The Conference Board of Canada

The Economic Case for Investing in Education

Report June 2019

Prepared for: The Ontario Secondary School Teachers' Federation, June 2019

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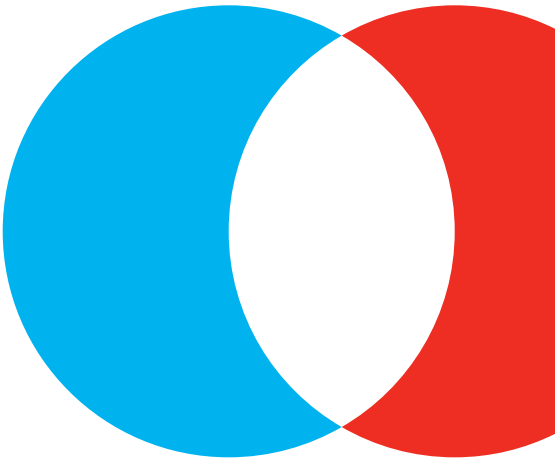
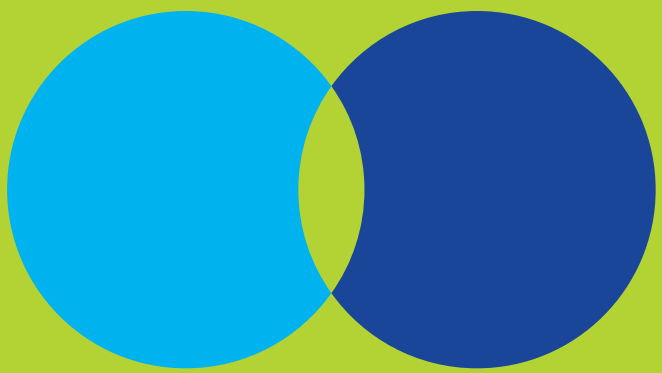


Key findings

- Each dollar of public education spending generates $1.30 in total economic impacts to Ontario. At the same time, the inverse holds true for each dollar taken from public education.
- Public education can generate social benefits, such as a healthier population, a higher standard of living, and a reduction in crime. That lessens demand for Ontario's social assistance, public health care, and criminal justice services.
- Through increases in public education spending, Ontario could lift its high school graduation rates to 90.0 per cent, matching the highest in the country and seeing average fiscal savings of $16.4 million per year. That could accrue to total savings of $3.5 billion over the course of two decades.
- In a reverse scenario, where high school graduation rates instead fall to 82.6 per cent, Ontario would spend an additional $18.0 million each year. Over a 20-year period, that could amount to total fiscal costs of $3.8 billion.
- Each additional high school graduate saves the Ontario government (on average) $2,767 each year on social assistance, health care, and criminal justice, while each additional high school non-completer costs the province $3,128 each year.

The Economic Case for Investing in Education

Executive summary



Education is often applauded for the individual-level (or private) benefits that it provides, such as higher earnings and better job opportunities. From a macroeconomic perspective, educational services are also an important contributor to the economy. In Ontario, a quarter of total public expenditures in 2018 were allocated to educational services, while 38 per cent was spent on public health care and 11 per cent on social services.[1]

Public education alone accounted for 18 per cent of total public expenditures.[2] Moreover, in 2018, public education accounted for 3.2 per cent of Ontario's total economic output and supported just over 290,000 jobs—or 4.5 per cent of total jobs in the province.

As such, the economic contribution of Ontario's education sector is of large importance. Our discussion here centres on Ontario's educational service sector as it pertains to public education (i.e., K–12 education). In the first part of this report, we evaluate the economic impacts on the province from a 1 per cent increase in spending on Ontario's public education.

We find that the impact on Ontario's economy is greater than the increase in public education spending. Our findings suggest that for each $1.00 increase in public education spending, $1.30 is generated in economic impacts for the province.

Apart from the direct economic impacts to the province, there are also indirect social (or public) benefits that can stem from public education spending. There are positive externalities that flow from having a better-educated and better-informed population. And the current research shows that increases to public education funding can lead to improvements in high school graduation rates.[3]

In comparison with high school graduates, individuals without a high school diploma are more costly to the province's public resources. High school non-completers are often linked to lower standards of living, poorer health outcomes, and higher crime rates. In turn, that places demands on Ontario's social assistance and public health care (both of which are grappling with rising costs as the share of Ontario's senior population continues to grow) and on criminal justice services. For example, our estimates suggest that a high school non-completer in Ontario is more than twice as likely as a high school graduate to draw on provincial social assistance programs. Moreover, we find that high school non-completers require 71 per cent more in annual per capita health care expenditures than do high school graduates.

1 Government of Ontario, *2019 Ontario budget*.

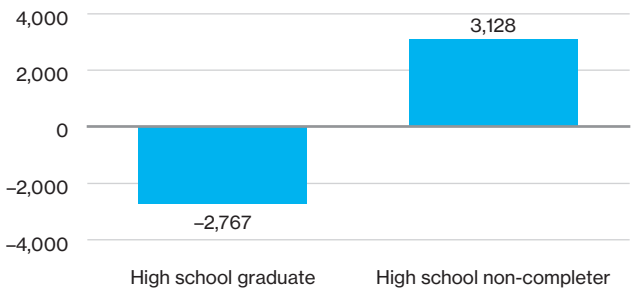
2 Total education expenditures in Ontario consist of expenditures on public education and on training, colleges, and universities. At 72 per cent, however, spending on K–12 public education accounts for the lion's share of Ontario's total education expenditures.

3 See Jackson and others, "The effects of school spending."

This suggests that public education investments that improve educational attainment produce social savings. As such, the second part of this report assesses the social impacts under two scenarios of public education spending—an "investment" scenario and a "dis-investment" scenario. Under our investment scenario, Ontario's high school graduation rate rises from its current level of 86.3 per cent to equal Nova Scotia's 90.0 per cent (the highest in Canada) for the 2019–40 period.[4] Of course, in the real world, there is a long time-lag effect between the period of increased spending and its effect on high school graduation rates. Nevertheless, our scenario is intended to shed light on the public returns that could be realized from improvements in public education.

