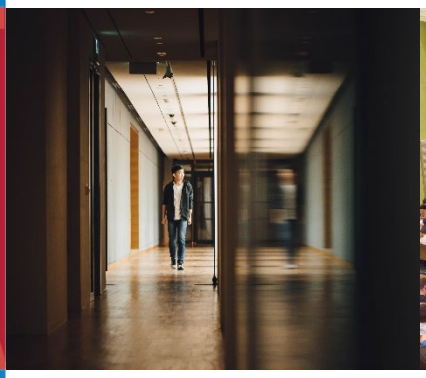

Net Costs of Postsecondary Non-completion in Ontario

A benefit-cost analysis for HEQCO

16 APRIL 2025

Ashley Pullman | Audrey Appiah | Catherine Yeh |
Masashi Miyairi | Michael Dubois | Reuben Ford | Taylor Shek-wai Hui

The Social Research and Demonstration Corporation (SRDC) is a non-profit research organization, created specifically to develop, field test, and rigorously evaluate new programs. SRDC's two-part mission is to help policy-makers and practitioners identify policies and programs that improve the well-being of all Canadians, with a special concern for the effects on the disadvantaged, and to raise the standards of evidence that are used in assessing these policies.

Since its establishment in December 1991, SRDC has conducted over 550 projects and studies for various federal and provincial departments, municipalities, as well as other public and non-profit organizations. SRDC has offices located in Ottawa and Vancouver, and satellite offices in Calgary, Hamilton, Montreal, Regina, Toronto, and Winnipeg.

For more information on SRDC, contact

Social Research and Demonstration Corporation
55 Murray Street, Suite 400
Ottawa, Ontario K1N 5M3
613-237-4311 | 1-866-896-7732
info@srdc.org | www.srdc.org

Vancouver Office
890 West Pender Street, Suite 440
Vancouver, British Columbia V6C 1J9
604-601-4070

Remote offices:
Alberta, British Columbia, Manitoba,
Ontario, Quebec, and Saskatchewan
1-866-896-7732

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Ontario postsecondary students not completing their education has significant cost implications for multiple stakeholders. Students who don't graduate may miss out on higher earnings, institutions may receive less funding, governments may see lower returns on educational investments, and society may suffer from reduced workforce skills. However, the true consequences of non-completion aren't well-defined, particularly relative to not attending higher education at all. Previous SRDC Research commissioned by the Higher Education Quality Council of Ontario found that about 24.7 per cent of Ontario postsecondary students didn't earn a credential within seven years, and non-graduates earned approximately 50 per cent less than graduates when entering the job market.

This report utilizes a cost-benefit analysis comparing the net costs of non-completion versus completion against non-participation among comparable individuals. Through comprehensive data analysis utilizing multiple microdata sets, econometric modelling of counterfactuals, simulations and forecasting, the report monetizes various components of costs within a cost-benefit framework.

The results include (a) estimates of costs incurred by non-completers over their lifetimes relative to their situation if they had not participated and (b) estimates of costs incurred by the same non-completers over their lifetimes if they had completed their postsecondary education, again relative to their situation if they had not participated. The results that are the central focus of this report estimate the difference between the values in (a) and (b), which represents the additional costs non-completers incur over their lifetimes relative to their situation if they had completed.

COSTS OF NON-COMPLETION OF PSE RELATIVE TO NON-PARTICIPATION

- The overall 'cost' for non-completers relative to non-participants is negative, meaning they gain from participating in PSE even though they did not complete. They lose on tuition, other educational expenditures and the income they did not earn while studying, but this is more than offset by their student aid and (especially) their higher prime working life earnings. Their higher prime working life earnings also bring in higher tax bills and more EI and CPP premiums than if they had not participated in PSE, but their higher income still outweighs these costs.

- These additional working life earnings yield substantial tax revenues to Ontario and federal governments, meaning governments more than recoup the amounts they spend to support students via funding to institutions and student aid.

- The net result is society gains from non-completion relative to non-participation. Institutions lose out, however, as they spend more to support non-completing students than the tuition and government funding they receive to support them.

COSTS OF COMPLETION OF PSE RELATIVE TO NON-PARTICIPATION

- The results are similar for completion as for non-completion but the amounts are somewhat amplified. As might be expected, earnings gains from completion are even more substantial relative to not participating in PSE. The lifetime net returns to PSE completion per student are estimated close to $600,000 in 2021 dollars.

- Completing means paying pay more in tax so governments gain even more when PSE is completed, given the extra student aid and direct support to institutions is much smaller in magnitude than the extra earnings gain. Society is better off by almost $1m for every non-completer who completes.

NET COSTS OF NON-COMPLETION

- The difference between the two sets of results above determines the final estimates of the net cost of non-completion. Non-completers save on tuition and other educational expenditures, and net somewhat more in foregone earnings than if they had completed but they lose out on a substantial earnings premium that comes with graduation. While this means they pay less to government in taxes and EI/CPP premiums, the net loss from non completion is more than a third of a million dollars over their lifetimes.

- There is a small difference for institutions when students do not complete, with most of this small dollar gain coming from the administration costs they do not pay for students who attend for less time.

- Governments lose out on potential gains for each non-completer relative to if they had completed, roughly $110,000 for Ontario and $125,000 for federal sources. The net loss to society is more than $600,000.

IMPLICATIONS AND NEXT STEPS

The results of SRDC's analysis point to the potential benefits of investing in interventions for increasing completion rates. Our comparison of the costs of non-completion relative to non-participation in PSE suggests that the decision to take up PSE is on average the right one regardless of whether the student goes on to complete. The outcome for PSE participants is that they are better off over their lifetime than if they had not participated. This is not to say that participating in PSE would make everyone better off, since our study only modelled the behaviour of participants. Nonetheless, our results suggest that governments, individuals, and society all benefit from even some PSE participation while the cost of non-completion for institutions is low.

The net costs of non-completion suggests that there are substantial benefits to be realized if non-completers can be supported to complete. Governments lose out on approximately $235,000 over the lifetime of each non-completer. Plausibly funding for interventions per non-completer of even just a tenth of this amount could generate substantial returns on investment for governments and other stakeholders over students' lifetimes.

Our estimation thus points to scope for widespread gains from policy efforts to find appropriate ways to encourage postsecondary completion. The implication is that there is a strong financial case for two key next steps to be taken urgently:

- to develop appropriate interventions that can support students to complete their studies who might otherwise fail to complete and
- to develop targeting mechanisms to direct the interventions that are found effective to the students most likely to benefit.

INTRODUCTION

Students enrolling in postsecondary programs without graduating is often portrayed as a policy issue, one with possible cost-related consequences. It could be costly for students who discontinue their education and do not reap the earnings benefits associated with a credential. It may be costly to institutions who receive lower amounts of funding through tuition or government transfers to cover operating costs (if they are based on student enrollment counts) when students leave prematurely. It may be costly to provincial and federal governments when they invest in the postsecondary education (PSE) and student aid, but a portion of students do not go on to complete a credential and pay less in taxes as a result. It may also be costly to society in the form of net lower skills in the workforce and reduced societal productivity, again reflected in lower net earnings.

However, the consequences of non-completion are not typically well-defined, nor are they often compared to the outcomes and situation of students who do not attend higher education at all. Even if people don't achieve a higher education credential, what if they acquire new skills through studying that are useful in the labour market? Are there financial benefits to students if they learn valuable information about their innate abilities through their incomplete studies? What about the social network that a person may build through studying, contacts who can support them in finding well-matched employment, even if they do not go on to complete a credential?

To inform the policy conversation in Ontario related to the costs of non-completion, the Higher Education Quality Council of Ontario (HEQCO) commissioned research from the Social Research and Demonstration Corporation (SRDC) in 2023 on four topics: 1) the definition of non-completion; 2) the measurement of non-completion across a set of student and program characteristics; 3) post-schooling outcomes associated with whether students completed or did not complete PSE; and 4) the net costs of non-completion relative to completion for the various stakeholders involved. Research on the first three topics, based on a system-wide definition of non-completion, found that 24.7 per cent of students who entered Ontario postsecondary programs at the undergraduate level or below did not earn a credential within seven years, a rate that decreased to 22.8 per cent by eight years (Colyar et al, 2023). Students who did not graduate earned approximately 50 per cent less than graduates when entering the labour market once SRDC's regression model accounted for other factors. While the study did not provide insight into the mechanisms that caused students to leave higher education prematurely (for prior research on the range of reasons, see McCarty, DeDiego, Carrier, & Thompson-Ebanks, 2023), it did find that certain program and background factors were associated with non-completion.

This report provides an answer to the fourth topic of research: a cost-benefit analysis that assesses how the net costs of non-completion to students, institutions, governments, and society compare to those attributable to the completion of credentials among comparable individuals. To develop and monetize the plan, we engaged in comprehensive data analysis as outlined in full in Appendix A—including several different types of estimation in order to monetize each component in the cost-benefit analysis framework that is described next.

In the implications section of this report, we use the results to estimate potential returns from investments that convert specified proportions of non-completers to completers, which could justify future testing of potential interventions that aim to increase the rate of completion.

OVERALL APPROACH

Background and considerations

SRDC adopts a cost-benefit analysis approach that measures the net costs of PSE non-completion in Ontario for students, institutions, governments, and society as a whole. "Net costs" are estimates of the costs of a given activity minus their estimated benefits. In the case of non-completion, net costs are a concern when they are positive (i.e., when the activity's costs exceed its benefits).

Take, for example, the perspective of students. There may be costs incurred when they start PSE but do not complete a program in the form of tuition paid and foregone earnings while not in the labour force. Nevertheless, non-completing students may still benefit from their time spent in college or university, even if they did not eventually go on to earn a credential (e.g., they may learn new skills or expand their social networks), that will help them find a higher paying job than people who did not attend PSE at all. Therefore, it cannot be assumed automatically that the net costs of non-completion are necessarily higher than:

- if they had gone on to complete PSE, since they would also have incurred costs associated with attending (presumably more) higher education, or
- if they had never entered PSE in the first place, and did not realize an earnings premium attributable to their time spent in higher education.

