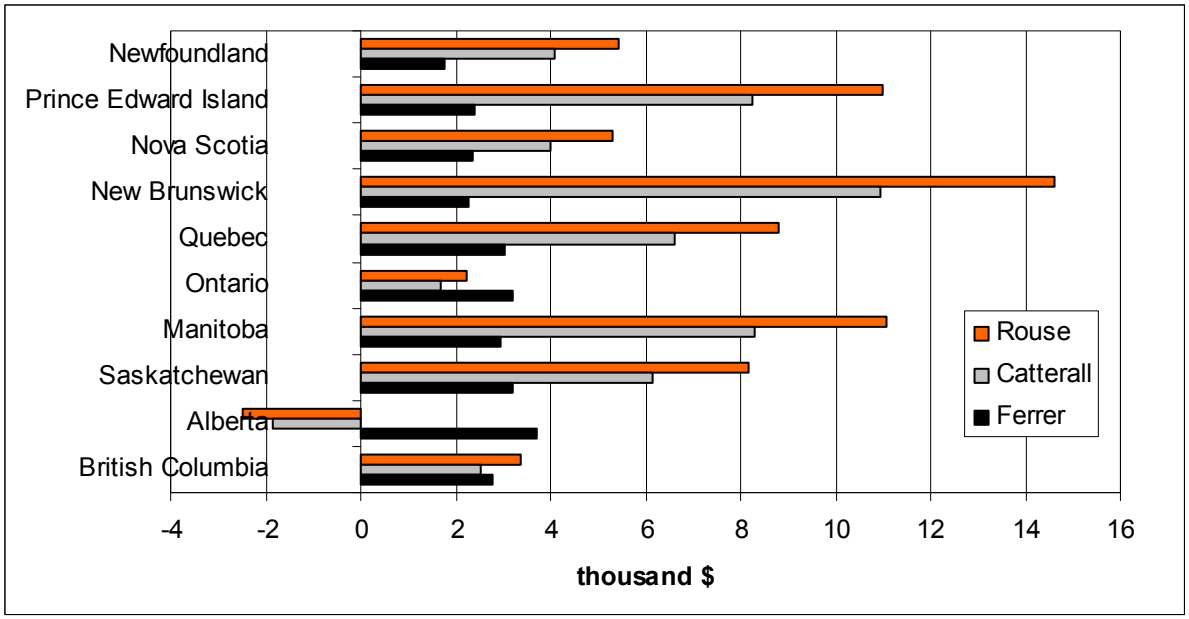


Figure 23. Annual tax revenue loss per dropout by Aboriginal status (estimated from SLID 2004)



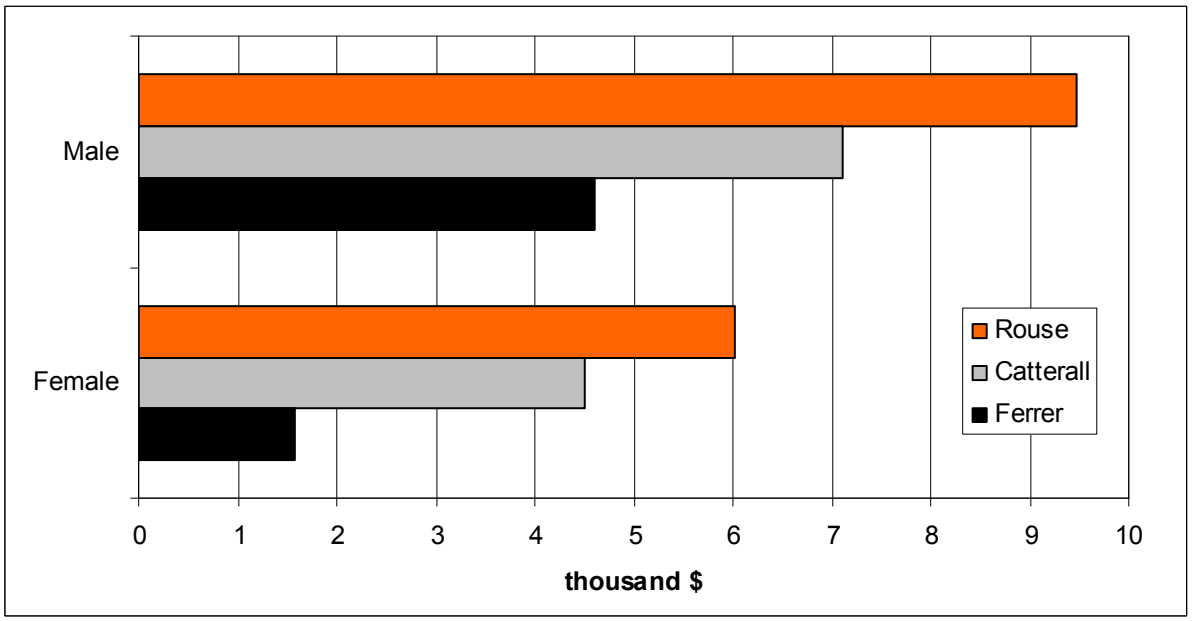
The following three figures show the lifetime tax revenue per dropout by province, gender, and aboriginal status using the three equations. Estimates at other segregation level can be found in the technical report.

Figure 24. Lifetime tax revenue loss per dropout by province (estimated from SLID 2004)



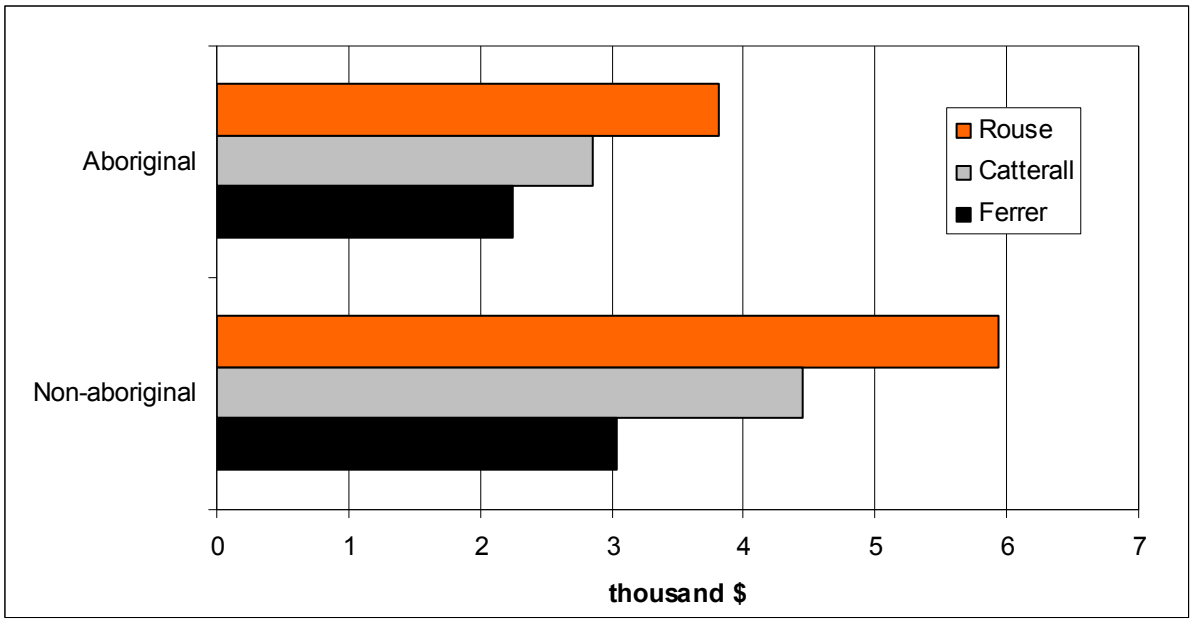
Using Rouse, the largest lifetime tax revenue losses are estimated for New Brunswick ($17,035.21) and suggest a gain for Alberta (-$2,913.29). Using Ferrer, in turn, produces the biggest losses for Alberta ($4,321.62) and the smallest for Newfoundland ($2,059.02).

Figure 25. Lifetime tax revenue loss to the state per dropout by gender (estimated from SLID 2004)



Bigger lifetime tax revenue losses are expected for males than for females by both Ferrer ($5,382.05 and $1,832.24) and Rouse ($11,060.45 and $7,024.88).

Figure 26. Lifetime tax revenue loss to the state per dropout by aboriginal identity (estimated from SLID 2004)



Bigger lifetime tax revenue losses are expected for non-Aboriginals than for Aboriginals by both Ferrer ($3,542.08 and $2,615.65 respectively) and Rouse's ($6,928.25 and $4,447.89).

The following six figures show the aggregate annual tax revenue and the aggregate lifetime tax revenue by province and gender using the three equations. Estimates at other segregation levels can be found in the technical report.