Our findings suggest that, under the higher graduation rate, Ontario's government could save an average of $16.4 million each year—or $2,767 per additional high school graduate. (See Chart 1.) For the two decades of improved educational attainment in each graduating cohort over 2019 to 2040, that would add up to total savings of $3.5 billion.

Chart 1
Average annual savings/costs per student
($)



Source: The Conference Board of Canada.

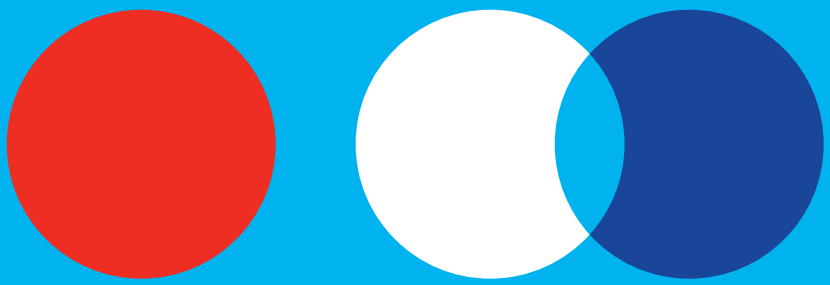
In addition, we considered the reverse scenario—a cut to public education spending that results in an equivalent 3.7 per cent drop in the province's high school graduation rate. This scenario could cost the Ontario government millions of additional dollars in annual program spending. Our findings indicate that Ontario could spend, on average, an additional $18.0 million each year on social assistance, health care, and criminal justice. That equates to $3,128 per additional high school non-completer. Over a 20-year period, this would add up to $3.8 billion in additional program spending. The report, however, did not research every type of public expenditures that is likely to bring social benefits to Ontario.

4 Government of Nova Scotia, "Graduation rates."

In comparison with high school graduates, individuals without a high school diploma are more costly to the province's public resources.

Section 1

Introduction



This report quantifies the economic impacts, as well as the wider social impacts, of public education spending in Ontario. Accounting for one-fifth of total public spending, Ontario's public education sector is an important provider of both jobs and economic activity in the province. That means that any change to public school funding has an impact on the province's economic performance.

At the same time, a strong public education system supports the educational attainment of Ontarians. This brings not just private benefits to the individual in the form of better labour market outcomes,[1] it also brings social benefits to the overall population. For instance, current research links higher levels of educational attainment with higher standards of living, better health outcomes, and reduced crime rates.[2]

In the first part of the report, we evaluate the economic impacts on Ontario from both an increase and a decrease in government spending on public education. The findings suggest that the impact on Ontario's economic growth is greater than the change in public education spending. First, we provide a brief overview of Ontario's public education sector. Second, we describe the model and assumptions used in the economic impact assessment before presenting and discussing the findings.

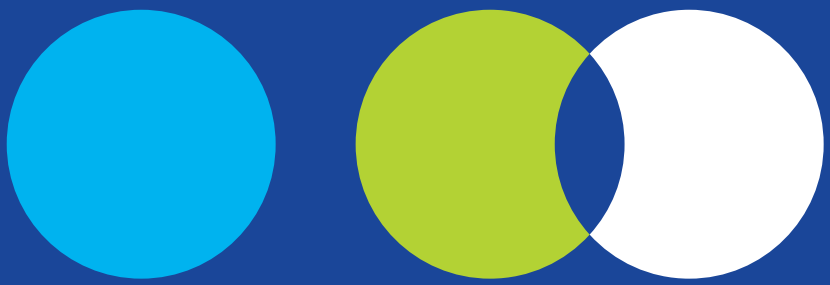
The second part of the report presents the social (or public) returns from improved educational attainment in Ontario—which stem, at least in part, from increases in public education funding. First, we review the current empirical research on the relationship between public education funding and student outcomes, such as high school completion. Second, we assess the fiscal savings or costs from a 3.7 per cent increase or decrease in Ontario's high school graduation rate, which was at 86.3 per cent in 2017. In particular, we evaluate the fiscal impact from changes in the size of Ontario's annual high school graduate pool on three of the province's public resources: social assistance, public health care, and criminal justice services. We describe the data, methodology, and assumptions used to measure the fiscal impact on each public resource.

1 For example, the employment rate for a person with a high school diploma in Ontario is 73.3 per cent, and it is 57.5 per cent for a person without a high school diploma.

2 Lochner and Moretti, "The effect of education on crime"; Jackson and others, "The effects of school spending"; and Cutler and Lleras-Muney, *Education and health.*

Section 2

The economic impacts of public education investments



Introduction

With $23.1 billion in real economic output in 2018, public educational services play a large role in Ontario's economic performance.

Public education in Ontario consists of kindergarten through to Grade 12 (K–12), and includes:

- 4,000 elementary schools
- 850 secondary schools
- 169,572 total educators (140,995 of which are in full-time positions)[1]

One-fifth of Ontario's total public spending was allocated to public education services in 2018, while 38 per cent was spent on public health care and 11 per cent on social services. In total, the public educational service sector supplied 290,000 jobs to Ontarians in 2018—accounting for 4.5 per cent of total jobs in the province.[2]

We used the Conference Board's input-output (IO) model to evaluate the economic impact of public education spending in Ontario. First, we describe the model, as well as the assumptions used in the economic impact analysis. In the second part, we present and discuss the findings.

Economic impact methodology

We describe the methodology used to quantify the economic impact of Ontario's education services sector. This involves identifying the key supply-chain linkages in the public education sector, as well as quantifying the sector's impact on key economic indicators, such as gross domestic product, employment, income, and government revenues. The analysis that follows evaluates the combined direct, indirect, and induced economic impacts:

- Direct impact measures the value-added to the economy by the public education sector that is attributed directly to the sector's employees, wages earned, and revenues generated.
- Indirect impact measures the value-added that the "direct impact" bodies generate within the economy through their demand for intermediate inputs or other support services. For example, activity in the public education sector creates demand for finance, insurance, and real estate services.
- Induced impacts are derived when employees of the aforementioned industries spend their earnings and owners spend their profits. These purchases lead to more employment, higher wages, and increased income and tax revenues, and can be felt across a wide range of industries.