Indeed, research from the United States finds that people who do not complete PSE are more likely to be employed and earn more than their counterparts without a history of PSE attendance (Giani, Attewell, & Walling, 2020). Research across 18 European countries finds that non-completers earn less than PSE graduates but more than people who never attended PSE in the first place (Berlingieri & Bolz, 2020).

Therefore, this cost-benefit analysis asks: *how much do students themselves, as well as institutions, governments, and society, save when a person who would have left PSE early without obtaining a credential, goes on to complete?* In many ways, this is a question of the economic efficacy of PSE credentials, aligning with prior research on "returns" to education (e.g., Bourbeau, Lefebvre, & Merrigan, 2010; Heckman, Humphries, & Veramendi, 2016; Psacharopoulos and Patrinos, 2018; OECD, 2018). In this type of analysis, a PSE credential is treated as a mediator "that transmits the effect of college attendance on earnings" (Zhou, 2022, p. 5), often in comparison to people with a high school credential—although there are studies that differentiate between people with a high school credential who have and have not attended PSE (e.g., Kim & Tamborini, 2019). A cost-benefit analysis of non-completion seeks to estimate the monetary benefit of some PSE attendance, even if a student did not go on to complete.

Under a basic analytical approach SRDC has used for cost-benefit analyses in the past (e.g., Gyarmati et al. 2008; Ford et al. 2012), a dollar value is assigned to the effect of a participant engaging in an activity given estimates of the per-participant resource costs, wherever possible, either through direct measurement or estimation. Costs to PSE participation obviously include tuition and other fees, educational expenditures (e.g., books), and initially foregone earnings, while benefits could include increases in later lifetime earnings.

In each case, it is important to identify who bears the costs or benefits of an activity since they may represent gains from one perspective and losses from another. Institutions gain the tuition and government direct funding that is conditional on having students enrolled or achieving certain milestones (Snowdon, 2022). Indeed, one prior study on the cost of non-completion only estimated costs from the college and university perspective by estimating the loss in tuition and funding, as based on their individual non-completion rate (Raisman, 2013).

However, a single activity can impact multiple actors. Non-completion does not just affect institutions. For example, when a student attends PSE, governments pay institutions directly but also (in certain cases) pay student aid to students. These "costs" to government may be later offset by increased tax revenues from the earnings of people who have benefitted from additional education (Levin & García, 2018). Furthermore, an activity may have desirable distributional effects for society even if it is costly, which needs to be taken into account when considering a policy response.

The framework

In Table 1, we consider the net costs and benefits of PSE participation from different perspectives: postsecondary participants, institutions, the Ontario government, the federal government, and society as a whole. The table illustrates the *expected* direction of effect of participating in PSE on each accounting perspective. The expected effects are shown as a net

benefit/gain (+), net cost/loss (-), or neither a gain nor a loss (0) relative to someone not attending postsecondary education at all.

While we include in Table 1 all the components of costs and benefits that SRDC initially identified, prior to commencing this work, we took forward into analysis a smaller number of categories following some initial investigations. The categories for which high quality data could not be obtained and/or for which a sufficiently robust estimation was not available are shaded in grey. These are discussed (including the rationale for their exclusion) but not estimated later in this report. Definitions are provided in Table 2.

Table 1 Cost-Benefit Analysis Framework for PSE participation used in this report

	Accounting Perspective				
	Participants	*Institutions*	*Ontario Government*	*Federal Government*	*Society*
Tangible Costs and Benefits					
Tuition and compulsory fees	-	+	0	0	-
Other educational expenditures	-	0	0	0	-
Non-educational expenditures	-	0	0	0	-
Government direct funding to institutions	0	+	-	-	-
Foregone earnings	-	0	0	0	-
Prime working life earnings	+	0	0	0	+
Provincial and federal taxes	-	0	+	+	0
EI and CPP contribution	-	0	0	+	0
EI and social assistance payout	-	0	+	+	0
Government Financial Aid to Students	+	0	-	-	0
Administration costs (e.g., student aid, admissions)	0	-	0	0	0
Total	**+/-**	**+/-**	**+/-**	**+/-**	**+/-**
Intangible Benefits (difficult to quantify or monetize)					
Health	+	0	+	+	+
Crime Reduction	0	0	+	+	+
Social benefits	+	0	+	+	+
Total	**+/-**	**+/-**	**+/-**	**+/-**	**+/-**

The individual participant perspective in the first column identifies net gains or losses for postsecondary participants, relative to non-participants. It is expected that they gain mainly in the labour market through increased working life earnings because of a higher educational endowment, even if they do not complete a credential. The educational endowment could include human, social or cultural capital, e.g. enhanced or new skills and a larger or more diverse social network.

The institution budget perspective identifies gains from PSE participation, relative to non-participation, including funding received when students' pay their tuition and other fees (e.g., library fees), as well as government transfers to institutions (for strong overview of this in Ontario, see Snowdon, 2022). It identifies losses primarily through administrative costs, which may include per-student costs to implement admissions, student supports offered through campus, as well as capital costs. Importantly, these costs may differ for completers and non-completers. For example, completers will remain in school longer but may use more or fewer services when enrolled.

The government budget perspective identifies gains and losses to participation, relative to non-participation incurred by the federal and provincial governments. It does not account for transfers from the federal government to the provincial government. Given the expectation of an increase in participants' income, the federal government budget should gain from increases in federal taxes and premiums. Similarly, the provincial government also gains from increases in provincial income tax and premiums.[1] If PSE yields reduced reliance on social assistance, then provincial governments will gain from this outcome as well. What matters for the net costs analysis is the differences in gains to government from non-completion of PSE relative to completion. As mentioned above, provincial governments may incur higher costs in per student transfers to institutions if more students complete.

The societal perspective combines the perspectives of multiple groups: the participants and those not participating, with the government budget representing alternative uses of tax funds. A net benefit to society arises when the benefits of all groups outweigh the costs of PSE participation. For a given component, if a gain to one group equals the loss to another, there is no net cost or benefit to society, and it is simply considered a transfer. For example, increased tax payment because of higher working life earnings are transfers from the participants to the government. If the loss to participants is identical to the revenue to the government, it represents net zero gain to society.

A simple criterion for the viability of a government program is whether it produces a net benefit to society. This criterion assumes that a loss by one group can be compensated by gains to

[1] For simplicity, it is assumed that out-migration attributable to postsecondary education is zero.

another, which may or may not be true in reality.[2] Nonetheless, the analysis treats every dollar the same, no matter who receives it.[3]

Table 2 Cost categories included and not included in this analysis

Category	Description
Relevant categories included in analysis	
Tuition and compulsory fees	Tuition and other compulsory education fees paid to institutions by completing and non-completing students in reference years.
Other educational expenditures	Costs incurred to pursue educational programs in terms of equipment, textbooks, computers, and other supplies. We assume payments for these supplies are not paid to institutions.
Foregone earnings	Estimates of the additional earnings that PSE participants would have expected to earn if – during the time they were studying – they had been PSE non-participants.
Prime working life earnings	Predictions of earnings up to age 60 based on differences in educational outcomes.
Provincial and federal taxes	Estimates of the differences in lifetime income taxes paid (separated into federal and provincial taxes) deriving from differences in educational outcomes.
EI premium and CPP contribution	Estimates of the differences in lifetime EI and CPP contributions arising from differences in educational outcomes.
EI and provincial social assistance payout	Estimates of the differences in EI benefits received, and social assistance payments received deriving from differences in educational outcomes.
Government direct funding to institutions	Estimates of government transfers to institutions utilizing a formula to apportion these costs to student head counts according to their duration of study.
Government Financial Aid to Students	Estimates of the financial aid received by completers and non-completers
Administration costs (e.g., student aid, admissions)	Estimates of the cost of providing services to students

2 In theory, the government may aim to facilitate inter-group compensation through taxes. A more restrictive alternative assumption to maintain the net benefit criterion is to assume that the value placed on a dollar gained or lost is equivalent for each of the groups.

3 The alternative is to establish a social welfare function that takes into account issues of distribution. However, a social welfare function requires a subjective judgment of fairness that is typically outside the scope of study.

Category	Description
Relevant categories excluded from analysis	
Non-educational expenditures	Cost of transport, food and shelter, healthcare, childcare incurred by the population in scope. SRDC found no reliable way to estimate how these costs might differ between completing students and non completing students on average, nor between non-completing students and equivalent adults not taking up PSE. Our estimates thus assume the differences in such costs are negligible.
Social benefits	Estimated cost of differences in social outcomes for people with different educational outcomes. While there is a literature that describes social returns deriving from differences in participation in education, SRDC found insufficient data to support monetizing the differences in social outcomes.
Health	Estimated cost of variation in health outcomes for people with different educational outcomes. There is a literature that describes and even estimates health benefits deriving from differences in participation in education, SRDC found no data sufficiently precise to support monetizing the differences in these outcomes between completers, non-completers and non attenders.
Crime reduction	Estimated cost of variation in crime outcomes for people with different educational outcomes. There is a literature that describes and estimates criminal justice outcomes (spanning involvement in the criminal justice system through victimization) arising from differences in participation in education, but again SRDC found no data sufficiently precise to support monetizing the differences in these outcomes between completers, non-completers and non attenders.

The overall estimation approach

Using the framework outlined in Tables 1 and 2, our study estimated all costs and benefits from each accounting perspective to derive "net costs" for two *education pathway* scenarios:

1. participating in postsecondary education *without* completing; and
2. participating in postsecondary education and completing.

As a simple accounting framework, Table 1 can be interpreted as capturing either of the education pathway scenarios (1) and (2). Based on the findings of our previous report, the direction of the effects is the same (e.g., students see higher earnings from each year of

postsecondary education, regardless of whether they complete), although the amounts of benefits/gains and costs/losses were expected to differ between the two scenarios.

Our cost-benefit analysis compares costs net of benefits between these two competing scenarios (1) and (2) above. Both scenarios are initially be costed *compared to not participating in PSE at all*. Given the policy focus is on non-completion in Ontario, we estimated net costs for students who do not complete programs they started at Ontario institutions and compare these to net costs we estimate for *equivalent Ontario students* who completed their programs. From this, we then derived the net costs of non-completion relative to completion as the net cost outcome of (1) above minus the net cost outcome of (2).