Figure 27. Aggregate tax revenue loss by province (estimated from SLID 2004)

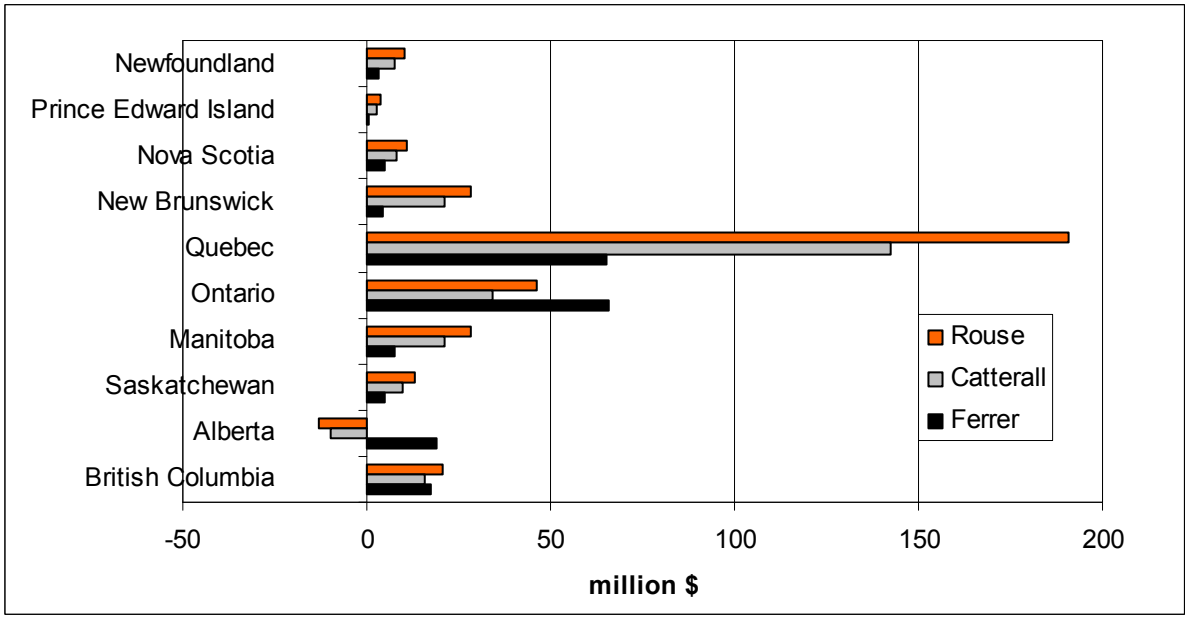


Figure 28. Aggregate tax revenue loss by gender (estimated from SLID 2004)

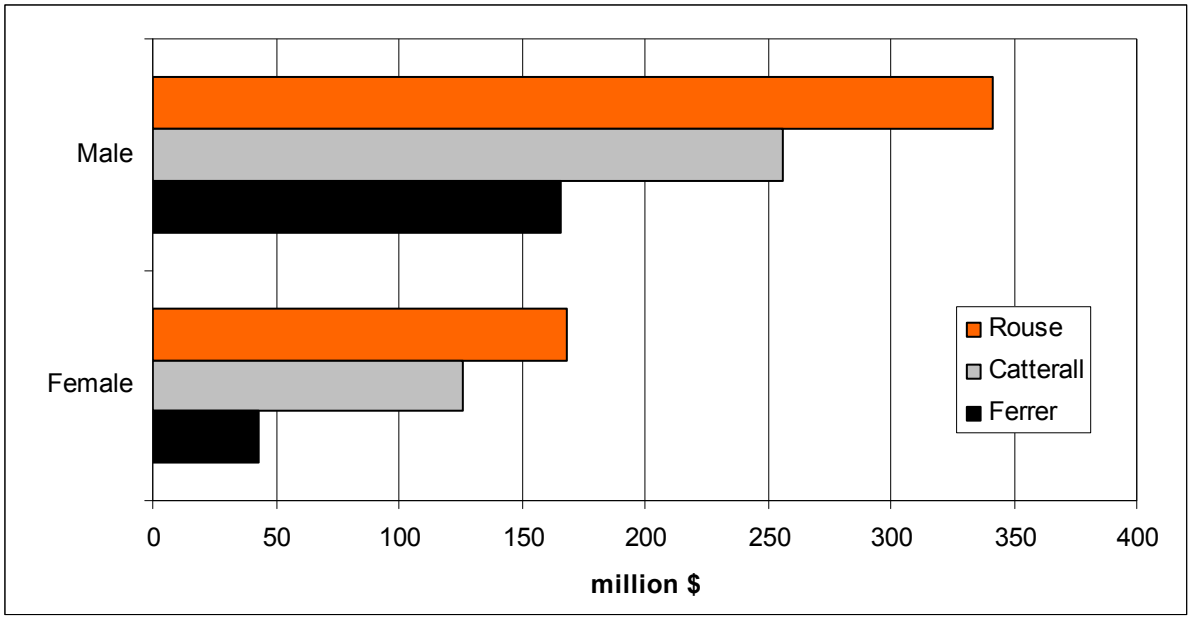


Figure 29. Aggregate lifetime tax revenue loss to the state by province (estimated from SLID 2004)

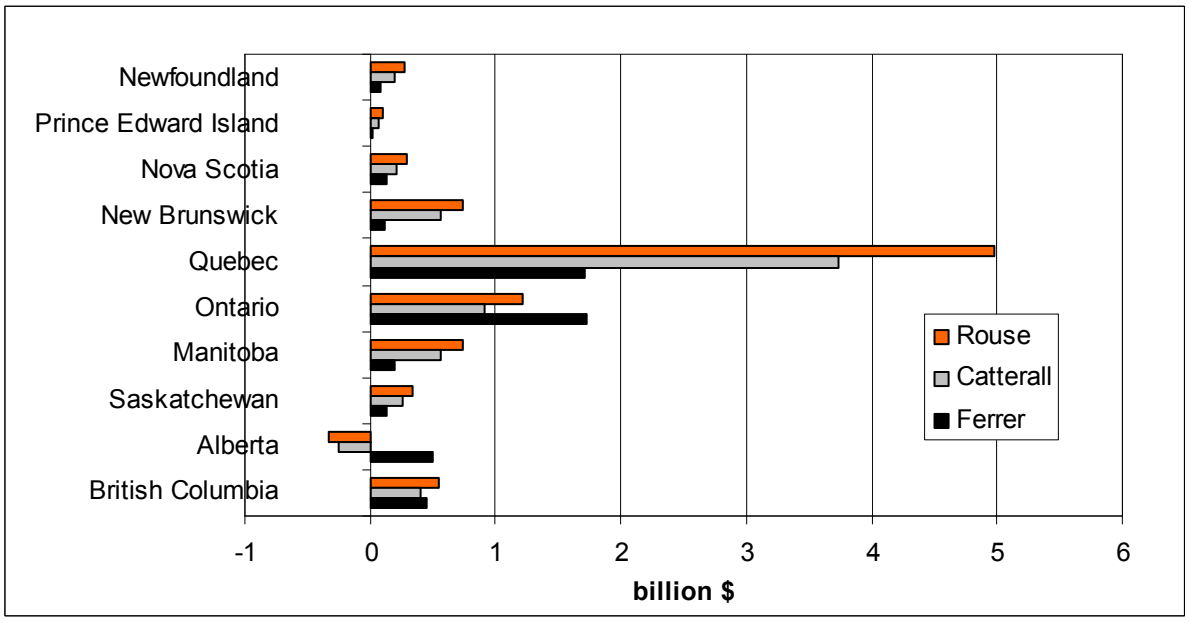
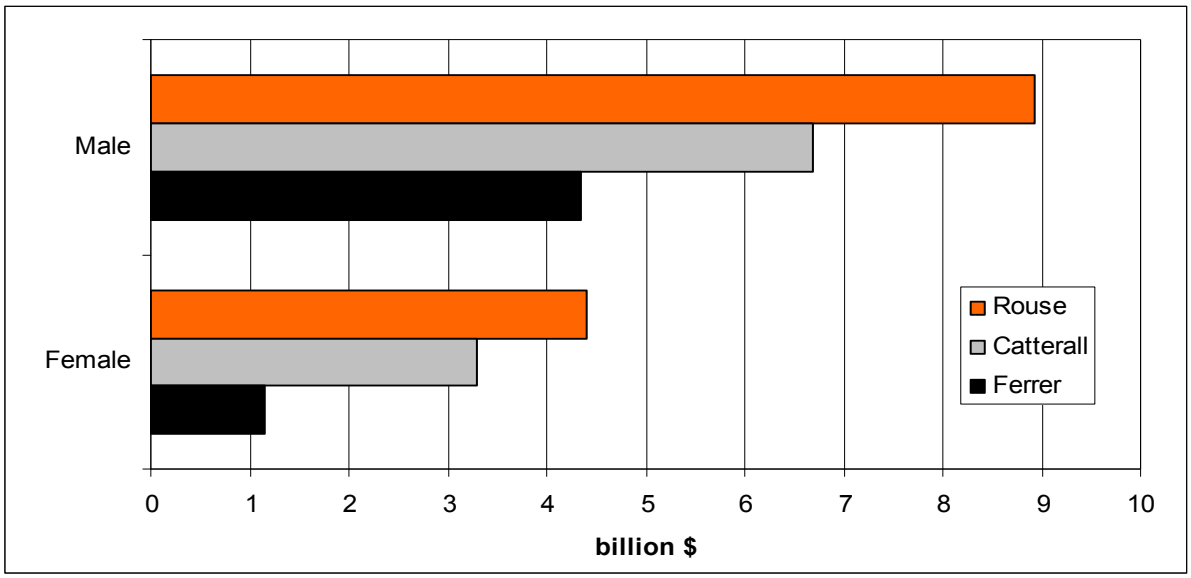


Figure 30. Aggregate lifetime tax revenue loss to the state by gender (SLID 2004)



IV. Public Annual and Lifetime Revenue Loss to the State in Employment Insurance Premiums

The annual and lifetime revenue loss to the state in employment insurance premium for not completing high school are estimated using the following formulas:

Annual loss in employment insurance premium = 1.98% x Annual earning loss

Lifetime loss in employment insurance premium =

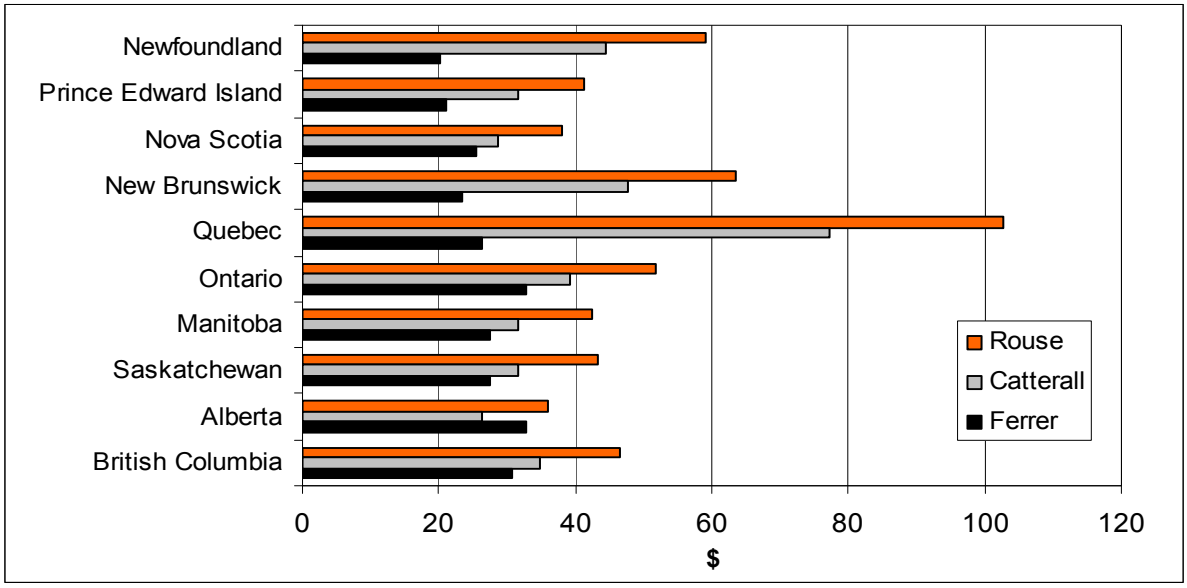
$$\sum_{0}^{35} \frac{1.98\% \text{ x Annual earning loss} \times 1.015^{t}}{1.025^{t}}$$