The Conference Board of Canada's provincial input-output model contains detailed linkages between industries, including government education services, based on the North American Industrial Classification System (NAICS). As such, a simulation was performed for the public education sector, using the model to derive the total direct and indirect impacts. The Board's model also has the benefit of assessing the impact on the economy of additional income (induced impacts) generated through changes

1 Statistics Canada, CANSIM Table 477-0028. (This includes teachers, school administrators, and pedagogical support personnel.)

2 Apart from educators, this sector includes jobs that provide food, accommodation, or transportation services to students.

in wages and profits. Results of the economic simulation are available for a wide range of economic indicators represented in the IO model.

Economic impact of public education

The public sector provides benefits to the economy through the jobs in maintaining operations, as well as through investments in new infrastructure and linkages to industries that provide services to the education services sector. The public education sector also has an impact on the economy through what economists refer to as "induced effects." When employees of the public education sector and all the other companies linked to the sector take the money they earn and spend it on goods and services, the economy receives an additional economic benefit in the form of new jobs and activity generated in other sectors of the economy. The sum of the direct, indirect, and induced effects represents the overall impact that the sector has on the economy.

We ran a scenario in which spending on education services is increased by 1 per cent compared with the base-case scenario. In fiscal 2018–19, the Ontario government spent $29.1 billion on public education. The 1 per cent increase represents an additional $291 million in public spending on education services. We didn't carry out a benefit-cost assessment of this change in policy to evaluate the opportunity cost and if this was the best policy alternative.

Due to the linear nature of IO models, the results of the simulation may also serve as a sensitivity analysis that quantifies the economic impacts of increasing expenditures, as well as the economic impact of holding expenditures back.[3]

The Conference Board estimates that the total economic impact of the 1 per cent increase in public spending on education services was $371 million in economic activity, resulting in an economic multiplier of 1.3.[4] We didn't estimate the impact that increased education spending may have on labour productivity. Table 1 provides the economic impact on key economic indicators.

Table 1
Economic impact results: key economic indicators
(level-difference shock minus control, except where otherwise indicated)

Nominal GDP at market prices (2018 $)	371,283,029
Employment	4,234
Wages and salaries	275,303,643
Federal personal income tax	37,130,639
Provincial personal income tax	18,150,056
Corporate taxes*	2,870,100
Retail sales	50,112,243
Sales taxes*	6,997,779
Municipal property taxes and fees	2,999,458
Federal government revenue	54,100,130
Provincial government revenue	36,182,110
Total taxes	**93,281,698**

Note: Unless otherwise indicated, all variables are measured in nominal terms.
*federal and provincial combined
Source: The Conference Board of Canada.

3 The results of the IO shock are static for any given year and do not fully capture the intertemporal effects of household, employer, and industry behaviour over a time span longer than a year.

4 The economic multiplier is calculated as the sum of the direct, indirect, and induced GDP impacts, divided by the direct GDP shock value.

When including indirect and induced impacts, a 1 per cent increase in public spending on education services supports around 4,200 additional jobs. The job creation within the sector itself and within others that benefit indirectly or through induced impacts results in roughly $275.3 million in wages and salaries. This increased income generates additional government revenues, with the lift to household personal incomes resulting in $37.1 million more in federal personal income taxes, $18.2 million in additional provincial personal income taxes, and roughly $7.0 million more in sales tax revenues. The indirect activity that is generated results in the collection of $2.9 million in corporate taxes. Overall, federal government revenues increase $54.1 million, while the provincial government's revenues rise $36.2 million.

Section 3

The social benefits of public education

Introduction

While much is known about the economic and private returns on education, the social benefits that stem from investments in public education have received far less focus and are, not surprisingly, less clear.

For the individual, educational attainment is often linked to better health outcomes, higher lifetime earnings, less precarious work, and a lower likelihood of involvement in criminal activity, as well as to greater political and civic participation (i.e., voting and volunteering). At the same time, these more private gains translate into social and, in turn, fiscal gains. For instance, a healthier population reduces the fiscal burden on public health care, while higher standards of living reduce the demand on social assistance programs. (See Exhibit 1.)

In the sections to follow, we explore the fiscal savings to three areas of government spending in Ontario—social assistance, health care, and criminal justice—that could be realized through raising the province's high school graduation rate. Together, the spending categories accounted for about half of the province's total operating budget in fiscal 2018–19, with health care alone accounting for the lion's share at around 40 per cent.

Ontario is entering a slower period of economic growth, which is expected to persist over the next few years. That will translate into slower revenue growth for the government, making reining in the provincial debt and eliminating the deficit even more difficult. At the same time, the share of the Ontario population 65 and over is projected to rise from 17.2 per cent in 2018 to 24.2 per cent in 2040. A larger senior population will require greater spending on health care, as well as on social assistance programs. Our findings suggest that investments in public education that improve educational attainment could alleviate some of the rising cost pressures of public health care and social assistance in Ontario.

Exhibit 1
The private, social, and fiscal benefits of education

Source: The Conference Board of Canada.

First, we present an overview on the current research on public education spending and student outcomes. The findings in general reinforce a major assumption that underpins our social impact calculations—that public education spending can lead to student outcome gains, such as higher levels of high school completion. We then explore the cost savings to social assistance, health care, and criminal justice programs in Ontario that could be made from investing in education and raising the province's high school graduation rate. For each, we describe the methodologies and assumptions that underpin the estimates.

Public education investment and student achievement

Do changes in public school funding have an impact on student achievement? Although the answer that they do indeed have an impact appears clear to most, the question has been debated at least since the 1966 release of the Coleman Report, one of the first large-scale studies into the impacts of public school funding on student achievement.

Published under the title *Equality of Educational Opportunity*, the report found only a small relationship between a school's financial resources and its students' outcomes. Instead, it suggested that out-of-school factors, such as a student's socio-economic status, accounted for most of the variation in student outcomes. Findings in many of these earlier studies, including in the Coleman Report, were correlational due to the methodological limitations at the time and were largely a mixed bag in their findings of an association between public school funding and student outcomes.