This approach called for estimation of a counterfactuals, i.e. the equivalent experience of people who resemble non-completers but did not enter PSE at all, or who entered PSE and completed. Thus, as far as possible, SRDC located datasets that could identify non-attenders, completers, and non-completers and that included a number of independent variables potentially able to be used to estimate counterfactuals such as propensity score matching (PSM) analysis to help account for group differences (e.g., locate completers who 'look like' non-completers in all but the PSE outcome).

Notes on the estimation

Costs and benefits are a product of dollar values attributable to student behaviour (like studying and engaging in paid employment) and the proportion of students in defined groups engaging in the behaviour. Estimating the amounts to include in a net cost calculation is not an easy undertaking given that many of the costs and benefits (a) occur over a longer timeframe than most data sources can capture and (b) require estimation for a counterfactual.

Our framework was applied using the data sources and analysis approaches outlined in Appendix A. Each analysis is necessarily approximate, with a unique set of caveats and considerations for each estimation that populates a given cell in Table 1. Across all estimations, however, there are limitations imposed by the methodology and available data:

- Firstly, the cost-benefit methodology means that for any given data source and approach we can only provide point estimates of average costs and average benefits for participants as a group, with no margin of error or confidence interval. Hence, we estimated some additional, optional sensitivity analyses for some of the larger category estimates, such as long-term earnings, as a means to increase confidence in the final estimates.

- Secondly, data limitations mean the analysis cannot readily account for variation in individual characteristics. Theoretically, we could generate estimates for subgroups of interest (for each of several racialized groups, by gender, etc.) but production of such

estimates in practice would not be workable. Not only does the work involved increase incrementally with each additional subgroup to consider, but for each and every component of the estimation, data for monetizing costs and benefits would need to be available disaggregated by subgroup. For many data sources (e.g., institution administration costs) such disaggregated information is not available. The smaller sample sizes for the data that do exist would mean higher levels of variability for each estimate.

In order to simplify data and analysis needs to some degree, and to generate comparable samples of completers, non-completers, and non-attenders, SRDC agreed two important exclusions with HEQCO:

- International students: International students are excluded from the sample of non-attenders as complete information on labour market outcomes is not available for those who leave Canada.
- Graduate students: As graduate students are often studying for longer periods of time and at an older age, SRDC excluded this group as they enter the labour market with comparably different prior work and study experience than students in undergraduate, diploma, and credential programs.

For certain cost categories, it was not possible or necessary to identify individual-level data (e.g., government direct funding to institutions). For these areas, our goal was to identify the data sources that would offer the most nuanced Ontario-based information. Individual-level estimates could then be obtained by dividing amounts by the numbers of participants affected. Identifying appropriate data sources involved HEQCO reaching out to its network of partners for informal interviews with SRDC, including a meeting with senior university administration responsible for students and Ontario government program and data managers. These contacts confirmed the availability of some potential datasets alongside their limitations and/or access constraints.

SPECIFICITY OF THE RESULTS

The data table in each section of Appendix A sets out on each row the datasets used to estimate each component, as well as the rationale for the chosen estimation approach. We summarize the specification of the sample and analysis, including a discussion of the benefits and drawbacks of various options considered. Given the complicated nature of some of the analyses, there are trade-offs being made between comprehensiveness, accuracy, and costs. Caveats and assumptions are thus also noted.

- Unit of analysis to calculate costs. The aggregate level of the estimate should not alter the conclusions, no matter what unit is used in analysis, provided the approach is consistent

across all aspects of the study. Typically, in social policy cost-benefit analysis, we estimate the *individual net cost*, interpreted here as the "net cost per non-completer".

- Definition of a non-completer. For simplicity we use a variant of the previous project's definition which is a person who starts an undergraduate, certificate or diploma program in an Ontario institution and who does not graduate from any form of PSE in Canada within the following seven years. Thus, there are identifiable "cohorts" of non-completers (an empirically countable number of them in Ontario) every year, which could be defined by their start year or by their "non-completion" year, seven years later. Given we have to determine costs from the start year onwards, it is easiest to define cohorts of non-completers by their start year. Arbitrarily, based on data availability, we chose to estimate average net costs for the 2013 entry cohort of non-completers whenever possible.

- Period over which to calculate costs. Education is a substantial investment with lifetime (even potentially intergenerational) payoffs so a long period for calculating costs and benefits is justified. There are nonetheless practical limits on estimations and legitimate questions about (a) the value and accuracy of projecting far into the future and (b) what constitutes a reasonable horizon for policy decisions. We use a 40-year maximum time horizon, but we ignore any differentials in costs and benefits that persist into retirement. We adopt analytical approaches to consider differentials that arise only during prime working age, up to age 60.

- Ages of potential learners. SRDC arbitrarily chose the 2013 entry cohort of non completers, who are at a variety of ages in 2013. Given we are costing their outcomes up to a 40-year horizon we needed the capacity to project their outcomes to 2053 (2013+40), when the youngest would be 58. This period will capture much of the prime working ages of much of this chosen cohort, but some non-completers start programs later in adulthood. Given we ignore any differences in costs and benefits of non-completion that arise during retirement then the later periods of the 40-year window experienced by "late starters" will have little consequence for our estimation.

- Constant dollar values. We selected a constant dollar amount to use in our estimates (e.g., 2021 dollars) and applied a pre-defined annual discount rate (e.g., 7 per cent as proposed in the Federal government's *Canadian Cost–Benefit Analysis Guide* [Treasury Board of Canada, 2022]). Discounting is standard feature of cost-benefit analysis to recognize human time preference: the tendency to value a dollar today more than a dollar in the future. These applied to dollars earned or spent in other years.

- Definition of a full-time courseload. To calculate the costs associated with any time spent in PSE requires an assumption about the "extent" of enrollment over the course of a year. SRDC already excludes those whose first PSE enrollment was part-time in the sample of

completers and non-completers.[4] However, the definition of "full-time" is not necessarily a full courseload. In fact, the Ontario Student Assistance Program (OSAP) defines full-time enrollment as 60 per cent (or more) of a full courseload. For this reason, we also apply the 60 per cent adjustment to all calculations related to time spent in PSE. While the 60 per cent assumption in *all* years of PSE is likely an underestimate, what we report as the final result is a difference, which means much of any error or bias inherent in a data set or estimation method is cancelled out, provided the error is not associated with the difference between non-completion and completion. Results (versions of Tables 3, 4 and 5) using a 100 per cent rather than the 60 per cent assumption for "full time" are also reported in Appendix B (Tables 20, 21 and 22) and illustrate that the differences related to this assumption are minor.

An important aspect of the study is the need to estimate net costs for *hypothetical* outcomes including both forecasts and counterfactuals. *Forecast* outcomes arise when an estimate has to be projected into the future. *Counterfactuals* represent the costs and benefits that non-completers would have experienced had they achieved a different outcome: either by completing PSE or not entering PSE at all. Counterfactuals answer questions such as: If the non-completers had completed, how long would they have taken to complete? And there can also be *forecast counterfactual* outcomes: If they had completed, how much more would they have earned over their lifetimes?

For some costs and benefits that can be directly estimated or imputed for the cohorts of Ontario students who do not complete (like the tuition they paid), the counterfactual of net costs had they not attended PSE is relatively easy (e.g., tuition is zero). Other costs and benefits (like foregone and projected lifetime earnings) are estimated using propensity score matching. This is because, even when there are data sources, the amounts for this specific category of participant are not observed. Where possible, we strive to avoid relying on the assumption actual non-completers would have had the same outcomes as actual completers, as if they were identical groups of students in all other respects.

Although means other than PSM to estimate counterfactuals exist, such as experimental and regression discontinuity designs, available datasets did not present obvious opportunities for variant counterfactual analyses.

As described in Appendix A, when propensity score matching was not possible, SRDC derived counterfactual estimates across a broader cross-section of completers, selected to resemble non-completers to the extent possible with the available data, by using variables such as number of

[4] This methodology is consistent with previous work done by SRDC on this topic (see Colyar et al., 2023).

years of study. Where feasible, estimates from sensitivity analysis were derived using alternative data sets or methods.

We include a brief account of the selection of appropriate data sources in Appendix A for each component of the analysis (each cell in Table 1) alongside our reasoning as to the best way to conduct each analysis given data- and information-related constraints. These rationales are both technical, such as the capacity of the sample size to support different types of analysis, and subjective, such as considerations of the extent to which a sample selection process would need to be modelled in order to identify a counterfactual for each cost category.

RESULTS

The final results of our analyses appear in Tables 3, 4 and 5. Table 3 contains the estimates of costs incurred by non-completers over their lifetimes relative to their situation if they had not participated. Table 4 contains the estimates of costs incurred by the same non-completers over their lifetimes if they had completed their postsecondary education, again relative to their situation if they had not participated. When reading Tables 3 and 4, negative numbers represent the gains of completion/non-completion, relative to non-participation. A negative cost is a benefit.

Table 5 contains the results that are the key focus of this report: the difference between the values in each cell in Table 4 relative to Table 3 (3 minus 4),which represents the net costs non-completers incur over their lifetimes relative to their situation if they had completed. When reading Table 5, positive numbers represent net costs, i.e. the net losses from non-completion. More detailed results of the analyses and how they were obtained appear in Appendix A.

Starting with Table 3 and the perspective of participants, we see the overall 'cost' for non-completers relative to non-participants is negative, meaning they actually gain from PSE even though they did not complete. They spend money on tuition costs, other educational expenditures and lose out on the income they did not earn while studying, but this is more than offset by their student aid and (especially) their higher lifetime earnings. Their higher lifetime earnings bring higher tax bills and more EI and CPP premiums than if they had not participated in PSE, but their higher income still outweighs all these costs

These additional working life earnings gains yield substantial tax revenues to Ontario and federal governments, meaning governments more than recoup the amounts they spend to support students via funding to institutions and student aid.

The net result is society gains from non-completion relative to non-participation. Institutions lose out, however, as we estimate they spend more to support non-completing students than the tuition and government funding they receive to support them.