According to Department of Finance of Canada, workers paid $1.98 in EI premium for every $100 earned in 2004. In other words, 1.98% of earnings were paid as EI premiums in 2004. This figure is not prorated to 2008 terms as it is a relative rather than absolute number. As in lifetime earnings calculation, the estimated lifetime revenue loss to the state in EI payments are the sum of present values over 35 years based on the revenue loss to the state in EI payments in 2004, a 1.5% productivity growth per year, and 2.5% discount rate.

Using the annual loss in earnings for not completing high school estimated in the previous section, the annual revenue loss to the state using Census (2001) data on employment insurance payments is estimated to be $67.70, $50.78, and $29.62 per dropout, or approximately $201 million, $151 million, and $88 million in aggregate terms. At the individual level, the lifetime losses in employment insurance premiums are estimated to be approximately $2,063, $1,547, and $902. At the aggregate level, the lifetime losses are estimated to be approximately $6.1 billion, $4.6 billion, and $2.7 billion.

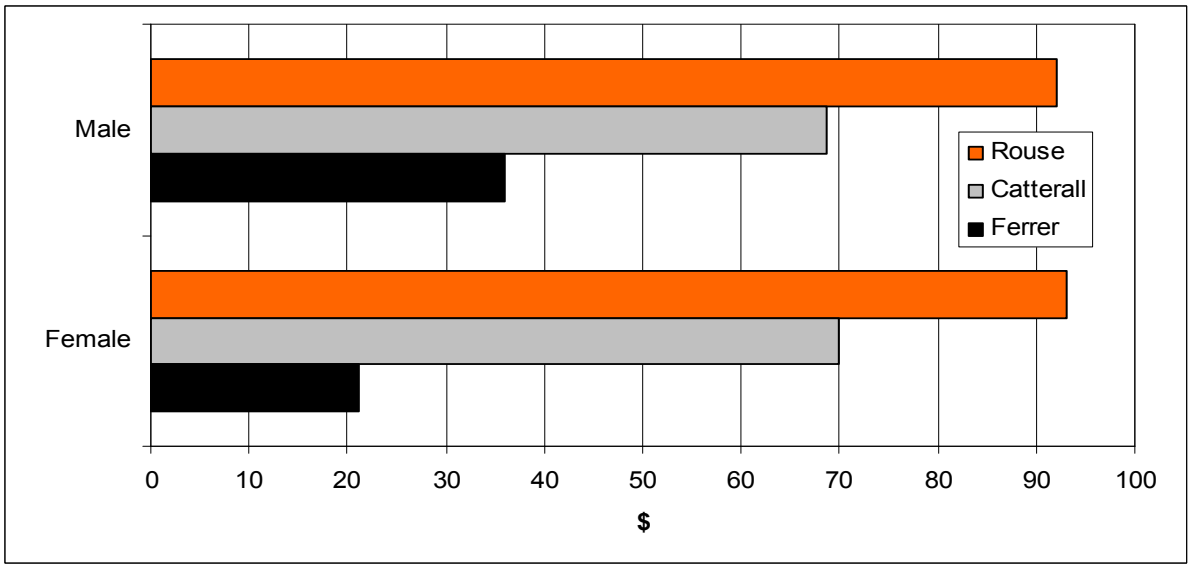
The following six figures show the "per dropout" and aggregate annual revenue loss in employment insurance premium by province, gender, and aboriginal status. Estimates at other segregation levels can be found in the technical report.

Figure 31. Annual revenue loss in EI premium per dropout by province (from Census 2001)



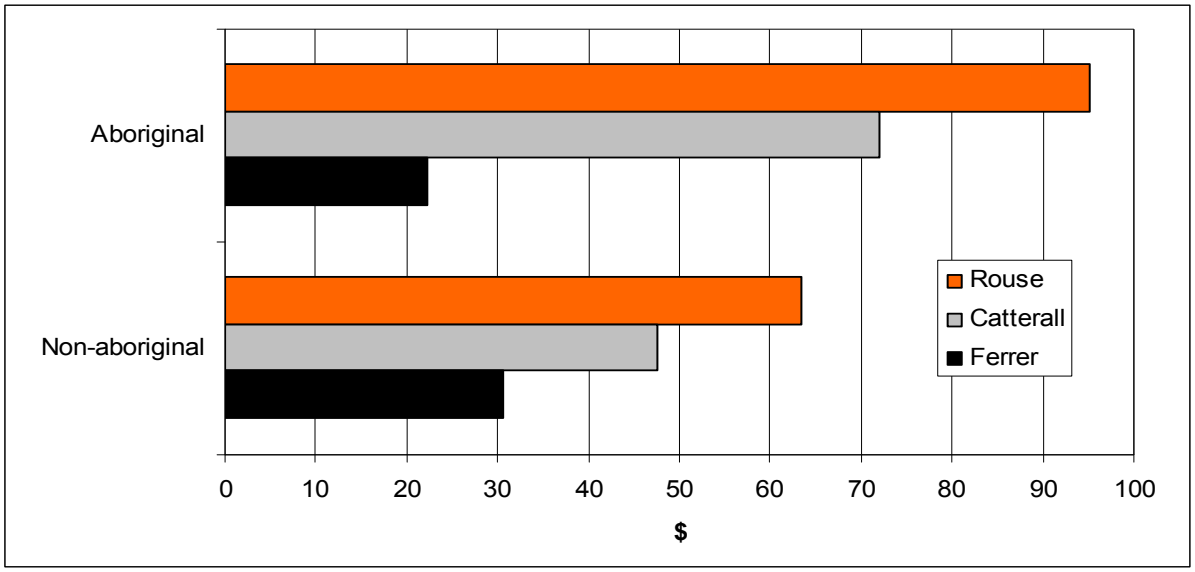
The largest loss in annual revenue from EI premiums per drop is estimated for Quebec ($102.61) and the smallest for Alberta ($35.97), according to Rouse. In contrast, Ferrer yields the largest loss for Ontario and Alberta ($32.79), and the smallest loss for Newfoundland ($20.10). Ferrer's estimates are much smaller and exhibit much less variation among provinces than Rouse's and Catterall's estimates.

Figure 32. Annual revenue loss in EI premium per dropout by gender (estimated from Census 2001)



According to Ferrer, males face a larger loss ($35.97) than females ($21.16), while Rouse's estimates are similar for males ($92.03) and females ($93.09). Ferrer's estimates are much smaller than Rouse's.

Figure 33. Annual revenue loss in EI premium per dropout by Aboriginal status (estimated from Census 2001)



Using Ferrer yields larger annual revenue losses from EI premiums for non-Aboriginals ($30.68) than Aboriginals ($22.21), while Rouse produces larger losses for Aboriginals ($95.20) than for non-Aboriginals ($63.47). Ferrer's estimates are much smaller than Rouse's estimates.

Figure 34. Aggregate annual revenue loss in employment insurance premium by province (estimated from Census 2001)

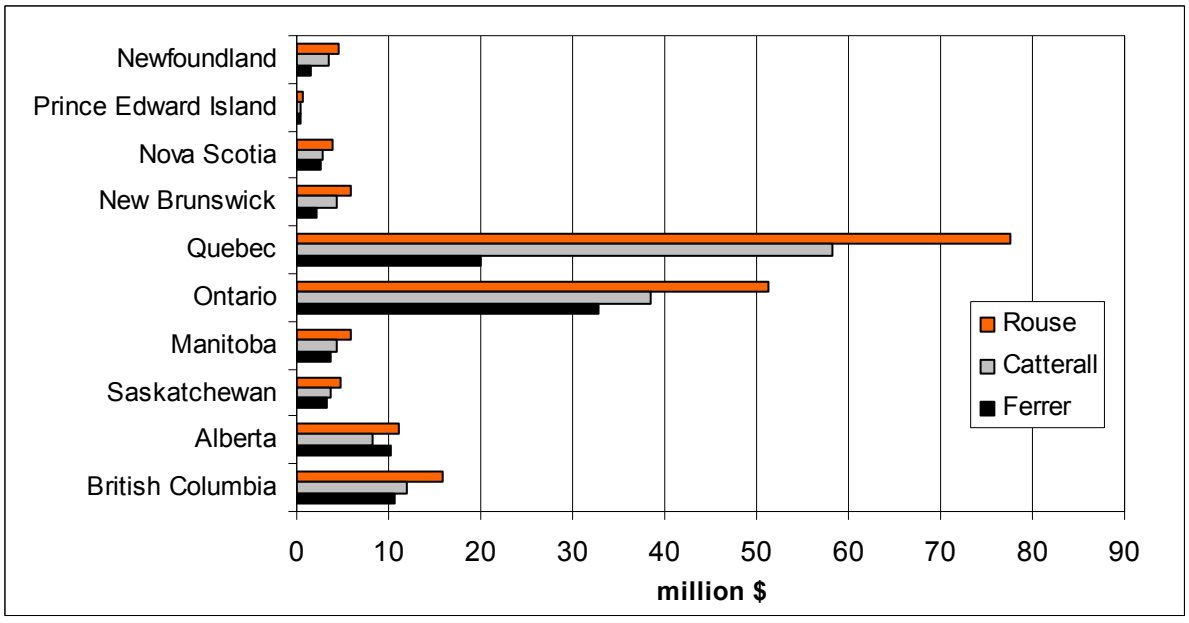


Figure 35. Aggregate annual revenue loss in employment insurance premium by gender (estimated from Census 2001)