Since the Coleman Report was released more than half a century ago, better research design techniques and better data (e.g., longitudinal data sets) have allowed researchers to produce causal estimates—rather than just correlations—between public school funding and student outcomes.[1]

Using quasi-experimental methods,[2] economist C. Kirabo Jackson and his colleagues found that a 10 per cent annual increase in per-pupil spending throughout a student's K–12 education was associated with a 0.3 per cent increase in educational attainment, a 7 per cent increase in wages, and a 3.2 per cent reduction in annual adult poverty.

In a related study, Jackson and his colleagues examined how student outcomes responded to the public education cuts during the Great Recession. Here, they found that a 10 per cent cut in public school funding during all four high

1 The more current research relies on exogenous shocks to public education spending to isolate the impact of educational inputs on student achievement.

2 Jackson and his colleagues conducted a randomized experiment using difference-in-difference and instrumental variable estimation techniques to isolate the causal effect of increases in educational inputs on student outcomes. See Jackson and others, "The effects of school spending."

school years was associated with a 2.6 per cent drop in the high school graduation rate.

More is also becoming known about the circumstances under which public education spending is effective in impacting student outcomes. For instance, the Jackson team's estimates of the impacts from a permanent 10 per cent increase in public education spending were largest for low-income students. Poor students were associated with a 0.5 per cent increase in educational attainment and a 10 per cent higher high school graduation rate when spending was increased, while non-poor students were associated with a 0.1 per cent increase in educational attainment and a 2.5 per cent increase in the high school graduation rate. Moreover, the estimates further suggest that increases in public education spending that go toward reducing class sizes and increasing teachers' base salaries could be more effective in improving student outcomes than those aimed at other purposes.

Educational attainment in Ontario

Over the past two decades, Ontario has seen considerable gains in high school completion. The province's high school graduation rate has risen by around 18 percentage points since 2004, increasing from 68 per cent to 86.3 per cent in 2017. The beginning of this period was marked by new investments targeted at improving student success, and by a rise in Ontario's compulsory school age from 16 to 18 in 2006.[3] Improvements to the high school graduation rates can explain, in part, the evolution of educational attainment in Ontario.[4] (See Chart 2). One-fourth of Ontario's adult population was without a completed high school education in 1986. However, that percentage had shrunk to 7 per cent by 2016.

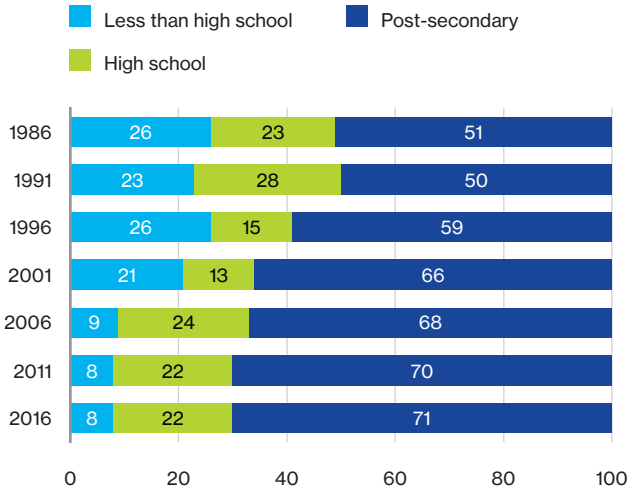
3 Anderson and Jaafar, *Policy trends in Ontario education*.

4 The large inflow of educated and skilled immigrants into Ontario was a significant force behind Ontario's shifting educational attainment levels.

Chart 2

Educational attainment in Ontario for persons age 25–34, 1986–2016

(share of Ontario population between the ages of 25 and 34, by highest level of education, per cent)



Sources: Statistics Canada, Censuses 1986, 1991, 1996, 2001, 2006, 2011, 2016; The Conference Board of Canada.

Recent research into the causal effects of public school spending on student outcomes is compelling and, in general, consistent in showing that large permanent changes in public school funding can impact student outcomes over the medium and long terms.

In this report, we use the hypothesis that changes in public school funding can affect student outcomes, such as high school completion. As such, and in addition to the economic impacts, we also measure the social and fiscal impacts that could result from both gains and losses in student achievement, which we measure through the province's high school graduation rate.

Measuring the social benefits of public education

In the sections that follow, we measure the fiscal impacts associated with a rise in student achievement that could result from investments in Ontario's public education spending. We assume that that the relationship between education and other outcomes is causal.

While most of the recent research is within a U.S. context, it is nonetheless consistent with how public education spending can affect student outcomes, such as high school completion, as well as labour income over the longer term. As such, we use Ontario's high school graduation rate as a measure of student achievement.

We evaluate the fiscal impacts under a scenario in which Ontario's high school graduation rate improves to 90.0 per cent (through new spending investments that target student achievement) in 2019 through to 2040. Our research, however, doesn't estimate how much public spending in education is required to improve the high school graduation rate to 90.0 per cent in Ontario. Our 90.0 per cent target reflects the highest provincial high school graduation rate in Canada, a title that Nova Scotia holds, and is a conservative and achievable goal for Ontario.[5] Although, in real life, new spending initiatives would only translate into student achievement gains over time, this scenario is intended to illustrate the fiscal savings that would stem from improvements in public education. For comparative purposes, we explore the fiscal impacts under a reverse scenario, in which Ontario's high school graduation rate falls over the same period.

To evaluate the relative impacts, we compared the scenario to a baseline case in which high school graduation rates remain at their current (2017) level of 86.3 per cent over 2019 to 2040. Using these three scenarios, we estimate the fiscal savings/costs related to social assistance, health care, and criminal justice in Ontario over 2019 to 2040. Table 2 summarizes our scenarios.

Table 2
Our scenarios

Scenario	Description
Baseline – No improvement in the graduation rate	Ontario's high school graduation rate is maintained at its 2017 level of 86.3 per cent over 2019–40.
Scenario A – An investment in public education leads to gains in the graduation rate	Ontario's high school graduation rate improves to 90.0 per cent over 2019–40, matching the highest provincial rate in Nova Scotia.
Scenario B – A disinvestment in public education leads to drops in the graduation rate	Ontario's high school graduation rate falls to 82.6 per cent over 2019–40.