Turning now to Table 4, the results are similar for the hypothetical situation SRDC modelled where the non-completing students completed and graduated, except the costs and benefits are amplified. The earnings gains are even more substantial relative to not participating in PSE. The lifetime net returns to PSE completion are estimated close about $600,000 in 2021 dollars. They pay more in taxes so governments gain somewhat more from them completing their PSE, and the extra student aid and direct support to institutions is much smaller in magnitude than the extra earnings gain. Society is better off by almost $1m for every person resembling a non-completer if they actually complete.

Interestingly, there is little difference for institutions whether student completes or does not complete. They lose money for every student in our estimation. Plausibly, at the institutional budget level, these losses are made up in some way for the institutions to remain financially viable. One possibility is by net gains from students not included in our analysis such as international and postgraduate students.

The difference between the results in Tables 3 and 4 determine the final estimates of the net cost of non-completion are presented in Table 5. Non-completers save small amounts on tuition and other educational expenditures, and net somewhat more in foregone earnings than if they had completed but they lose out on a substantial earnings premium that comes with graduation. While this means they pay less to government in taxes and EI/CPP premiums, the net loss from non-completion is more than a third of a million dollars over their lifetimes. By our estimation, there is little difference for institutions whether students complete or not. Governments lose out on potential gains for each non-completer relative to if they had completed, roughly $110,000 for the provincial government and $125,000 for federal sources. The net loss to society is more than $600,000.

Table 3 Costs of non-completion relative to non-participation

	Accounting perspective				
	Participants	*Institutions*	*Ontario Government*	*Federal Government*	*Society*
Non-completers – non-participants costs (if negative = benefit)					
Tuition and compulsory fees	$10,427	-$10,427	$0	$0	$10,427
Other educational expenditures	$2,026	$0	$0	$0	$2,026
Non-educational expenditures					
Government direct funding to institutions	$0	-$14,356	$14,231	$126	$14,356
Foregone earnings	$51,529	$0	$0	$0	$51,529
Prime working life earnings	-$401,907	$0	$0	$0	-$401,907
Provincial and federal taxes	$118,695	$0	-$39,408	-$79,287	$0
EI premium and CPP contribution	$6,044	$0	$0	-$6,044	$0
EI and social assistance payout	$15,012	$0	-$11,053	-$3,959	$0
Government Financial Aid to Students	-$21,441	$0	$12,094	$9,347	$0
Administration costs (e.g., student aid, admissions)	$0	$35,136	$0	$0	$0
Total	***-$219,615***	***$10,353***	***-$24,137***	***-$79,817***	***-$323,569***

Table 4 Costs of completion relative to non-participation

	Accounting perspective				
	Participants	*Institutions*	*Ontario Government*	*Federal Government*	*Society*
Completers – non-participants costs (if negative = benefit)					
Tuition and compulsory fees	$11,633	-$11,633	$0	$0	$11,633
Other educational expenditures	$2,260	$0	$0	$0	$2,260
Non-educational expenditures					
Government direct funding to institutions	$0	-$16,018	$15,877	$140	$16,018
Foregone earnings	$59,615	$0	$0	$0	$59,615
Prime working life earnings	-$1,028,358	$0	$0	$0	-$1,028,358
Provincial and federal taxes	$309,169	$0	-$104,389	-$204,780	$0
EI premium and CPP contribution	$10,906	$0	$0	-$10,906	$0
EI and social assistance payout	$57,260	$0	-$56,986	-$273	$0
Government Financial Aid to Students	-$23,788	$0	$13,418	$10,370	$0
Administration costs (e.g., student aid, admissions)	$0	$39,201	$0	$0	$0
Total	***-$601,304***	***$11,551***	***-$132,080***	***-$205,449***	***-$938,832***

Table 5 Net costs of non-completion

	Accounting perspective				
	Participants	*Institutions*	*Ontario Government*	*Federal Government*	*Society*
Non-completers - completers costs (value in table 3 – table 4)					
Tuition and compulsory fees	-$1,206	$1,206	$0	$0	-$1,206
Other educational expenditures	-$234	$0	$0	$0	-$234
Non-educational expenditures					
Government direct funding to institutions	$0	$1,661	-$1,647	-$15	-$1,661
Foregone earnings	-$8,086	$0	$0	$0	-$8,086
Prime working life earnings	$626,451	$0	$0	$0	$626,451
Provincial and federal taxes	-$190,474	$0	$64,981	$125,493	$0
EI premium and CPP contribution	-$4,862	$0	$0	$4,862	$0
EI and social assistance payout	-$42,248	$0	$45,933	-$3,685	$0
Government Financial Aid to Students	$2,347	$0	-$1,324	-$1,023	$0
Administration costs (e.g., student aid, admissions)	$0	-$4,065	$0	$0	$0
Total	***$381,688***	***-$1,198***	***$107,943***	***$125,632***	***$615,263***

OTHER CONSIDERATIONS

It is critical to emphasize that the results in Tables 3 and 4 (and by implication, Table 5) are just estimates. There are many potential ways to calculate the amounts considered and no doubt different estimates could be obtained. The magnitude of each estimate does seem plausible, however. What we report as the final result in Table 5 is a difference, which means much of any error or bias inherent in a data set or estimation method is cancelled out, provided the error is not associated with the difference between non-completion and completion. For example, if we overestimate earnings students forego annually while studying, we will have overestimates of the foregone earnings for both non-completers and completers. But by taking the difference the residual error (one overestimate is subtracted from another) is reduced substantially.

There are omitted costs and benefits that we could not estimate including any differences in non-educational (living) expenditures between non-participants, non-completers and completers. Also there may be education-induced differences in health, crime and social benefits that we could not estimate or monetize. However, these would need to be substantially different between completers and non-completers, and in the opposite direction to the financial effects already estimates to alter our broad takeaways from this analysis. For us to conclude the net costs of non-completion were much more modest than shown in Table 5, health or social benefits (for example) from non-completion would need to exceed those attributable to completion, which seems unlikely.

Finally, we should draw attention to the limitations of our counterfactual approach given much of students' experiences remain unobserved. Without a randomized experiment it is very hard to estimate the behaviour of people who followed one path for the hypothetical situation where they did something different. We are reliant on data observations of people who did follow the paths that our non-completers did not and there may be something fundamentally different in their background or experiences that our analyses could not control for. For example, possibly some students who do not complete are making a rational decision based on an assessment of negative mental health consequences from continuing studies that are not working out for them. By ceasing studies, they avoid these negative health outcomes (that our counterfactual analyses cannot pick up) whereas continuing to graduation could have yielded severe ill health or trauma. By not factoring in the costs of such trauma, we then might be overestimating the benefits of completing. There is no easy way to assess whether such bias is present in our analysis, so we need to point out the possibility that non-completion may well be rational and cost-effective for some students. The larger the share of non-completers affected by such unobserved costs and benefits, the more error or bias there may be in Table 5.

IMPLICATIONS OF THE NET COST ESTIMATES

Assuming the results in Tables 3 and 5 present a reasonable approximations, there are some implications from this study. Mostly these relate to results in Table 5, but it is worth reflecting on the implications of Table 3 since these have a bearing on policy with respect to non-completion as well.

Table 3 (and Table 4) suggests that the decision to take up PSE is on average the right one regardless of whether one goes on to complete. The outcome for PSE participants is that they are better off over their lifetime than if they had not participated. That is not to say we have evidence that PSE would make absolutely everyone better off. We only modelled the behaviour of participants. But results from Table 3 suggests that governments, individuals, and society all benefit from even some PSE participation while the cost for institutions is low.

Table 5 suggests that if non-completers can be supported to complete. there is potential for substantial return to this investment in supports. Governments lose out on approximately $230,000 in potential contributions over the lifetime of each non-completer. There should be an incentive to invest in programs that switch non-completers to complete. One thought experiment is if the federal and provincial governments were to invest just over one tenth of the amount of these missing potential gains into supportive programming per student (say $25,000) and that this could be targeted to non-completers. Let's also say the programming was known to be 50 percent effective in converting non-completers to completers, then each $50,000 (two implementations of the intervention) would yield one conversion of a non-completer to completer; in other words, each $50,000 investment would yield $230,000 in gains.. This is a 360 per cent return on investment. Of course, targeting may be less than effective in identifying non-completers or program success rates may be lower, but the size of the potential gains allows considerable scope for less efficient policy intervention before there is any risk to governments of losing out overall relative to the status quo. If these additional program resources went to institutions, they would also go some way to offsetting the apparent financial losses that students currently generate for institutions.

Our estimation thus points to scope for gains to governments, students and even institutions from efforts to find appropriate ways to encourage postsecondary completion. These results point to an urgent need to develop appropriate interventions that can support students who might otherwise fail to complete their studies to complete and an equivalent need to develop targeting mechanisms to direct the interventions that are found effective to the students most likely to benefit.

REFERENCES

Berlingieri, F., & Bolz, T. (2020). Earnings of university dropouts across Europe. ZEW-Centre for European Economic Research Discussion Paper (20-085).

Bourbeau, E., Lefebvre, P., & Merrigan, P. (2010). Returns to Education for 21 to 35 year olds across Canada: Results from the 1991–2006 Canadian Analytic Censuses Files.

Colyar, J., Chatoor, K., & Deakin, J. (2023). Linking postsecondary non-completion rates and labour market outcomes. Higher Education Quality Council of Ontario.

Ford et al. (2012), *Future to Discover (FTD) – Post-secondary impacts report*. Ottawa: Social Research and Demonstration Corporation.

Frenette M. (2014) An Investment of a Lifetime? The Long-term Labour Market Premiums Associated with a Postsecondary Education, Analytical Studies Branch Research Paper Series Ottawa: Statistics Canada

Giani, M. S., Attewell, P., & Walling, D. (2020). The value of an incomplete degree: Heterogeneity in the labor market benefits of college non-completion. The Journal of Higher Education, 91(4), 514-539.

Gyarmati et al. 2008. *Community employment innovation project (CEIP)*. Ottawa: Social Research and Demonstration Corporation.

Heckman, J.J., E. Humphries, and G. Veramendi. (2016). Returns to Education: The Causal Effects of Education on Earnings, Health, and Smoking. NBER Working Paper 22291. Cambridge, Mass.: National Bureau of Economic Research.