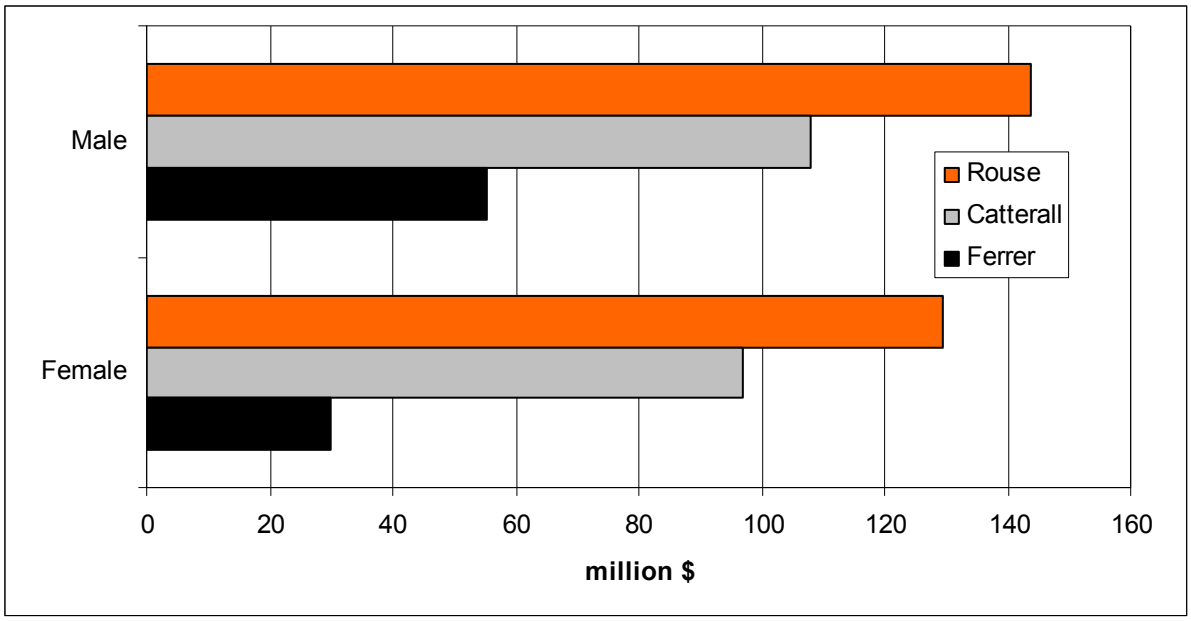
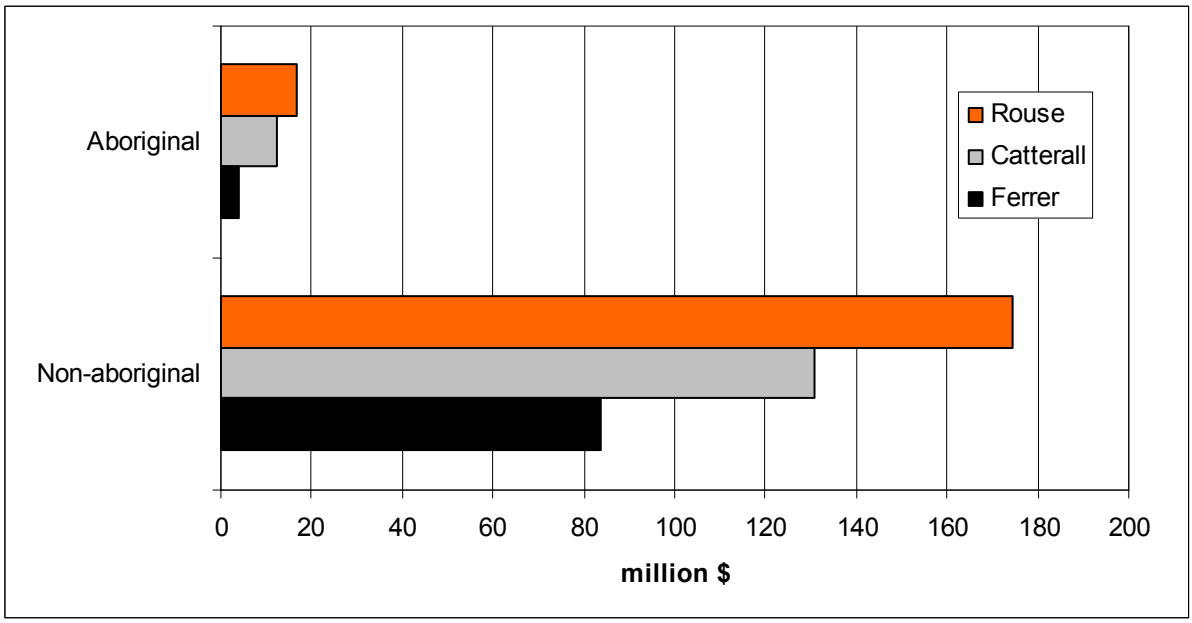
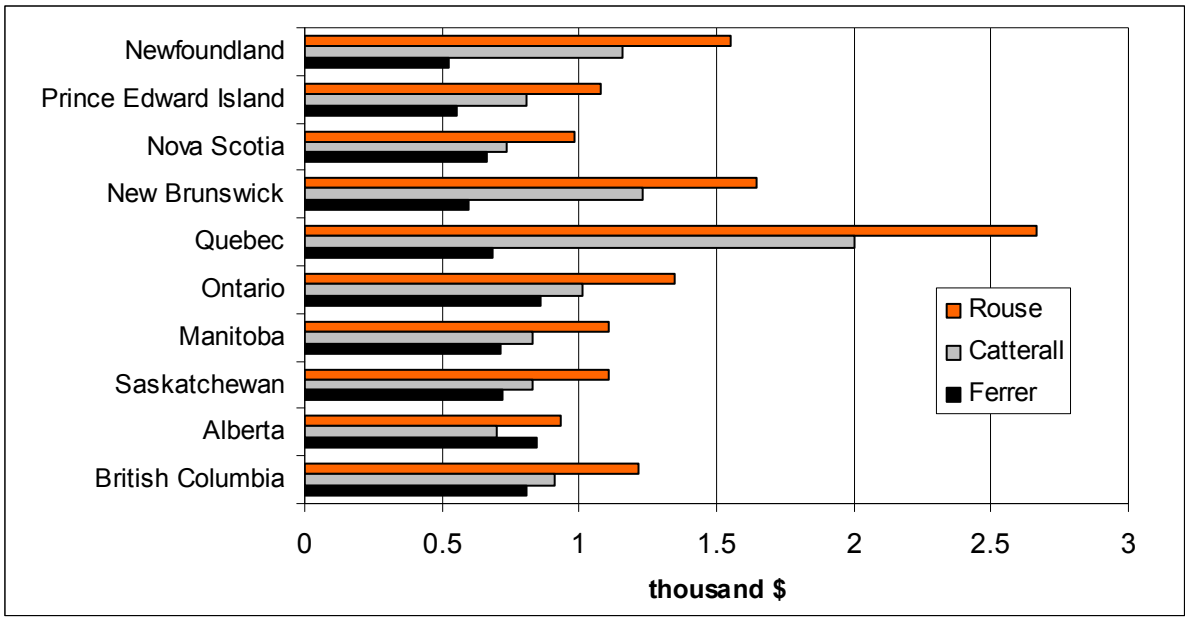


Figure 36. Aggregate annual revenue loss in employment insurance premium by aboriginal status (estimated from Census 2001)



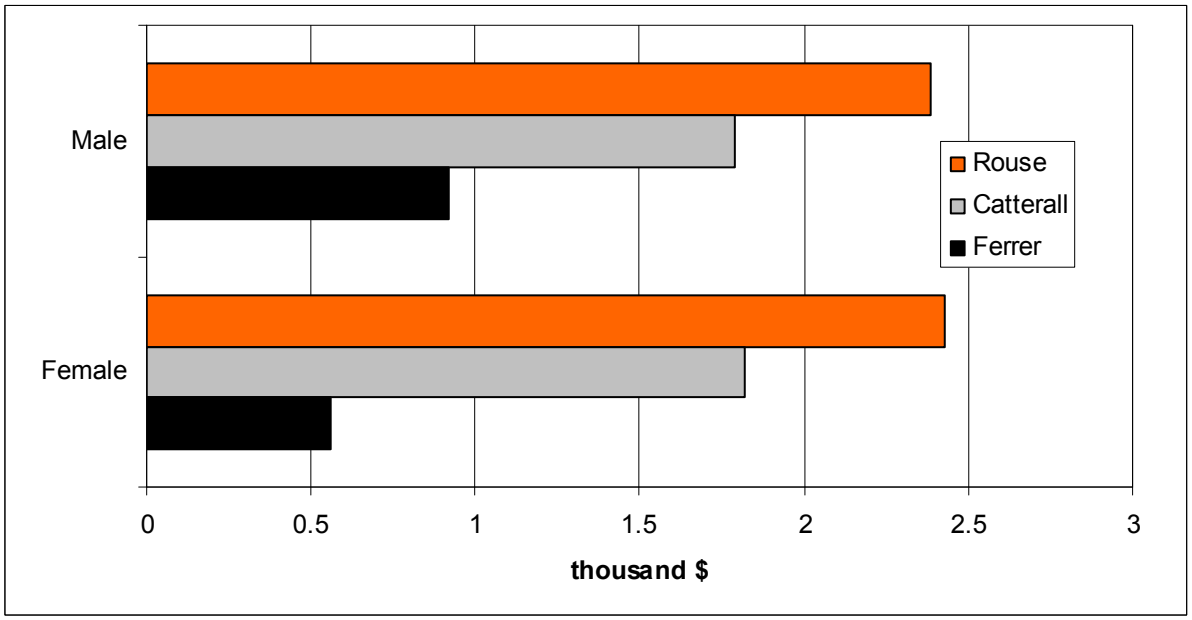
The following six figures show the "per dropout" and aggregate lifetime revenue loss in employment insurance premium by province, gender, and aboriginal status. Estimates at other segregation levels can be found in the technical report.