Source: The Conference Board of Canada.

5 Government of Nova Scotia, "Graduation rates."

Methodological limitations

Our cost saving estimates likely underestimate the true fiscal savings from improvements in Ontario's high school graduate rate. A high school diploma is a stepping stone to higher education. More than one-third of Ontarians between the ages of 20 and 24 have attained an education higher than a high school diploma.[6] That suggests that a share of the additional graduates under our scenario could go on to attain a higher education, which would bring additional fiscal savings related to social assistance, health care, and criminal justice. For example, the estimates from our logistic regression suggest that the likelihood that a college degree holder in Ontario will use social assistance is only 70 per cent of that for high school non-completers, with that likelihood sinking to 40 per cent if the person has a bachelor's degree.

Moreover, our estimates do not capture the general equilibrium effect of higher educational attainment levels among Ontario's population. In other words, we "hold all else equal" in evaluating the fiscal impacts. Higher high school graduation rates would lead to higher levels of human capital in Ontario's labour market, which in turn could devalue the price of a high school education.

6 Statistics Canada, "2016 census of population."

The impact of public education on provincial social assistance spending

Education is often linked to higher earnings, better job opportunities, less precarious work, and, in general, a higher standard of living. As such, those without a high school diploma are often put at greater risk of having to draw from social assistance programs. This suggests that investing in public education to improve high school completion can have spillover effects on the province's social assistance expenditures.

The earnings premium on a high school diploma in Ontario

Using labour economist Jacob Mincer's 1974 model of earnings that controls for potential experience and other relevant factors, we estimate that high school graduates in Ontario earn 26 per cent more than high school dropouts. And that earning premium rises with education attainment, as those with college degrees in Ontario earn, on average, 60 per cent more than high school dropouts, those with bachelor's degrees earn 93 per cent more, and those with more than a bachelor's degree earn 114 per cent more than a high school dropout. (See Table 3 in Appendix A for the estimated coefficients.)

Improving the high school graduation rate can produce fiscal savings. Although high school non-completers can draw on other forms of welfare (e.g., employment insurance) at greater rates as well, our discussion is centred on social assistance benefits that are a provincial responsibility.

Assumptions

Data used in the analysis are drawn from the cross-sectional public use microdata files (PUMFs) of the 2016 Canadian Income Survey (CIS). The CIS provides us with a means of matching data on provincial social assistance use and data on educational attainment. The CIS collects data on the incomes, as well as income sources, of Canadian respondents. It is supplemented with the data from the Labour Force Survey (LFS) on individual and household characteristics, such as age, sex, educational attainment, and geographic location.

In estimating the relationship between education and social assistance, a logistic (logit) regression model is used that controls for relevant socio-demographic factors.[7] In other words, this approach assumes that differences in the use of social assistance between high school graduates and high school dropouts are a result of the different levels of schooling, rather than some other relevant factor, such as sex, age, or being an immigrant. Our regression analysis is restricted to a sample of 10,118 Ontario respondents to the CIS between the ages of 18 and 65. The CIS is administered to a sub-sample of the Ontario population. As such, the sample weights provided in the CIS are used to generate sample estimates that can be applied to the entire Ontario population.

Using the CIS sample, we calculate the prevalence of social assistance use based on educational attainment in Ontario. We find that 11.6 per cent of high school dropouts in Ontario use social assistance versus 8.5 per cent for high school graduates. And that percentage falls as educational attainment rises—7.2 per cent for those with college degrees and 3.8 per cent for those with a university degree.

To arrive at our results, we consider two means for which improved graduation rates can affect social assistance spending in the province. First, we assume a reduction in the number and the value of social assistance receipts from a drop in the number of high school dropouts. Second, we take into consideration that a portion of high school graduates will draw on social assistance—although the prevalence and value of their use is less than that of high school dropouts. Similar assumptions are made in calculating the effect on social assistance from a fall in Ontario's high school graduation rate.

7 Logistic and probit regressions model the relationship between a categorical response variable, which takes values of either 1 or 0, and a set of independent variables. Here, we are interested in whether the use (1) or no use (0) of social assistance can be predicted by educational attainment levels.

The findings

Our estimates suggest that high school dropouts in Ontario are more than twice as likely as high school graduates to use provincial social assistance. (We provide the estimates from our logistic model in Table 1 of Appendix A.) Not surprisingly, that rate declines with educational attainment. The rate of social assistance use by college degree holders in Ontario is 70 per cent that of high school non-completers, while the rate for a holder of a bachelor's degree or higher is just 40 per cent as high. If high school graduation rates were to improve from 86.3 to 90.0 per cent, we estimate that the additional graduates in each graduating cohort would lead to annual cost savings of $5.1 million for Ontario's social assistance programs. As the cost savings attached to each cohort of additional graduates would be lasting, the cumulative savings from improving graduation rates would be $1.1 billion over the next two decades. (See Chart 3.)

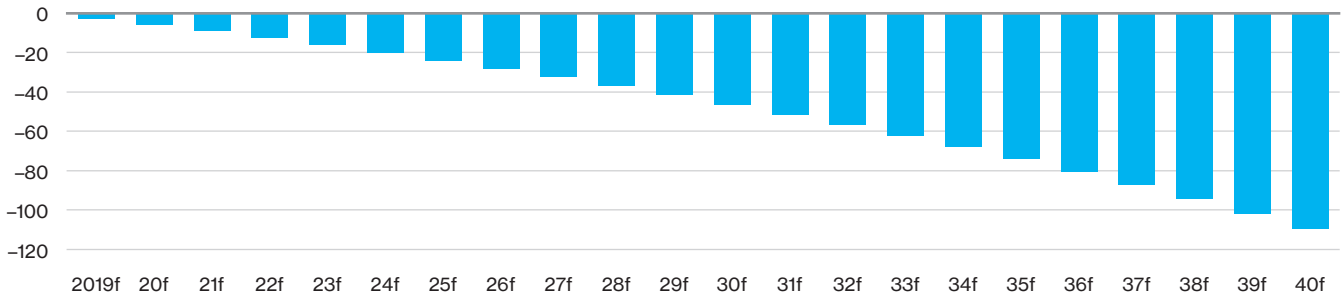
The impact of public education on health care spending

Research has shown that better educated people have better health outcomes.[8] The "why" part of the relationship between education and health is also becoming better understood in the literature. The consensus appears to be that a substantial part of the relationship can be explained through the economic resources that education provides,

Chart 3

Cumulative cost savings for Ontario's social assistance programs

($ millions)



f = forecast
Source: The Conference Board of Canada.