Hui, T. S.-w. (2004) The "Sheepskin Effects" of Canadian Credentials, Munich Personal RePEc Archive Paper. https://mpra.ub.uni-muenchen.de/17994/

Kim, C., & Tamborini, C. R. (2019). Are they still worth it? The long-run earnings benefits of an associate degree, vocational diploma or certificate, and some college. RSF: The Russell Sage Foundation Journal of the Social Sciences, 5(3), 64-85.

Levin, H. M., & García, E. (2018). Accelerating community college graduation rates: A benefit–cost analysis. The Journal of Higher Education, 89(1), 1-27.

McCarty, J. D., DeDiego, A. C., Carrier, J. W., & Thompson-Ebanks, V. (2023). Self-Reported Reasons for College Student Attrition. Journal of Applied Research in the Community College, 30(2), 33-50.

OECD (2018) *Education at a Glance 2018: OECD Indicators,* Paris: OECD Publishing.

Psacharopoulos, G. & Patrinos, H.A., 2018 Returns to investment in education: a decennial review of the global literature, *Education Economics,* 26 (5), 445-458

Raisman, N. (2013). The Cost of College Attrition at Four-Year Colleges & Universities. Policy Perspectives. Educational policy institute.

Snowdon, K. (2022) *College and University Baccalaureate Degrees: Another Look at Costs*. Toronto: Higher Education Quality Council of Ontario

Treasury Board of Canada (2022) Canada's Cost-Benefit Analysis Guide for Regulatory Proposals https://publications.gc.ca/collections/collection_2022/sct-tbs/BT58-5-2022-eng.pdf

Vining, A. R., & Weimer, D. L. (2019). The value of high school graduation in the United States: Per-person shadow price estimates for use in cost–benefit analysis. Administrative Sciences, 9(4), 81-100.

Zhou, X. (2022). Attendance, completion, and heterogeneous returns to college: A causal mediation approach. Sociological Methods & Research, 00491241221113876.

APPENDIX A: ESTIMATIONS BY COMPONENT

TUITION AND COMPULSORY FEES

SRDC estimated tuition and other compulsory education fees paid to institutions by completing and non-completing students in the reference years.

Data Sources

In order to produce estimates of the tuition and compulsory fees, two pieces of information were critical: 1) *enrollment information* to derive estimates of time-in-PSE of otherwise equivalent completers and non-completers and 2) yearly *tuition information* at the institutional- or credential-level in reference years.

Table 6 Data sources for tuition and compulsory fees

Data source	Outcomes	Purpose	How estimated?	Assumptions/ caveats
Enrollment Data				
PSIS [PSE enrollment, program and demographic characteristics, completion status]	Estimates of the number of years non-completers and equivalent completers spend in PSE across over each reference year.	Estimates of time-in-PSE for non-completers and for otherwise similar completers; the difference representing time-not-in-PSE which can be combined to include tuition and other ancillary costs.	Observed time-in-PSE of non-completers and estimated duration of equivalent completers.	Non-participants pay no tuition. In each year a student spends in PSE (completer or not), the available data do not indicate "the extent" of the enrollment (i.e., whether they spent the whole year in PSE and/or whether their enrollment is full-time or part-time. As a proxy, we apply an assumption of 60 per cent, which is the OSAP definition of full course load.

Data source	Outcomes	Purpose	How estimated?	Assumptions/ caveats
				The institution type (college or university) that each student spends in their subsequent years is the same as the one they were enrolled in at entry (i.e., in 2013).
Tuition Data				
MCU data [total tuition & fees, ancillary fee breakdown]	Tuition fees for universities and colleges; ancillary fees for colleges available from 2013-14 onward.	Identify yearly institution, credential, and field of study weighted tuition and fees to link to enrollment data to estimate fees paid by non-completers and the fees that would have been paid by equivalent completers.	Once linked to enrollment data or combined with estimates of observed and estimated time-in-PSE from the enrollment data, estimate actual tuition and fees paid by non-completers and by equivalent completers.	Assume that the recorded amounts for tuition students are liable to pay is equivalent to the tuition they actually pay.
OSAP data [tuition fees, study level, field of study, institutions, year of study, total compulsory fees]	Tuition and other compulsory fees for university and colleges by year, institution, and program.			
PSIS [PSE enrollment, program] from Statistics Canada Table: 37-10-0234-01	Enrollment by jurisdiction, institution, credential level, immigration status, registration status, and by year.			

Base Sample for Estimation Purposes

The 2013 cohort of students who entered a full-time undergraduate university program, college certificate program, or college diploma program. Non-completers were those who had not completed PSE seven years later (December 2019).

Analysis Approach

The key questions answered by this analysis were

- How much tuition and compulsory fees do Ontario PSE non-completers pay to institutions, and
- How much tuition and compulsory fees would they have paid to institutions had they completed?

The time measure of interest when estimating how much completers and non-completers pay to institutions is their *time-in-PSE*. This *time-in-PSE* is distinct from the *anticipated completion time* for a full-time program (i.e., four years for a bachelor's degree, two years for a diploma, and one year for a certificate) and *time to completion* (i.e., how many years later that a student graduated). For example, say a student enrolls in a diploma program in 2013 and graduates in 2018; between 2013 and 2018, they took some time off here and there and the total number of years they spent in school might be the equivalent of three years. In this example, the student's *anticipated completion time* is two years, their *time to completion* is six years (which still qualifies them as a completer), and the *time-in-PSE* is three years. The counterfactual for the number of years a non-completer would have spent in PSE had they completed their program is the average time the equivalent completer spends in PSE, regardless of the average anticipated completion time and the average completion time for completers.

Using PSIS enrollment data, we first identified our 2013 cohort of interest.[5] We then created a completer group by flagging those who had a PSIS graduation record by December 2019.[6] Those without the graduation flag were considered non-completers. Table 7 presents the descriptive profile of our sample, by completion status.

[5] We also merged the PSIS data with the Registered Apprenticeship Information System (RAIS) to remove a small number of students who had begun a registered apprenticeship before their first postsecondary program.

[6] A small number of students who started in degree, diploma, or certificate programs but completed a registered apprenticeship (as observed in RAIS) were also considered to be completers in our sample.

Table 7 Descriptive profile of the 2013 enrollment cohort

	Non-Completer		Completer	
	Freq.	**Prop.**	**Freq.**	**Prop.**
Credential Type				
Certificate	5,330	0.136	11,120	0.100
Diploma	17,920	0.456	34,830	0.313
Bachelor's degree	16,070	0.409	65,390	0.587
Age Group				
Age: 16-17	220	0.006	1,010	0.009
Age: 18	14,130	0.359	61,090	0.549
Age: 19	9,160	0.233	19,140	0.172
Age: 20-24	10,700	0.272	17,390	0.156
Age: 25-34	3,730	0.095	8,540	0.077
Age: 35-54	1,290	0.033	3,950	0.035
Age: 55+	100	0.003	220	0.002
Immigration Status				
Citizen	36,870	0.938	103,910	0.933
PR/Refugee	2,450	0.062	7,430	0.067
Gender				
Male	22,340	0.568	47,290	0.425
Female	16,980	0.432	64,050	0.575
Field of Study				
Education	440	0.011	2,100	0.019
Arts	2,850	0.072	5,940	0.053
Humanities	3,950	0.100	9,910	0.089
Soc Sci	6,750	0.172	19,410	0.174
Business	7,090	0.180	19,420	0.174
Sciences	2,720	0.069	11,850	0.106
Math/Computer Science	1,630	0.041	2,850	0.026
Engineering	5,780	0.147	14,990	0.135
Agriculture	460	0.012	1,550	0.014
Health	4,490	0.114	16,770	0.151

To construct the time-in-PSE outcome variable, we leverage the longitudinal nature of PSIS, whereby we observe whether each 2013 cohort member appeared in each PSIS year between 2014 and 2019 and summed up the number of observed years to create time-in-PSE. Using linear regression, we then estimated the effect of being a completer on time-in-PSE, controlling for covariates (credential type, age, immigration status, gender, and field of study). Table 8 provides the regression results. The resulting coefficient for the "completer" variable (0.36 years) is the

difference in time-in-PSE for completers and non-completers, net of other differences. To calculate the average time-in-PSE for an average non-completer, we multiplied the completer coefficient by 0, and the rest of the coefficients by the proportions for non-completers illustrated in Table 8 and the summing them (3.14 years). For the average time-in-PSE for the equivalent completer, we did the same except multiply the completer coefficient by 1 (3.5 years).

Table 8 Effect of completion status on time spent in PSE

	Coef.
Completer	0.363***
Credential Type	
Diploma	0.644***
Bachelors Degree	2.225***
Age Group	
Age: 18	-0.0384
Age: 19	-0.208***
Age: 20-24	-0.675***
Age: 25-34	-0.999***
Age: 35-54	-1.089***
Age: 55+	-1.31***
PR/Refugee	0.199***
Female	-0.0161
Field of Study	
Arts	0.734*
Humanities	0.885*
Soc Sci	0.685
Business	0.806*
Sciences	1.094**
Math/CompSci	1.064**
Engineering	0.863*
Agriculture	0.715
Health	0.812*
Services	0.437
Other/multiple	1.043**
Constant	1.518***

* p < 0.05, ** p < 0.01, *** p < 0.001

While we can observe whether a student is enrolled in postsecondary for each PSIS year, we do not know the "extent" of this enrollment. In other words, we do not know if the enrollment is

full-time or part-time or if the enrollment duration lasted the entire year. Given that the average time to completion is typically longer than the anticipated completion time, a 100 per cent enrollment assumption is likely to be an overstatement. For this reason, we applied an adjustment of a 60 per cent full-time assumption to our time spent in PSE estimates. The 60 per cent adjustment is based on the Ontario Student Assistance Program (OSAP) definition of a full-time course load.

Outcomes of Analysis

With the 60 per cent adjustment, the time-in-PSE is 1.88 years for the average non-completer and 2.1 years for the equivalent completer. The net difference is 0.22 years. These estimates were combined with the estimates for tuition and compulsory fees described below. They were also used in the calculations for other education expenditures, government direct funding to institutions, and administration costs discussed in subsequent sections.