Figure 37. Lifetime revenue loss in EI premium per dropout by province (estimated from Census 2001)



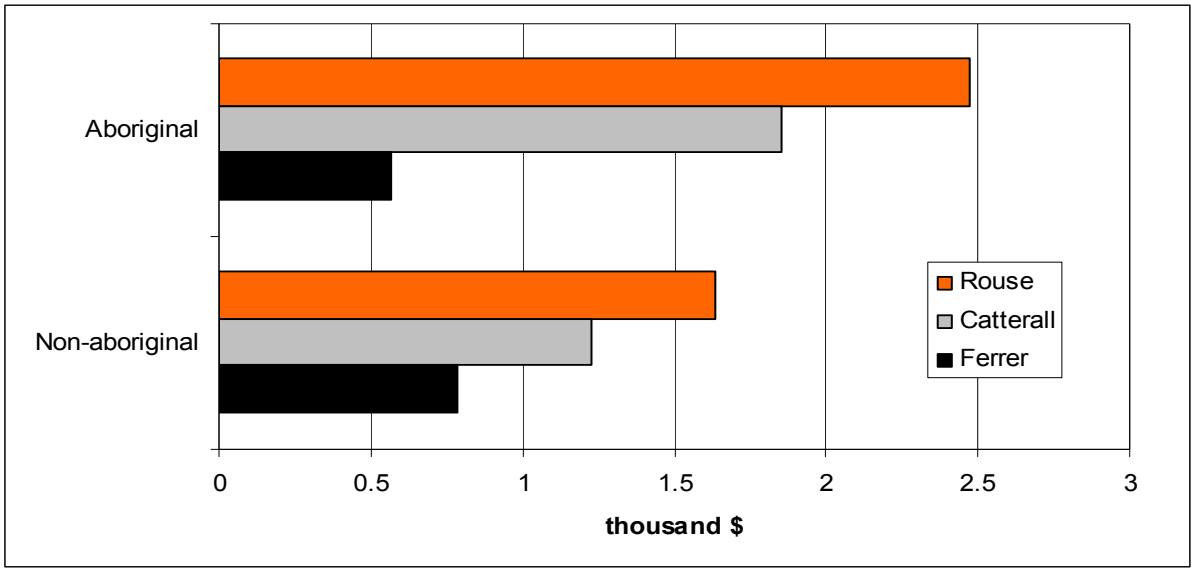
Rouse's estimates of lifetime revenue losses from EI premiums are biggest in Quebec ($3,112.87) and smallest in Alberta ($1,086.63), while Ferrer's estimates yields the biggest estimated losses for in Ontario ($1,003.32) and the smallest loss in Newfoundland ($614.98). Ferrer's estimate exhibits much less variation among provinces than Rouse's and Catterall's estimates.

Figure 38. Lifetime revenue loss in EI premium per dropout by gender (estimated from Census 2001)



Ferrer's methods estimated a higher lifetime revenue loss in EI premium for males ($1,073.15) over females ($652.96), while Rouse yields a highest revenue loss for females ($2,831.11) than for males ($2,785.78).

Figure 39. Lifetime revenue loss in EI premium per dropout by aboriginal identity (estimated from Census 2001)



According to Ferrer, non-Aboriginals ($913.89) suffer bigger lifetime revenue losses in EI premiums than Aboriginals ($661.53), while Rouse estimates the losses to be greater for Aboriginals ($2,882.56) than non-Aboriginals ($1,906.19).

Figure 40. Aggregate lifetime revenue loss in employment insurance premium by province (estimated from Census 2001)

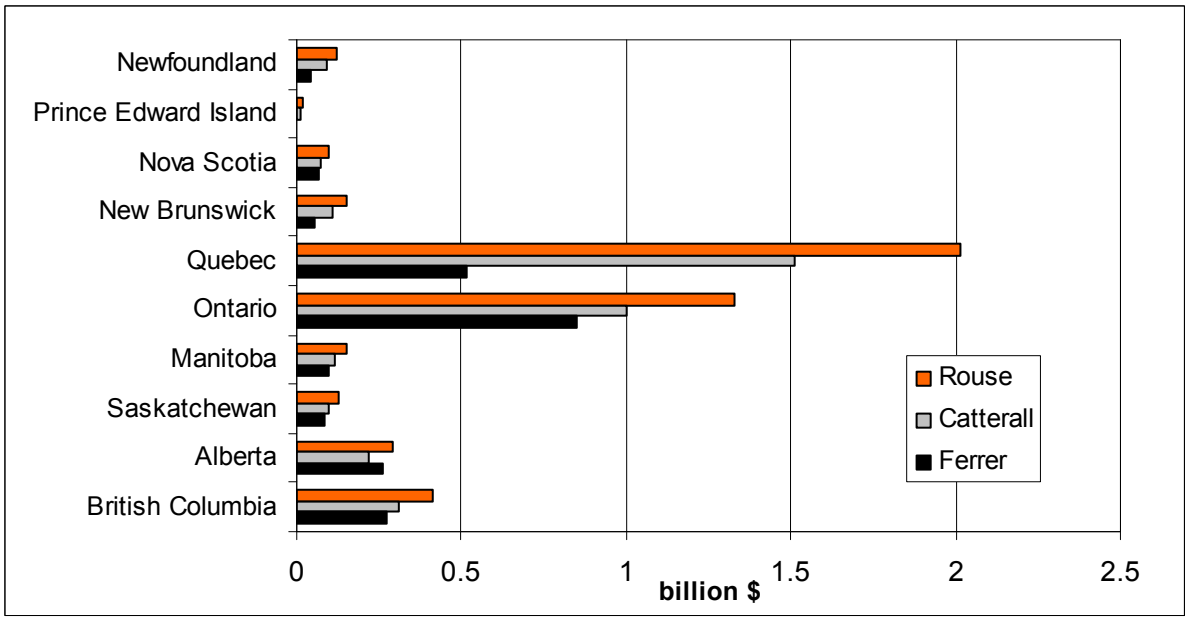


Figure 41. Aggregate lifetime revenue loss in employment insurance premium by gender (estimated from Census 2001)

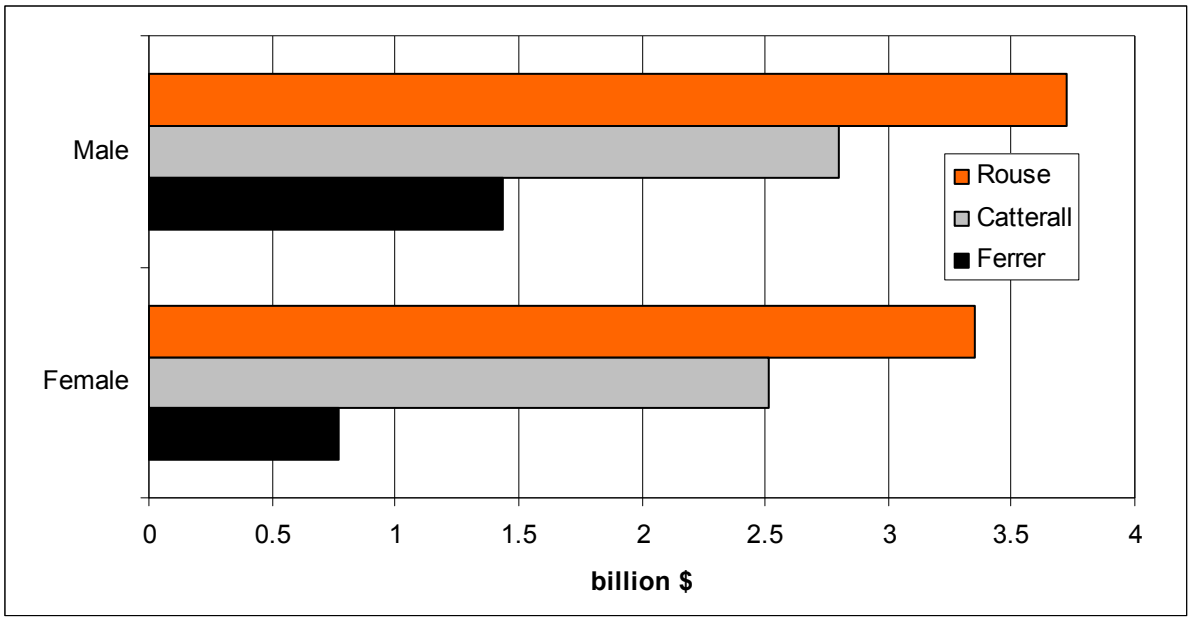
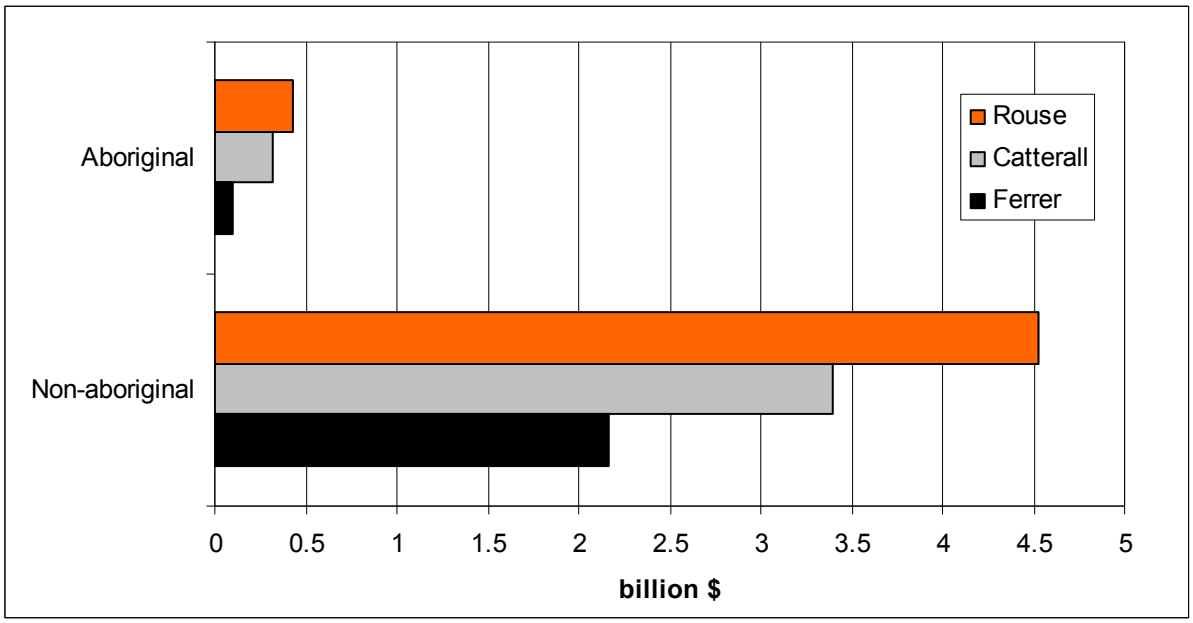