8 Cutler and Lleras-Muney, *Education and health*.

such as higher earnings, stable and safer work conditions, and private health insurance.[9,10] However, other research suggests that cognitive abilities also play a large role in education's impact on health.[11]

Assumptions

We assume that the main mechanism in which education impacts health is through the attainment of financial resources, such as higher income, which can be used to improve health. And this is echoed in existing studies, which found that financial resources can explain one-third of the association between education and health.[12]

In an ideal world, data would exist that link health care use and costs to educational attainment. But given that such data are not available to us, we draw on the results from work by health scientist Cameron Mustard and his team, which estimates the share of Canada's public health expenditures by income quintiles in Canada.[13] For instance, their results suggest that Canada's lowest-income quintile accounts for 31 per cent of public health expenditures, with the share of public health expenditures declining as income increases.

From the CIS, we calculate shares of the Ontario population based on income quintiles as well as education level, which we use to further decompose the Mustard team's estimates based on educational attainment levels. Using Ontario's public health care expenditures and estimates of Ontario's population based on education levels, we then calculate the per capita public health care costs for high school graduates and high school dropouts. We find that, on average, a high school dropout in Ontario uses $808.10, or 71 per cent, more in annual public health care than does a high school graduate.

The findings

If high school graduation rates were to improve to 90.0 per cent over our time period, Ontario could see average annual savings of $6.4 million to public health care. This amounts to $1.4 billion in cumulative savings resulting from the reduction in the pool of high school dropouts in each of the graduating cohorts over the next two decades. (See Chart 4.)

9 Ibid.

10 However, Cutler and Lleras-Muney, as well as Frisvold and Golberstein, have shown that education's impact on health remains large and significant even when controlling for factors related to socio-economic status (e.g., income and job characteristics). This signals that education policies could have the potential to impact a population's health.

11 Cutler and Lleras-Muney, *Education and health;* and Frisvold and Golberstein, "The effect of school quality."

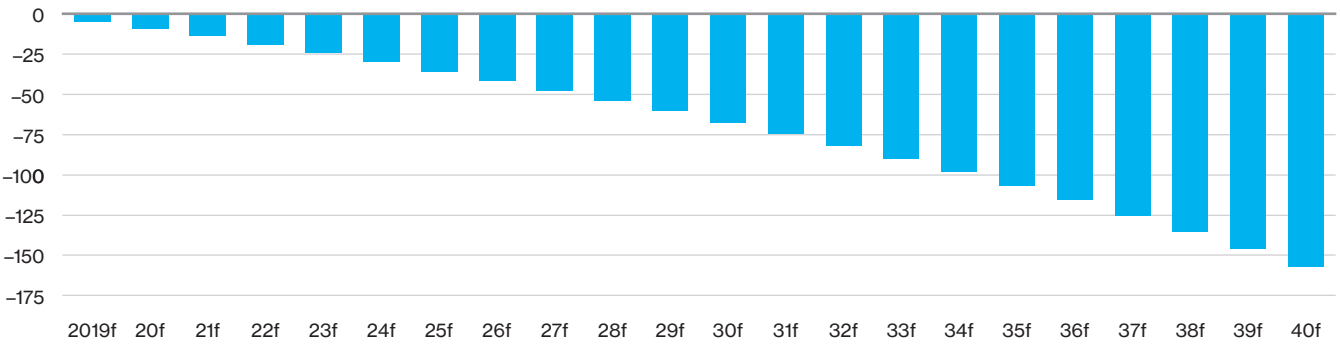
12 Cutler and Lleras-Muney, *Education and health*.

13 Mustard and others, "Paying taxes and using health care services."

Chart 4

Cumulative cost savings to public health care in Ontario

($ millions)



f = forecast
Source: The Conference Board of Canada.

The impact of public education on criminal justice spending

Education attainment is also a means of reducing crime rates in a population. Education can often provide the economic resources, such as higher earnings and better job opportunities, that reduce the incentives—or, in economic terms, increase the opportunity costs—of engaging in crimes. For instance, economists Lance Lochner and Enrico Moretti found that U.S. states that increased high school graduation rates saw drastic declines in incarceration rates.[14]

Assumptions

Data that link incarceration rates to educational attainment are not available to us. As such, we draw on U.S. findings from Lochner and Moretti that suggest the social savings per additional graduate from crime reduction are 14 to 26 per cent of the private return per additional graduate. In her study, political scientist Olena Hankivsky adjusted the lower bound of Lochner and Moretti's estimate to fit within a Canadian context in which crime and incarceration rates are lower. In doing so, the social return to crime in Canada was found to be 6.43 per cent of the private return.[15] We draw on this estimate and 2016 census data that cross-sections education and average annual income to arrive at our saving estimates.

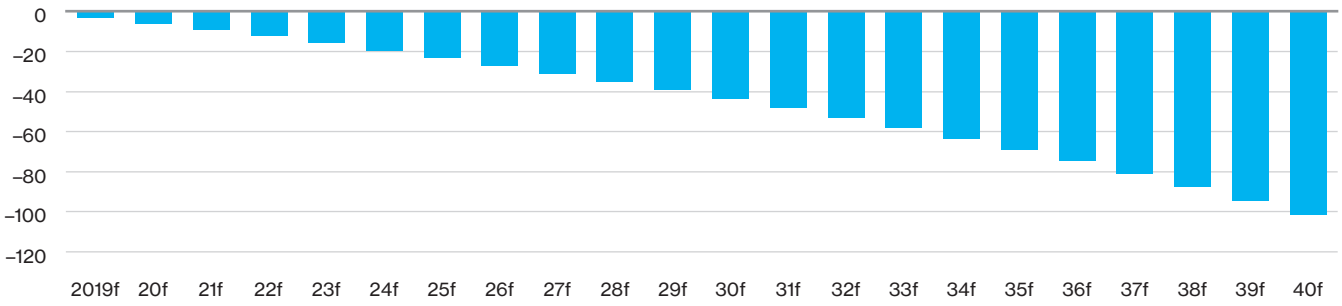
Results

Under a 3.7 per cent improvement to high school graduation rates, Ontario could realize average annual savings of $4.9 million to its criminal justice spending. Over the span of two decades, this would amount to $1.0 billion in aggregate savings from a reduction in high school dropouts and, in turn, crime rates. (See Chart 5.)