Multiple data sources on tuition and compulsory ancillary fees were explored, including data from Tuition and Living Accommodation Costs (TLAC) and the Council of Ontario Universities (CUDO), both of which are publicly available and data from the Ministry of Colleges and Universities provided by HEQCO as well as data provided by OSAP. While TLAC and CUDO were promising sources, they only included costs for university programs. The ministry data provided by HEQCO included information on both college and university programs, but were missing college certificate information, a sizeable proportion of the sample. OSAP provided both full-time equivalent domestic tuition and compulsory fees covering the full period of analysis by institution, level of study, and program, which is what SRDC used to produce the estimate. To produce a weighted estimate of the average yearly tuition and other compulsory costs, we relied on publicly available enrollment data from PSIS that matched cost breakdown provided by OSAP. We extracted full-time domestic enrollment numbers by institution, credential, and field of study.[7] Weighted tuition and costs were then CPI-adjusted to 2021 dollar and averaged across 7 years[8] before being combined to the time-in-PSE estimates.

Combining the time-in-PSE multiplier and weighted average tuition and compulsory fees, we estimated that non-completers pay $10,427 in tuition and compulsory fees, and equivalent completers pay $11,633, resulting in a net difference of $1,206.

[7] OSAP's data used faculty codes while PSIS used CIP codes. The overlap between the two is substantial and the few remaining unmatched categories were assigned to CIP codes manually.

[8] A weighted average that places more emphasis on the earlier years of the 7-year completion window. The weights are derived from PSIS data on the proportion of our sample that was enrolled in each PSIS year.

Final Estimates

Cells by accounting perspective in Tables 3, 4 and 5.

OTHER EDUCATIONAL EXPENDITURES

SRDC estimated costs incurred to pursue educational programs in terms of equipment, textbooks, computers, and other supplies.

Data Sources

In order to produce estimates of the educational costs other than tuition and compulsory fees, two pieces of information were critical: 1) *enrollment information* to derive estimates of time-in-PSE of similar completers and non-completers and 2) yearly *educational costs* at the institutional- or credential-level.

Table 9 Data sources for other educational expenditures

Data source	Outcomes	Purpose	How estimated?	Assumptions/caveats
Other Educational Expenditures Data				
OSAP [Student study period costs: all educational costs, books & supplies]	Other educational costs for colleges and universities	Identify yearly institution, credential, and field of study weighted costs associated with other educational expenditures to link to enrollment data and estimate costs paid by non-completers and the costs that would have been paid had they completed.	Once linked to enrollment data or combined with estimates of observed and estimated time-in-PSE from the enrollment data, estimate actual costs of other educational expenditures paid by non-completers and equivalent completers.	Non-participants do not incur these costs.
PSIS [PSE enrollment, program] Table: 37-10-0234-01	Enrollment by jurisdiction, institution, credential level, immigration status, registration status, and by year.			

Base Sample for Estimation Purposes

The 2013 cohort of students who entered a full-time undergraduate university program, college certificate program, or college diploma program. Non-completers were those had not completed PSE seven years later (December 2019).

Analysis Approach

Very similar to the tuition and compulsory fees section, the key questions to be answered by this analysis were:

- How much in education-related costs (other than tuition and ancillary fees) do Ontario PSE non-completers incur, and
- How much in education-related costs (other than tuition and ancillary fees) would they have paid had they completed?

The approach is the same as the one described in the previous section: to estimate the yearly average cost associated with educational expenditures other than tuition and compulsory fees. These weighted costs would then be multiplied by the same the time-in-PSE estimate produced for the previous analysis.

Outcomes of Analysis

The only sources of data collected to produce this estimate came from OSAP. They provided average cost of books and equipment for full-time equivalent domestic students by institution, level of study, and program. To produce a weighted estimate of the average yearly educational costs (other than tuition and compulsory fees), we relied on publicly available enrollment data from PSIS that matched cost breakdown provided by OSAP. We extracted full-time domestic enrollment numbers by institution, credential, and field of study.[9] Weighted educational costs were then CPI-adjusted to 2021 dollar and averaged across 7 years[10] before being combined to the time-in-PSE estimates.

Combining the time-in-PSE multiplier and weighted average other educational expenditures, we estimate that non-completers pay $2,026 in other educational expenditures, and the equivalent completers pay $2,260, resulting in a net difference of $234.

Final Estimates

Cells by accounting perspective in Tables 3, 4 and 5.

9 OSAP's data used faculty codes while PSIS used CIP codes. The overlap between the two is substantial and the few remaining unmatched categories were assigned to CIP codes manually.

10 Using the weighting approach described in footnote 7.

PRIME WORKING LIFE EARNINGS

SRDC estimated predictions of prime working life earnings based on differences in educational outcomes. This is one of the more contentious areas for estimation but also one where there is considerable previous work to draw on, estimating "returns to education" (e.g. Psacharopoulos and Patrinos, 2018; OECD, 2018).

A critical dimension is the potential for sheepskin effects (the returns specifically to a credential over the equivalent amount of learning without earning a credential). The last Canadian estimates of sheepskin effects dates from 2004 (Hui, 2004).

Table 10 Data sources for prime working life earnings

Data source	Outcomes	Purpose	How estimated	Assumptions/caveats
Longitudinal and International Study of Adults (LISA) [education, earnings, demographic characteristics]	Earnings of non-completers and completers in the short-term	Estimate the effect of non-completion on earnings	A propensity score matching model can be used to estimate the short-term impact of education on earnings	PSM assumes that treatment assignment (non-completion) is independent of potential outcomes (earnings) given a set of covariates. This assumption is not always valid when there are unobserved confounders that influence both non-completion and earnings for instance ability. It also requires a large sample size.
ELMLP (PSIS and T1FF). There is only data on completers and non-completers. [demographic characteristics]	Age profile of 2013 cohort	Check the age distribution of 2013 cohort and census data	Proportion of non-completers at different ages	

Data source	Outcomes	Purpose	How estimated	Assumptions/caveats
Census 2001 [educational attainment, income information]	Earnings of non-completers and completers in the short-term	Estimate the effect of non-completion on earnings	A propensity score matching model can be used to estimate the short-term impact of education on earnings	PSM assumes that treatment assignment (non-completion) is independent of potential outcomes (earnings) given a set of covariates. This assumption is not always valid when there are unobserved confounders that influence both non-completion and earnings for instance ability. It also requires a large sample size.
Census-Longitudinal Worker File (1991) [education, earnings, demographic characteristics]	Earnings in the long term	Estimate the future earnings by using different or older cohorts	Age-earnings profile to project earnings of non-completers and counterfactual completers	Assumes that young workers today will eventually earn what today's older workers earn, i.e., we assume that the future productivity of non-completers will equal the productivity of present workers.

Base sample for estimation purposes

The 2013 cohort of students who entered a full-time undergraduate, certificate, or diploma program. Non-completers are those who still have not completed PSE seven years later.

Analysis approach

The key questions to be answered by this analysis were:

- What are the prime working life earnings of Ontario PSE non-completers, relative to non-participants?

- What are the prime working life earnings of Ontario PSE completers, relative to non-participants?

To estimate the earnings of completers, non-completers, and non-participants, we used the 2001 Census, which allows us to observe short-term earnings (up to age 25), as well as project future earnings (up to age 60). To estimate the earnings of completers, non-completers, and non-participants, we identified the three groups based on respondents' highest level of educational attainment. The 2001 Census was the last to permit a sufficiently-detailed distinction in educational attainment.

First, a sample of non-participants in Ontario was identified from the 2001 Census according to the following conditions:

- A person who did not attend any school, college or university during eight-month period between September 2000 and May 2001.
- The person's highest education was secondary education completion without any further training.

Second, a sample of completers in Ontario was identified from the 2001 Census according to the following conditions:

- A person's highest education completion being completion or above of a postsecondary education.

Finally, a sample of non-completers in Ontario was identified from the 2001 Census according to the following conditions:

- A person who had some post secondary education without a post secondary education certificate, diploma or degree.

As the 2001 Census sample is slightly older than the 2013 PSIS cohort, we adjusted for age differences by reweighting the data based on the proportions in each age group. PSE non-participants, completers and non-completers may differ significantly in characteristics that affect earnings. To adjust for some of these differences, a propensity-score matching method is applied to estimate the counterfactuals for annual employment earnings, which involved the following steps:

- Estimating the likelihood or probability of non-completion of PSE by regressing a dummy variable for non-completion on core covariates (variables describing sample characteristics including age, marital status, gender, first official language spoken and visible minority

status). This provided the likelihood of the comparison group not completing PSE given these characteristics.

- Assessing common support [the ranges of propensity scores where 'treatment' and counterfactual groups are both represented] between non-completers and the comparison groups and trimming observations outside this support.
- Evaluating covariate balance [between 'treatment' and counterfactual groups] post-matching. If the distribution of covariates is similar between groups, the model is better estimating counterfactual differences in outcomes than if they are dissimilar.
- Using the nearest neighbour matching approach to estimate the effect of non-completion on earnings.

Due to sample size constraints, it was not feasible to estimate counterfactual earnings by individual year of age. Instead, we applied propensity score matching within the 18–27 year age group to estimate short-term earnings. For the projection of future earnings (up to age 60), we constructed age–education–earnings profiles using propensity score matching across age categories: 26–33, 34–41, 42–49, 50–57, and 58–65 years. We assumed that the future productivity of current non-completers would resemble that of present workers in similar age-education groups. The prime working life earnings (up to age 60) was estimated as the sum of both short-term (observed) and long-term (projected) earnings from the 2001 Census.

Sensitivity analysis

To estimate short-term earnings (age 18-25 years), we also used LISA data and explored potential differences in skills/ability between non-participants, non-completers and completers using Programme for the International Assessment of Adult Competencies test scores information. The estimates indicated potential differences in ability. However, due to the small sample sizes for these test results and the sample in general, we could not reliably harness these differences and use the LISA dataset for the main analysis.

For further validation of prime working life earnings, we combined the 1991 Census with the Longitudinal Worker File[11] (1991–2021) to estimate cumulative earnings over time for different education levels. This analysis provided comparative benchmarks for evaluating our primary estimates from the 2001 Census.