Figure 42. Aggregate lifetime revenue loss in employment insurance premium by aboriginal identity (estimated from Census 2001)



V. Public Employment Insurance Costs to the State

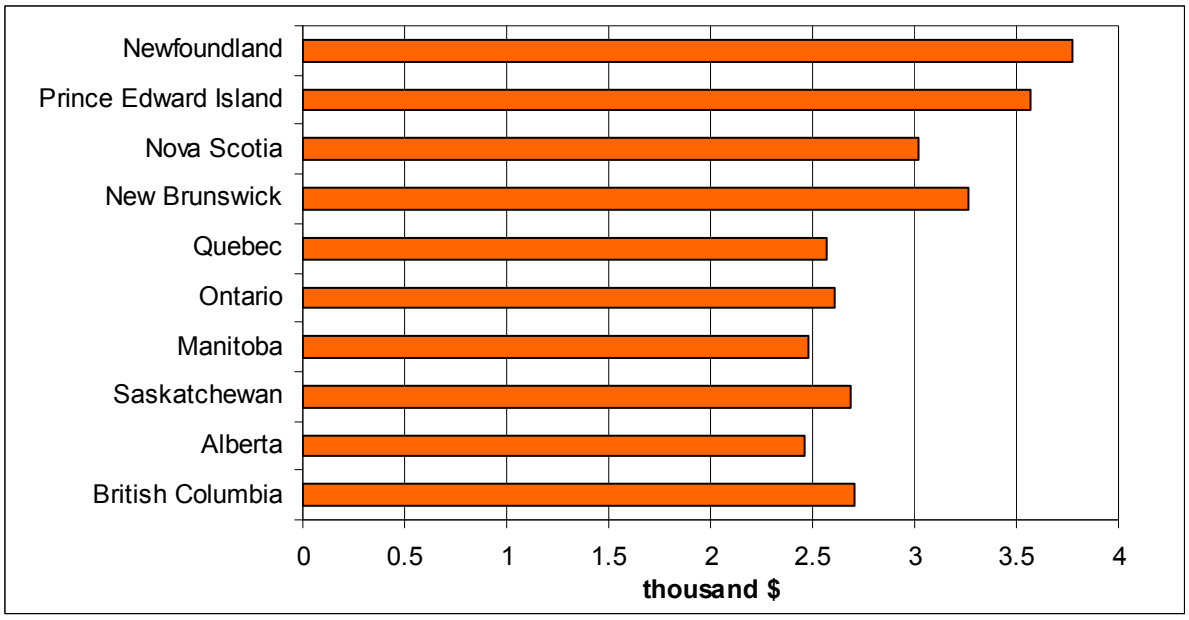
By using the same approach in the social assistance calculation, we count 50% of the average EI payment received by a dropout as the employment insurance costs to the state:

> *Cost of employment insurance benefit = 50% x Average employment insurance benefits by dropouts*

Data on employment insurance benefits were obtained from a custom run on Census 2001 from Statistics Canada. The estimates, prorated to 2008 value, are $2,767.05 per dropout and slightly around $1.1 billion in aggregate terms.

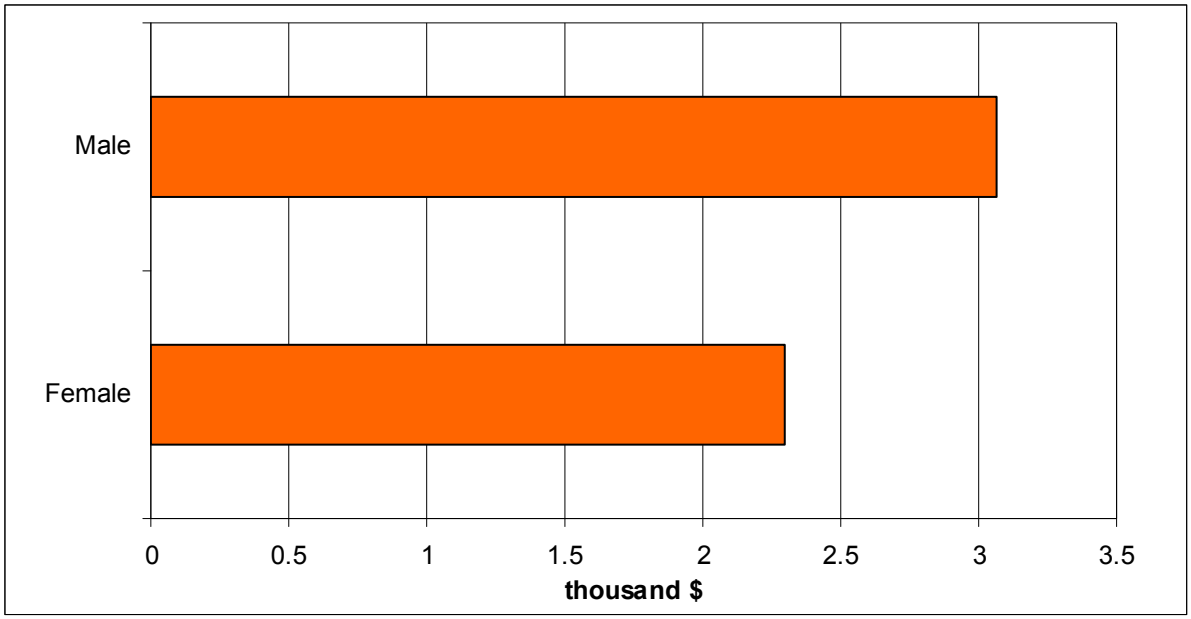
The following six figures show the "per dropout" and aggregate cost of employment insurance benefit by province, gender, and aboriginal status respectively. Estimates at other segregation levels can be found in the technical report.

Figure 43. Employment insurance cost to the state per dropout by province (Census 2001)



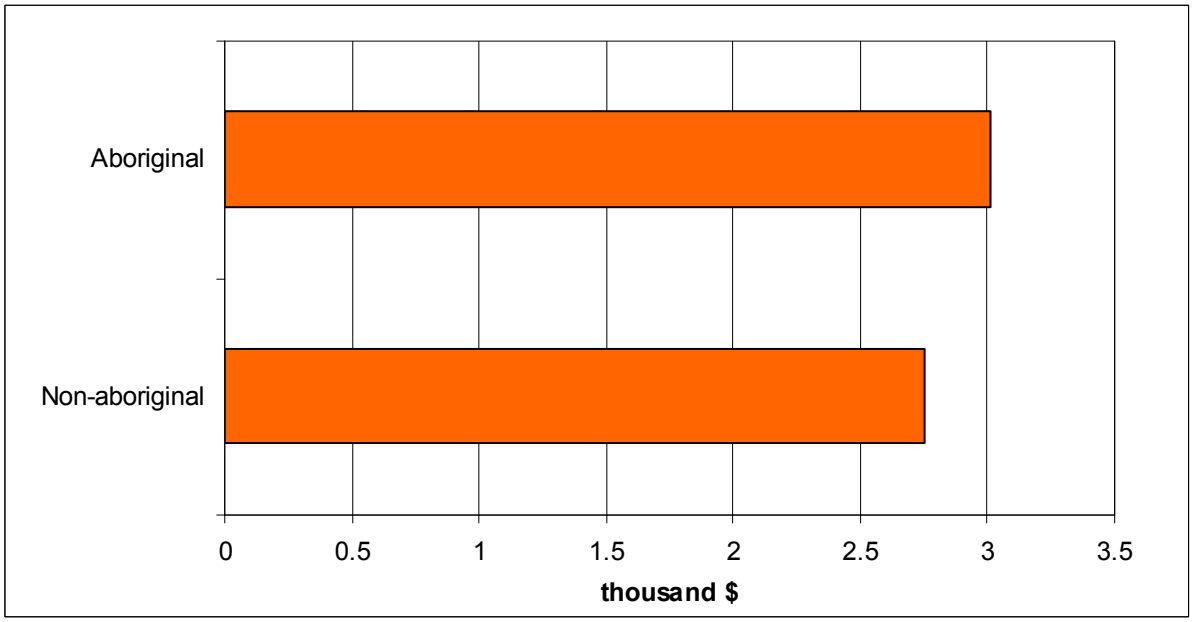
Employment insurance costs per dropout incurred by the state are highest in Newfoundland ($3,774.76) and lowest in Alberta ($2,456.90).

Figure 44. Employment insurance cost to the state per dropout by gender (Census 2001)



Employment insurance costs per dropout incurred by the state are higher for males ($3,066.16) than for females ($2,294.65).

Figure 45. Employment insurance cost to state per dropout by Aboriginal identity (Census 2001)



Employment insurance costs per dropout incurred by the state are slightly higher for Aboriginals ($3,012.08) than non-Aboriginals ($2,751.60).