Chart 5

Cumulative cost savings to Ontario's criminal justice system

($ millions)



f = forecast
Source: The Conference Board of Canada.

14 Lochner and Moretti, "The effect of education on crime."

15 Hankivsky, *Cost estimates of dropping out of school*.

Does education make better citizens?

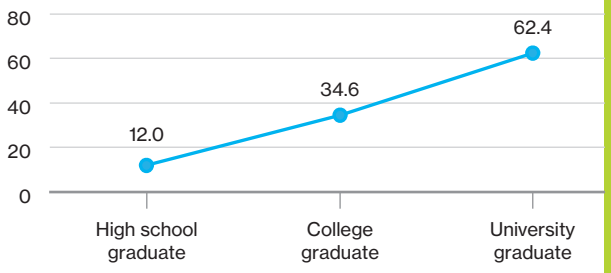
While its fiscal impact may be less, another social benefit known to stem from education is increased civic involvement. Education provides students with the skills and knowledge required to make informed decisions, facilitating civic behaviours such as voting, volunteering, and charitable giving.[16] For example, studies by economists Thomas Dee and by Kevin Milligan, Enrico Moretti, and Philip Oreopoulos found that higher educational attainment generated substantial increases in voter turnout.

Due to data limitations, our discussion is limited to the relationship between educational attainment and two measures of civic engagement—volunteering and charitable giving. We use data from the cross-sectional PUMFs from Statistic Canada's 2013 General Social Survey (GSS) on Giving, Volunteering, and Participating. The GSS contains data on whether the respondent has volunteered and/or given to charity in the last 12 months, as well as on several social-economic and demographic characteristics.

To model the relationship between educational attainment and civic engagement, we use a probit regression that controls for socio-economic and demographic factors, such as age cohort, region, and income, that could influence the likelihood that a respondent engages in civic activities. (See Table 2 in Appendix A for coefficient estimates.)

Our findings are consistent with the claim that better-educated individuals engage more in civic activities. The estimates from our probit regression suggest that high school graduates are 12 per cent more likely to engage in volunteering or giving than an individual with less than a high school diploma. (See Chart 6.) That increased likelihood of civic involvement rises to 35 per cent for college graduates and to 62 per cent for university graduates.

Chart 6
Civic engagement rises with education
(likelihood of engagement, per cent)



Sources: The Conference Board of Canada; Statistics Canada, *General social survey, cycle 27: Giving, volunteering and participating*; public use microdata files.

16 Dee, "Are there civic returns to education?"

The fiscal costs of a reduction in school achievement

But what if public education spending is lowered, leading to a drop in the high school graduation rate? In this scenario, Ontario's high school graduation rate is lowered from 86.3 per cent to 82.6 per cent from 2019 through to 2040. This allows us to compare the results under the two scenarios. (We recognize that a fall in the high school graduation rate of this magnitude is unlikely, as high school graduation rates have not fallen over the past two decades—with the exception of 2017, when the high school graduation rate fell 0.2 percentage points. Nevertheless, the following scenario shows that there are significant societal costs associated with high school non-completers.)

As with the first scenario, we measure the additional costs to social assistance, public health care, and criminal justice services in Ontario that could result from a fall in the high school graduation rate. (Because our methodologies and assumptions are identical to those for the first scenario, we will not repeat them here and, instead, go straight to the results.) Not surprisingly, we find that the magnitude of the public costs is greater than the savings under our first scenario, as the costs to the province of a high school dropout are more than the savings that flow from a high school graduate.

The impact on provincial social assistance

The estimates from our earlier logistic regression found that the likelihood of a high school non-completer using provincial social assistance is more than twice that of a high school graduate. If the high school graduation rate were to fall to 82.6 per cent as a result of a cut to public education funding, it could cost Ontario an average of $6.4 million each year in provincial social assistance programs. Over two decades, Ontario could see the additional fiscal costs to social assistance accrue to $1.4 billion.

The impact on public health care

Our findings suggest that a high school non-completer uses, on average, $808.10 (or 71 per cent) more in annual per capita health care expenditures than does a high school

A high school non-completer uses, on average, $808.10 more in annual per capita health care expenditures than does a high school graduate.

graduate. Under a scenario in which the high school graduation rate falls to 82.6 per cent, Ontario would spend, on average, an additional $6.7 million each year on public health care. That would amount to total fiscal costs of $1.4 billion over a 20-year period.

The impact on criminal justice spending

Due to the manner in which we estimate the impact on the criminal justice system, we are limited to estimating the fiscal savings from an increase in high school graduates. However, and for the benefit of our inverse scenario, we can assume that the fiscal costs if the high school graduates under our investment scenario were instead non-completers would mirror the fiscal savings that we saw for graduates.

If the high school graduation rate fell to 82.6 per cent—shifting a portion of otherwise graduates into non-completer status—it would cost the Ontario government an additional $4.9 million each year on criminal justice services, for a total of $1.0 billion in additional costs over the next two decades.

Table 3 summarizes the results from the two scenarios. Under the scenario where high school graduation rates improved to 90.0 per cent, the Ontario government could see average annual total savings of $16.4 million across the social assistance, health care, and criminal justice services, or total savings of $3.5 billion over the span of two decades. This amounts to, on average, $2,767 per additional high school graduate in Ontario.

Under the reverse scenario, where high school graduate rates instead fall to 82.6 per cent, Ontario could see additional average annual costs of $18.0 million—for total costs of $3.8 billion over two decades. Our findings indicate that Ontario spends an additional average annual amount of $3,128 per student who does not complete high school.