[11] SRDC did not have access to the raw micro-dataset and thus made a custom request for tables from Statistics Canada.

Outcomes of analysis

Over the "lifetime" used in this study (up to age 60, applying a discount rate of 7 per cent), we find that the difference in earnings between non-participants and non-completers is $401,907. The difference in earnings between non-participants and completers is $1,028,358 in 2021 constant dollars. This results in the net difference of $626,451.

Final estimates

Cells by accounting perspective in Tables 3, 4 and 5.

FOREGONE EARNINGS

SRDC estimated the earnings that PSE participants would have expected to earn if – during the time they were studying – they had been PSE non-participants.

Table 11 Data sources for foregone earnings

Data source	Outcomes	Purpose	How estimated	Assumptions/caveats
Census 2001 [educational attainment, income information]	Earnings of PSE non-participants	To estimate the foregone earnings in actual (non-completion) and counterfactual (completion) scenarios	Observed amount earned by PSE non-participants	PSE students are in the same labour market as PSE non-participants.
PSIS and PSIS-T1FF in ELMLP [PSE enrollment, program characteristics, institution, completion status, income information]	Earnings immediately after leaving PSE		Observed amount earned by PSE non-completers immediately after leaving PSE	Years in PSE affect earnings capacity of individuals even without obtaining a PSE credential.

Base sample for estimation purposes

The 2013 cohort of students who entered a full-time undergraduate, certificate, or diploma program. Non-completers are those who still have not completed PSE seven years later.

Analysis approach

The goal of the analysis was to estimate:

- How much foregone earnings Ontario PSE non-completers incur while in PSE, and
- How much they would have incurred in foregone earnings if they had completed.

For both actual and counterfactual scenarios, foregone earnings were estimated based on the average annual earnings of PSE non-participants in the following two steps.

First, a sample of PSE non-participants in Ontario was constructed from the Canadian 2001 Census according to the following conditions:

- A person who did not attend any school, college or university during the eight-month period between September 2000 and May 2001.
- A person's highest education was secondary education completion without any further training.

This group identified for the analysis was significantly older than the 2013 cohort of PSE entrants in Ontario. As a result, their average annual employment earnings would overestimate foregone earnings because they would likely have substantially higher work experience than PSE entrants. To adjust the difference in age profile, their average employment earnings in 2000 were calculated by each year of age from 18 to 50, and the results then weighted by the age distribution among PSE non-completers for the 2013 Ontario PSE entrants in this age range.[12] The process yielded $11,561. This value was converted to 2021 constant dollar values, which corresponds to $17,160.

Second, together with the estimated lengths in PSE for non-completers and completers, the above estimate of annual foregone earnings was used to calculate the present values of foregone earnings under the non-completion and completion scenarios, respectively. Under the 7 per cent discount rate, this process yielded $51,529 and $59,615 for the two scenarios, respectively, resulting a difference of $8,086.

Sensitivity analysis

PSE non-participants and non-completers could differ significantly in characteristics that affect earnings. To account for some of these differences, a propensity score-based method could be applied to estimate counterfactual annual employment earnings had non-completers not participated in PSE.

Similarly for PSE non-participants, the age profile of PSE non-completers in the 2001 Census was substantially older than for PSE entrants in Ontario. However, estimating counterfactual earnings for each year of age by a propensity score-based method was not practicable due to sample size issues. Instead, we applied a propensity score-based method among individuals

[12] This age range covers almost all 2013 PSE entrants in Ontario.

between 18 and 22, which accounted for nearly 80 per cent of the non-completers. The result was similar to the value obtained in the main analysis process above.

As another sensitivity analysis, SRDC calculated the annual earnings of non completers immediately *after leaving PSE* using T1FF tax data linked to PSIS as an alternative measure of annual foregone earnings. This approach, perhaps not unexpectedly, yielded higher estimates for foregone earnings. However, the difference was not large enough to change the main findings from the net cost analysis.

Outcomes of analysis

Under the 7 per cent discount rate, this analysis yielded $51,529 and $59,615 for the non-completion and completion scenarios, respectively, resulting a net difference of $8,086.

Final estimates

Cells by accounting perspective in Tables 3, 4 and 5.

PROVINCIAL AND FEDERAL TAXES

SRDC estimated the differences in lifetime personal income taxes paid (separated into federal and provincial taxes) deriving from differences in educational outcomes.

Table 12 Data sources for provincial and federal taxes

Data source	Outcomes	Purpose	How estimated?	Assumptions/caveats
Estimated lifetime earnings using the CTaCS tax simulator.	Federal tax and Provincial tax.	Estimate federal and provincial taxes on earnings.	CTaCS simulates taxes for tax years up to 2019.	Tax system simulated years after 2019 all resemble 2019 tax year. Simulations are run on single individuals with no dependents, whose only income source is their earnings, and who have no deductions (e.g., donations, union dues, etc.).

Base sample for estimation purposes

The sample and earnings from the Prime Working Life Earnings section.

Analysis approach

The key questions to be answered by this analysis were:

- How much in federal and provincial taxes do Ontario PSE non-completers pay on their lifetime earnings, relative to non-participants?
- How much federal and provincial taxes would they have paid if they had completed, relative to non-participants?

We utilize the prime working life earnings estimates to simulate the different taxes using the Canadian Tax and Credit Simulator (CTaCS). CTaCS uses inputs (e.g., tax year, earnings, and

province) to simulate both provincial and federal taxes. CTaCS only has information for simulations up to 2019. For tax years after 2019, we assume the 2019 tax structure. Another assumption we make is in the profile of the simulated individuals. CTaCS allows for optional inputs that can affect a person's tax obligations, such as family size, other income sources, and tax deductions. We utilized the default settings, which assume that simulated individuals are single with no dependents, whose only source of income is their earnings, and have no eligible tax deductions (e.g., donations, union dues, etc.).

Outcomes of analysis

The difference in lifetime federal and provincial taxes between non-completers and non-participants was $ 118,695. The difference in lifetime federal and provincial taxes between completers and non-participants was $ 309,169. This results in a net difference of $ $190,474.

Final estimates

Cells by accounting perspective in Tables 3, 4 and 5.

EI AND CPP CONTRIBUTIONS

SRDC estimated the differences in EI and CPP contributions deriving from differences in educational outcomes.

Table 13 Data sources for EI and CPP contributions

Data source	Outcomes	Purpose	How estimated?	Assumptions/caveats
Estimated lifetime earnings using CTaCS tax simulator.	EI and CPP contributions.	Derive estimates of EI and CPP contribution.	CTaCS simulates EI and CPP contributions for tax years up to 2019.	Same as described in the section above.

Base sample for estimation purposes

The sample and earnings from Prime Working Life Earnings section.

Analysis approach

The key questions to be answered by this analysis were:

- How much EI and CPP contributions do Ontario PSE non-completers pay in their lifetime, relative to non-participants?
- How much EI and CPP contributions would they have paid if they had completed, relative to non-participants?

Similar to taxes, a simple derivation of EI and CPP contributions from earnings was made using the CTaCS.

Outcomes of analysis

The difference in lifetime EI and CPP contributions between non-completers and non-participants was $6,044. The difference in EI and CPP contributions between completers and non-participants was $10,906. This results in a net difference of 4,862.

Final estimates

Cells by accounting perspective in Tables 3, 4 and 5.

EI AND SOCIAL ASSISTANCE PAYOUT

SRDC estimated the differences in EI and provincial social assistance paid to individuals deriving from differences in educational outcomes.

Table 14 Data sources for EI and social assistance payments

Data source	Outcomes	Purpose	How estimated?	Assumptions/caveats
Statistics Canada's Social Policy Simulation Database and Model (SPSD/M).	EI and provincial social assistance payment.	Derive estimates of EI and provincial social assistance received for different educational outcomes.	The SPSD/M is a synthetic dataset that is representative of the Canadian population.	For years after 2028, we assume the same population structure as 2028. Non-participants and non-completers fall within the same category in the education variable in the SPSD/M.

Base sample for estimation purposes

The SPSD/M is based on a synthetic dataset that is representative of the Canadian population.

Analysis approach

The key questions to be answered by this analysis were:

- How much EI and provincial social assistance is paid to non-completers, relative to non-participants?
- How much EI and provincial social assistance would they have been paid if they completed, relative to non-participants?

To approximate EI and provincial social assistance payouts by educational levels, we utilized Statistics Canada's Social Policy Simulation Database and Model (SPSD/M). The SPSD/M is a synthetic dataset that is representative of the Canadian population. We utilized the SPSD/M to extract approximations of EI and social assistance by age, as well as the person count by

educational level by age. The SPSD/M only allows for analysis up to 2028, so years after 2028 were assumed to adopt the same 2028 structure.

While the SPSD/M does provide educational information, its education categories do not allow us to distinguish non-participants and non-completers as both are included in the "graduated high school or partial postsecondary education" category. To approximate an amount for non-participants, we created a multiplier based on the percentage difference in earnings between non-completers and non-participants to proxy how estimates for assistance payments might differ for non-attendees relative to PSE non-completers. The rationale was that the principal reason non-participants receive more in assistance over their lifetimes is because they earn less over their lifetimes.

Outcomes of analysis

The difference in lifetime EI and social assistance payout between non-completers and non-participants was $15,012. The difference in lifetime EI and social assistance payout between completers and non-participants was $57,260. This results in a net difference of$42,248.

Final estimates

Cells by accounting perspective in Tables 3, 4 and 5.

GOVERNMENT DIRECT FUNDING TO INSTITUTIONS

SRDC estimated government transfers to institutions and a formula for apportioning these costs to students according to their duration of study.