Figure 46. Aggregate employment insurance cost to the state by province (Census 2001)

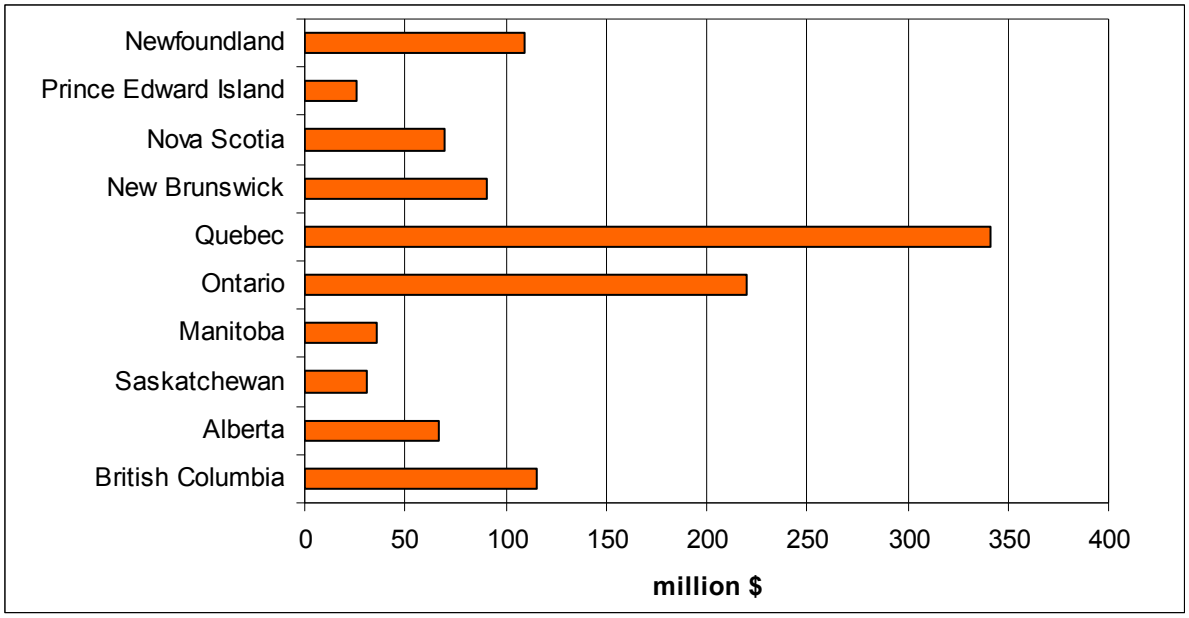


Figure 47. Aggregate employment insurance cost to the state by gender (Census 2001)

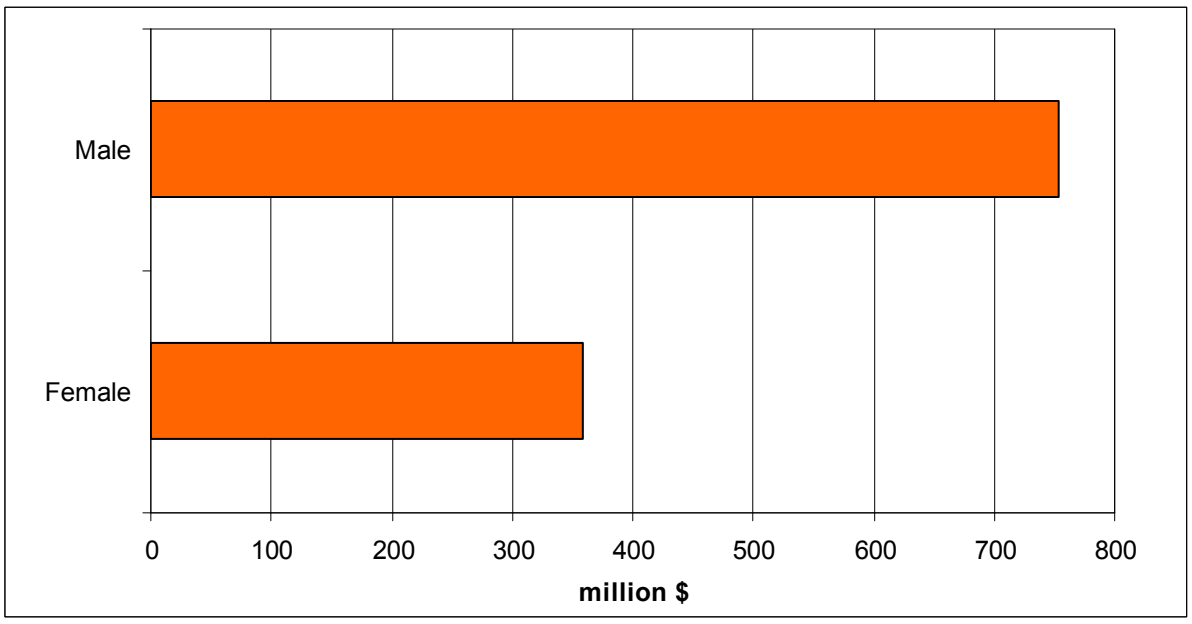
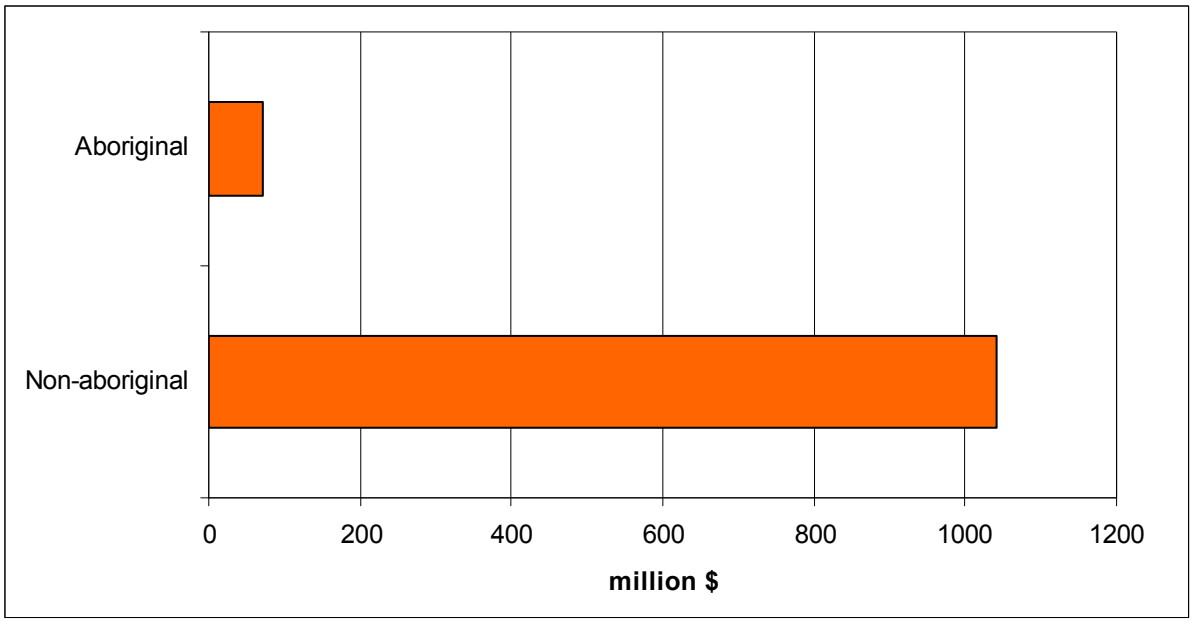


Figure 48. Aggregate employment insurance cost to the state by Aboriginal identity (Census 2001)



For comparative purposes, according to SLID 2004 data, the aggregate amount of employment insurance benefits received by dropouts was:

(Number of social assistance recipients who are dropouts = 0.29 million) X
(Average amount of social assistance received by dropouts prorated to 2008 = $5,184.12)
= $1.5 billion.

Using the above formula, the cost of employment insurance benefits would be reduced by 50% * (average employment insurance benefits by dropouts) = $2,592.06 for each additional high school graduate. Given the estimated number of employment insurance benefits recipients who did not complete high school, the aggregate cost reduction in employment insurance benefits would be $2,592.06 * (number of employment insurance benefits recipients who are dropouts) = $764.7 million in 2008 dollars. Segregated estimates can be found in the technical report.

Education and Research

Over the years, Canadian governments, have developed and implemented a number of educational interventions or second-chance opportunities to support high school dropouts who want to finish their degrees or obtain other forms of training and education. Moreover, there is a large body of work that has been produced on the topic of high school dropouts and the cost of such research is significant. This research has been funded by for example by the Canadian

Council for Learning, Social Sciences Humanities Research Canada, Department of Human Resources and Social Development (formerly HRDC) and Statistics Canada.

Basic Assumptions for Economic Calculations

Following the methodology of previous costing studies, including the more recent *The Costs of Substance Abuse in Canada 2002* (Rehm et al., 2006), we attempted to gather data and costs for both prevention, intervention and research. Data sources included provincial and territorial ministries of education. Information was gathered on the following: costs of producing educational materials related to the issue of high school dropouts, any costs of providing related training or education, and any costs of meeting, workshops, or conferences.

Calculations

Programs from across Canada that worked to assist individuals who had not completed high school and/or promote high school completion among at-risk students were identified using a range of internet sources. The National Literacy Database (http://www.nald.ca/index.htm) was used to identify programs that provided training and other assistance to individuals who had not completed high school, and individual programs were contacted to obtain information on program budgets and funding sources. To gather information on government program expenditures, representatives of provincial ministries responsible for education and training, as well as Human Resources and Social Development Canada were contacted. Follow-up phone calls and emails were used to confirm program objectives and obtain detailed program expenditures.

Through this process, it became apparent that many programs targeting students at-risk of not completing high school are delivered at the school district level. In order to gain a better understanding of the cost of these programs, a purposeful sample of school districts from five provinces (British Columbia, Alberta, Ontario, Quebec and Nova Scotia) was constructed by selecting at least one urban, one suburban, and one rural school district from each province. Districts were selected based on community demographic information (2001 Census) as well as recommendations from individuals at provincial education ministries. For example, staff members were asked to identify representative urban, suburban and rural districts in their province. Each district was then contacted by email and/or telephone to determine their expenditures on high school completion-related programs. In most cases, it was impossible to accurately extract what expenditures were directed at high school completion efforts.