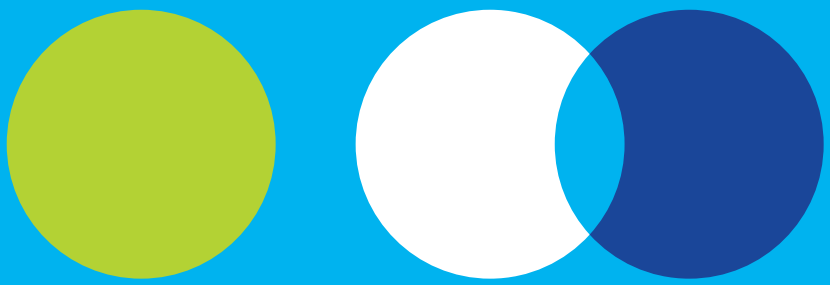
Table 3
Summary of the results
(change in costs)

	Social assistance		Health care		Criminal justice		Total	
Scenarios	Average annual	Cumulative*	Average annual	Cumulative*	Average annual	Cumulative*	Average annual	Cumulative*
High school graduation rate rises to 90.0 per cent	–$5.1 million	–$1.1 billion	–$6.4 million	–$1.4 billion	–$4.9 million	–$1.0 billion	–$16.4 million	–$3.5 billion
High school graduation rate falls to 82.6 per cent	$6.4 million	$1.4 billion	$6.7 million	$1.4 billion	$4.9 million	$1.0 billion	$18.0 million	$3.8 billion

*This refers to the total savings from the additional graduates/non-completers from each graduating cohort over the 20-year period.
Source: The Conference Board of Canada.

Section 4

Conclusion



In the first part of the report, we assessed the economic impacts from increased and decreased spending on Ontario's public educational services. Our findings suggest that changes in public education spending have a significant impact on the province's economic performance, including an estimated total increase in Ontario's economic activity of $371 million from a 1 per cent increase in public education spending.

Since a large share of public education expenditures goes toward wages and salaries (and is thereafter spent within the region), public education spending creates an elevated total multiplier of 1.3. That means that, on average, for each $1.00 spent on public education, Ontario's GDP will increase by $1.30.

In addition, we found that a 1 per cent increase in government spending on public education services supports around 4,200 additional jobs and provides a $275.3 million boost to Ontarian's wages and salaries. In turn, government coffers also benefit, as the lift to income results in $37.1 million more in federal personal income taxes and $18.2 million in provincial personal income taxes. In the second part of the report, we assumed that changes in public education spending can impact high school graduation rates, which is consistent with current research. As such, we quantified the social impacts that arise from improvements (or, conversely, reductions) in Ontario's high school graduate pool. Social benefits arise, as high school graduates tend to have better labour market outcomes, higher standards of living, better health outcomes, and lower crime rates than high school non-completers. That, in turn, places less demand on Ontario's public resources, such as social assistance, health care, and criminal justice services.

Under a scenario in which high school graduation rates rise 3.7 per cent, our findings suggest that Ontario can save, on average, a total of $16.4 million—or $2,767 per additional graduate—across social assistance, public health care, and criminal justice spending. However, the effects from a boost to educational attainment are long-lasting. As such, the annual savings could amount to a total of $3.5 billion in savings over two decades of improved educational attainment.

Conversely, under a scenario in which high school graduation rates instead fall to 82.6 per cent, Ontario could see additional average annual costs of $16.8 million—for a total of $3.8 billion over two decades. Moreover, our findings indicate that Ontario spends an average annual amount on services of $3,128 per student that does not complete high school.

The savings are small relative to Ontario's total operating budget. However, our scenarios nonetheless indicate that there is a public cost to not sustaining educational attainment. Furthermore, our findings suggest that improvements to public education could be a means of alleviating costs in other public expenditures, such as social assistance, health care, and criminal justice services.

Appendix A
Coefficient estimates

Table 1
The effect of education on provincial social assistance use

Variable	Coefficient	Prob.
Constant	–3.70*	0.0
Age	0.07*	0.5
Age^2	0.00*	0.5
Immigrant	0.09*	0.5
Less than high school	0.81*	0.7
College	–0.35*	0.4
University	–1.00*	0.3

Notes:
1. Dependent variable is whether the respondent has drawn on provincial social assistance.
2. Reference case is a high school graduate.
3. Sample is all Ontario respondents between the ages 18 and 65 in the 2016 Canadian Income Survey.
4. The coefficients from a logistic regression are logged odd ratios. As such, the coefficient is exponentiated to obtain the odd ratio.

*indicates significance at 1 per cent level.
Sources: The Conference Board of Canada; Statistics Canada, 2016 Canadian Income Survey; public use microdata file.

Table 2
The effect of education on civic engagement

Variable	Coefficient	Marginal effects
Constant	–0.38*	–0.15
Generational cohort	0.00*	0.00
High school graduate	0.12*	0.05
College	0.35*	0.14
University	0.63*	0.25
Income	0.00*	0.00

Notes:
1. Dependent variable is whether the respondent has either volunteered or charitably given in the past 12 months.
2. Reference case is a high school non-completer.
3. Sample are all Canadian respondents between the ages of 18 and 65 in the *General Social Survey, Cycle 27: Giving, Volunteering and Participating*.

*indicates significance at 1 per cent level.
Sources: The Conference Board of Canada; Statistics Canada, *General social survey, cycle 27: Giving, volunteering and participating*; public use microdata file.

Table 3
The private returns to educational attainment

Variable	Coefficient	Standard error
Constant	9.08*	0.01
Experience	0.03*	0.00
Experience^4	–0.00*	0.00
High school	0.27*	0.02
College	0.69*	0.02
University	1.00*	0.02

Notes:
1. Dependent variable is the logarithm of the respondent's wages and salaries.
2. Reference case is a high school non-completer.
3. Sample is all Ontario respondents between the ages of 18 and 65 in the 2016 Census.

*indicates significance at 1 per cent level.
Sources: The Conference Board of Canada; Statistics Canada, 2016 census; public use microdata file.

Appendix B
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