And finally, funding bodies and organizations, research institutes, and centres were surveyed by email about any research they may have funded or undertaken aimed at further understanding, preventing and responding to high school dropouts in Canada. Only three relevant research projects were identified from a cursory search of the Social Sciences and Humanities Research Council of Canada database. The grants on these projects are $20,000 for 2004-2005, which

come to a total of $60,000. This total cost is thus very small relative to the estimated cost of education programs. A list of the research projects we were able to identify can be found in the technical report.

After all the available data were gathered, it was decided that because of the difficulty in identifying specific programs and/or portions of programs dedicated to high school dropouts and because of small sample number and timeframe problems in relation to funded research projects, education and research costs were not included in the final calculations.

Intangible Costs

Intangible aspects of not completing high school are numerous. High school dropouts experience lessened social growth (through impaired relationships with teachers, peers, or parents), a reduced sense of control over their life, less personal satisfaction, and less of a sense of control over life circumstances (PHAC, 2004). Moreover, the lack of a high school education can lead to low self-esteem and emotional disturbances (Waller, 2004; Waller & Weiler, 1985). It can affect overall happiness (Oreopoulos, 2005). It can also affect one's social network and social capital (Groot & van den Brink, 2004; Link & Phelan, 1995; Muennig, 2005).

The links between high school and citizenship skills have been established (Coppock, 1995; Dee, 2004; McMahon, 2004; Milligan, Moretti & Oreopoulos, 2004; OECD, 2006b). High school dropouts are less engaged in terms of voting, charitable giving, volunteerism, and other forms of social involvement. According to Junn, "Education is the cornerstone of democracy because it aids in the cognitive, ideological and strategic development of democratic citizens, allowing voters to acquire political information, deliberate about the issues, voice perspectives and engage in politics" (Levin, 2005, pp. 18-19).

In Canada, the impact between education and civic engagement has been documented. For example, in rural areas, persons with a university degree are 2.2 times more likely to undertake volunteer work than those without a high school diploma (Statistics Canada, The Daily, 2006). In her 1992 economic cost study, Lafleur reported decreased participation in the electoral system and political process, decreased level of charitable giving, and a decrease in social cohesion among high school dropouts (1992). Inadequate education therefore inflicts significant damage "….by excluding vast numbers of young people from participation in…civic and political life" (Levin, 2005, p. 18).

Children of parents who are high school dropouts are less likely to graduate from high school than if their parents were high school graduates. Those persons who dropout of high school also experience difficulties in forming peer and family relationships. In a recent study by Statistics Canada (see Crompton, 2005), respondents who did not think they would marry were twice as likely to be high school dropouts. For those who do become parents, the life opportunities of their offspring may also be negatively affected. Those who become parents are at increased risk for perpetuating the pattern of dropping out with their offspring (McCaul,

Donaldson, Coladarci & Davis, 1992; Vitaro, 2005; Wolfe & Haveman, 2002). Indeed, research has demonstrated that the failure to complete high school is the strongest risk factor associated with inter-generational reliance on social assistance (New Wave Research Inc, 2003).

So while the financial impact of tangible costs associated with dropping out of high school is significant, it is also the case in terms of intangible costs. In the literature, many intangible costs are referred to as non-market effects. For example, Haveman and Wolfe (1984) argued that research has shown the following relationships under the category of non-market effects:

- A positive link between one's own schooling and the schooling received by one's children;
- A positive association between schooling and the health status of one's family members;
- A positive relationship between one's own education and one's own health status;
- A positive relationship between own education and the efficiency of choices made such as consumer choices (of which efficiency has positive effects on well-being similar to those of money income);
- A relationship between own schooling and fertility choices of one's offspring (in particular decisions of one's female teenage children regarding non-marital childbearing); and
- A relationship between schooling/social capital of one's neighbourhood and youth decisions regarding their level of schooling, non-marital childbearing, and participation in criminal activities (Wolfe & Haveman, 2001).

Wolfe and Haveman's most recent research focuses on the intergenerational effects of schooling given that educational attainment in one generation has positive effects on the human capital attainments of the next generation (2001, p. 3).

Basic Assumptions for Economic Calculations

As noted by the 2000 study produced by HRDC, potential non-market benefits "are difficult to quantify" (HRDC, 2000, p. 44). Haveman and Wolfe (1984) argue that a conservative estimate of the value of non-labour market influences is of the same order of magnitude as estimates of the annual marketed, earnings-based effects of one more year of schooling" (pp. 400-401). They have more recently argued that "given the growing evidence on the non-market effects of schooling, including intergenerational and social capital effects, this assessment seems likely to hold, indicating again that traditional estimates of the market returns to schooling fail to capture the full social return of education" (2001, p. 20).

This study uses the methodology of Haveman and Wolfe (1984) adjusting for health, and criminal activity, which we included in the direct cost category. The analysis therefore takes

into account some but not all factors in Haveman and Wolfe's framework of non-market and social benefits. This study views these as foregone benefits or costs.

In the final calculations, in consultation with Dr. Wolfe, we assume that intangible costs are equal to 50% of all tangible costs. This is considered a reasonable estimate because even though we include health and crime in another category, intangible consequences still leave a number of factors used in the Havemen and Wolfe framework such as improved consumer productivity, benefits to children, benefits of planned fertility, charitable giving, voting, social cohesion etc. as "costs" of dropping out.[17]

Calculations

The following is a list of the tangible costs[18] used in the calculation for the intangible cost in 2008:

Table 5. Tangible costs (2008)

Tangible costs	Per dropout (in nearest $)	Aggregate
Social assistance	$4,230	$972 million
Earnings	$3,491	$10.2 billion
Tax revenue loss to the state	$226	$378 million
Revenue loss in employment insurance premium to the state	$68	$199 million
Employment insurance cost to the state	$2,767	$1.1 billion
Total	**$10,782**	**$12.8 billion**

By taking 50% of the sum of these tangible costs, the intangible costs are estimated to be $5,391 per dropout and $6.4 billion in aggregate terms.

Conclusion

In sum, the costs presented in this report are only a partial accounting of the economic consequences of inadequate education. Even these estimates, however, show that the failure to complete a high school education carries with it astounding economic costs to individuals and the state. Quantifying the losses associated with a failure to complete high school widens

[17] The assumption of 50% was developed in consultation and confirmed in a personal correspondence with Barbara Wolfe during the research design development of the project.

[18] If there are more than one estimated tangible costs in the listed categories, the given numbers are taken from the most conservative, i.e., lowest estimates.

the policy perspective on this issue. Presenting economic costs and losses also heightens the awareness of the importance of a high school education. These costs can do much to prioritize the development and implementation of national and provincial policies, including interventions for increasing high school graduation so that in the end, the economic and human toll associated with an inadequate education can be significantly reduced. As Levin et al. put it so eloquently, “[i]f life chances depend so heavily on education, it is important that educational inequalities be redressed so as the equalize opportunities in a democratic society” (2007, p. 2).

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Appendix A
Details of Phase I -- Research Design Development

The first phase of the research included research design development including the development of a methodological approach modelled on previous studies, based on available data and statistics, and designed through collaboration with expert international researchers in this field. This phase included:

- Literature searches for relevant information in a variety of jurisdictions including Canada, the United States, Australia, the United Kingdom and New Zealand, using the Internet and a variety of online databases: Academic Search Premier, Business Source Premier, Campbell Collaboration, Dissertation Abstracts, EconLit, Education Index Full-Text, EPPI Centre, ERIC, International ERIC, Linguistics and Language, PsycInfo, PubMed, Sociological Abstracts and Web of Science.

- Review of Statistics Canada website and other federal and provincial data/ publications.

- Consultation with relevant data experts including:

  Mario Bédard
  Health Statistics Division
  Statistics Canada

  Geoff Bowlby
  Formerly with Labour Force Survey
  Co- author of: Statistics Canada: Provincial Dropout Rates: Trends and Consequences (2005)

  Jennifer Campagnolo
  Account Executive
  Western Region and Northern Territories-Vancouver
  Statistics Canada

  Jacques Ouellet
  Labour Force Survey
  Statistics Canada

- Consultations with experts in the field of economic costing and education including:

  Brenda Lafleur
  Director
  The Canada Project
  Conference Board of Canada

Author of Dropping Out: The Cost to Canada (1992)

Lance Lochner
Associate Professor
Department of Economics
University of Western Ontario

Thomas Lemieux
Professor
Department of Economics
University of British Columbia

Kevin Milligan
Assistant Professor
Department of Economics
University of British Columbia

Enrico Moretti
Associate Professor,
Department of Economics
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Peter Muennig
Assistant Professor
Mailman School of Public Health
Columbia University

Philip Oreopoulos
Assistant Professor
Department of Economics
University of Toronto

W. Craig Riddell
Professor of Economics
Department of Economics
The University of British Columbia

Cecilia Elena Rouse
Theodore A. Wells '29 Professor of Economics and Public Affairs
Princeton University

François Vaillancourt,
Professeur titulaire, sciences économiques/
Full Professor, Economics Department

Université de Montréal

Jane Waldfogel
Professor of Social Work and Public Affairs
Columbia University School of Social Work

Bill Warburton
Executive Director
Child and Youth Development Trajectories
Research Unit
University of British Columbia

Rebecca Warburton
Associate Professor
Michael Smith Foundation for Health Research Scholar
School of Public Administration
University of Victoria

Barbara Wolfe
Director, La Follette School of Public Affairs and
Professor of Economics and Population Health Sciences
University of Wisconsin-Madison

A number of these experts – Moretti, Muennig, Rouse and Waldfogel – presented costing research in a variety of sectors at the 2005 Equity Symposium on "The Social Costs of Inadequate Education" at Teachers' College, Columbia University. It was essential to access their conference presentations, working papers, final symposium reports, and follow up research papers as their methodologies and findings reflect the most current and accurate approaches and calculations available. While focused on the United States, their research nevertheless provides appropriate approaches and methods that can be drawn on and used in the Canadian context.

Consultations with these key experts continued throughout the implementation phase of the research, especially in the policy sectors where Canadian data and research are unavailable, or where research evidence is unavailable for cost calculations.