Table 15 Data sources for direct funding to institutions

Data source	Outcomes	Purpose	How estimated?	Assumptions/caveats
Government Funding to Institutions				
Financial Information of Universities and Colleges (FIUC) (combines FINUNI & FINCOL) [L07 Other federal funding (non-research-based), L08 Provincial funding, L09 Municipal funding, L10 Funding from other provinces]	Average government funding tied to student enrollment on a yearly basis, which can be merged with non-completion estimates to derive actual and foregone direct funding to institutions due to non-completion.	Identify yearly institution-level funding tied to student enrollment and estimate the funding amount received and lost by institution when students discontinue their studies.	Estimate a per year transfer amount per student for each type of transfer (federal, provincial, municipal) and apply multipliers based on characteristics of non-completers in terms of their student category and time-in-PSE.	Snapshot data in PSIS corresponds to the number of students reported to governments for funding purposes. The funding model is primarily enrollment-driven.
PSIS [PSE enrollment, program] From Statistics Canada Table: 37-10-0018-01	Enrollment by jurisdiction, institution-type, credential level, immigration status, registration status, and by year.			

Base sample for estimation purposes

The 2013 cohort of students who entered a full-time undergraduate university program, college certificate program, or college diploma program. Non-completers were those had not completed PSE seven years later (December 2019).

Analysis approach

The key questions to be answered by this analysis were:

- How much do Ontario PSE public institutions receive in direct government funding on a year/student basis, and
- How much would Ontario PSE public institutions have received had non-completers finished their studies?

Similar to other approaches described above, using FIUC we estimated an average government transfer amount by reference year across all institutions (24 colleges and 21 universities), which was divided by the enrollment count (i.e., full-time equivalent domestic students) to yield an annual per student direct transfer amount. This estimate was then to be combined to the time-in-PSE estimate produced using PSIS.

Outcomes of analysis

FINCOL and FINUNI report provincial-level revenue of postsecondary institutions by type, funds, and year for all public colleges and public universities, separately. To produce a per-student government funding from both provincial and federal sources, we used the aggregated provincial and federal revenue type specifically earmarked for general operating funds, which excludes funds reserved for sponsored research or capital investments. Both the provincial and federal revenue categories include respective government departments and agencies whether funds come in grants or contracts.[13] The portion of provincial funding directly tied to headcounts is government grants, however only FINCOL provides this specific information and not FINUNI. Therefore, we determined that total provincial and federal revenues for operations was the closest measure to the grant measure, the cells in red in Table 16.

[13] Some of the provincial funds come from federal transfers, the data available does not permit us to determine the proportion of the provincial contribution that comes from federally transferred funds. They remain included in provincial contributions.

Table 16 Common across FINCOL and FINUNI

Type of revenues	Total funds	Type of funds: General operating	Type of funds: Sponsored research	Type of funds: Capital
Total revenues				
Federal				
SSHRC				
Health Canada				
NSERC				
CIHR				
Canada Foundation for Innovation				
Canada Research Chairs				
Other federal (ESDC, CFI, CRC, etc.)				
Non-federal				
Provincial				
Other provinces				

To produce a weighted estimate of per-student funding from government sources, we relied on publicly available enrollment data. We extracted full-time and part-time domestic enrollment numbers by institution-type and year. To produce a full-time equivalent estimate, all full-time enrollees and half of part-time enrollees were combined. Institution type weighted per-student provincial and federal transfers were estimated and then CPI-adjusted to 2021 dollar and averaged across 7 years[14] before being multiplied by the time-in-PSE estimates.

Combining the time-in-PSE multiplier and weighted average transfers, we estimated that the provincial and federal governments transfered an average of $14,356 per non-completer and $16,018 per completer, resulting in a net difference of $1,661.

Final estimates

Cells by accounting perspective in Tables 3, 4 and 5.

[14] Using the weighting approach described in footnote 7.

GOVERNMENT FINANCIAL AID TO STUDENTS

SRDC estimated the financial aid received by completers and non-completers.

According to the 2020 report by Ontario Auditor General, prior to the major changes to OSAP in the 2017/2018 academic year, grant recipients who withdrew from their studies were not required to repay their grants. Given the time in PSE estimate we are using, we adopted the assumption that non-completers in the 2013 cohort were unaffected by grant to loan conversion because they generally had left PSE before this change took place.

Table 17 Data sources for financial aid to students

Data source	Outcomes	Purpose	How estimated?	Assumptions/caveats
Data request to OSAP	Financial aid for PSE study	To estimate financial aid amount received by PSE non-completers in actual and counterfactual scenarios.	Custom tabulation of summary statistics for financial aid received by PSE students.	Financial aid amount received during study years does not differ by completion status.
PSIS in ELMLP	Number of PSE students in Ontario	To adjust aggregate data on financial aid from OSAP to align amounts to the Ontario student body	Observed PSE student count	

Base sample for estimation purposes

The 2013 cohort of students who entered a full-time undergraduate, certificate, or diploma program. Non-completers are those who still have not completed PSE seven years later.

Analysis approach

The goal of the analysis was to estimate:

- How much financial aid Ontario PSE non-completers would receive from the Ontario and Federal governments while in PSE, respectively, and

- How much financial aid would they have received from the Ontario and Federal governments if they had completed?

To estimate these values, SRDC obtained from OSAP summary statistics on financial aid received by Ontario PSE students. The data provide the number of students in the 2013 Ontario PSE entrant cohort who received provincial or federal financial aid and the average amounts of these aids by institution type and levels of study.

Based on these data, the total amount of financial aid received by the 2013 entrant cohort in a given academic year was estimated, and this amount was divided by the number of students in the 2013 entry cohort (cohort size) to produce the average amount of financial aid received *per student*.[15,16] This process yielded $3,350 for provincial grants and $2,589 for federal grants. The results were then converted into 2021 constant dollars based on CPI.

Together with the estimated length in PSE and the given discount rate, the present value of financial aid received during PSE was estimated for the non-completion and completion scenarios.

Outcomes of analysis

This analysis yielded $12,094 of provincial aid and $9,347 of federal aid under the non-completion scenario (total $21,441), while the counterpart values for the completion scenario were $13,418 and $10,370, respectively (total $23,788). This resulted in a total net difference of $2,347.

Final estimates

Cells by accounting perspective in Tables 3, 4 and 5.

[15] The data provided by OSAP span eight academic years starting from the 2013/14 academic year. The average annual amount of financial aid received by the students is similar between the 2013/14 to 2016/17 academic years, and for the sake of simplicity while affecting the results little, the average value based on the 2013-14 academic year is used to represent a typical amount of financial aid received by students each year.

[16] The cohort size is obtained from the sample size used in the time in PSE analysis with PSIS.

ADMINISTRATION COSTS (E.G., STUDENT AID ADMINISTRATION, ADMISSIONS)

SRDC estimated the cost of providing services to students.

Table 18 Data sources for administration costs

Data source	Outcomes	Purpose	How estimated?	Assumptions/caveats
Financial Information of Universities and Colleges (FIUC) **(combines FINUNI & FINCOL)** [general operating expenditures: library, computing and general, administration and academic support, student services]	Calculate costs per student of institutions' various administrative and academic supports as well as student services.	Determine the impact of non-completion on administering various student services and supports.	Application of formulae derived from select institutions' reports of differential usage to administrative costs reported province wide. In the absence of detectable differentials by student outcome, stage- and duration of study-based estimates could be used.	The relationship between student services and supports and enrollment is linear.
PSIS [PSE enrollment, program] From Statistics Canada Table: 37-10-0018-01	Enrollment by jurisdiction, institution-type, credential level, immigration status, registration status, and by year.			

Base sample for estimation purposes

The 2013 cohort of students who entered a full-time undergraduate, certificate, or diploma program. Non-completers are those who still have not completed PSE seven years later.

Analysis approach

The key questions answered by this analysis were:

- How much do Ontario PSE public institutions spend in administrative and academic supports as well as student services on a year/student basis, and

- How much do Ontario PSE public institutions spend on administrative and academic supports as well as student services for non-completers and for equivalent completers?

Aggregate budget allocations/expenditures for academic and student services are not difficult to access, but usage data is much more difficult to obtain. Usage is not tracked, nor differentiated between students, systematically. There is also a wide variety of services for students across institutions and/or programs, some of which are offered to all (e.g., admission and library), while others are geared towards specific students. For example, some services are targeted to students with academic needs, while others are geared towards highly motivated students (e.g., career development, experiential learning, peer-mentoring). Those who are at risk of leaving may use some more often (e.g., writing support, financial and housing support).

It is therefore difficult to provide an aggregated estimate of whether completers or non-completers are more likely to be using these services, given that offerings are so diverse. Initial conversations with institutions revealed that usage profiles for these services are rarely available. Typically, data collection is only done for specific government initiatives, such as academic accommodations, or mental health or disability supports delivered within one-time or recurring funding envelopes.

Since there were effectively no data on services used, the study relied on total postsecondary institution operational expenditures to create per-student cost estimates based on full institution enrollment (not just the population of interest in the base sample since expenditures cannot be broken down by credential). Postsecondary per-student operational expenditure estimates were then combined with the time-in-PSE measured devised above for completers and non-completers.

Outcomes of analysis

A total of 17 expenditure categories are shared between FINCOL and FINUNI and these expenditures are classified across nine types of funds (Table 19). Given that none of the combinations of expenditure categories and types of funds offers an ideal measure of administrative costs of student services, we opted to use total expenditure within the general operation funds, highlighted in Table 19.

Table 19 Expenditures and types of funds available in both FINCOL and FINUNI

Expenditure categories	Types of funds
Total Expenditures	Total
Salaries and wages	General operations
Teachers	Instruction and non-sponsored research
Other salaries and wages	Library
Fringe benefits	General administration
Library acquisitions	Physical plant
Operational supplies and expenses	Student services
Utilities	Sponsored research
Furniture and equipment	Capital
Scholarships and other related students support	
Fees and contracted services	
Debt services	
Buildings	
Land and site services	

To produce a weighted estimate of postsecondary institution per-student operational expenditures, we relied on publicly available enrollment data. We extracted full-time and part-time domestic enrollment numbers by institution type and year. To produce a full-time equivalent estimate, all full-time enrollees and half of part-time enrollees were combined. Institution type weighted per-student expenditures were estimated and then CPI-adjusted to 2021 dollars and averaged across 7 years[17] before being combined against the time-in-PSE estimates.

Combining the time-in-PSE multiplier and weighted average institutional administration costs, SRDC estimated that postsecondary institutions spent an average of $35,136 per non-completer and $39,201 per completer, resulting in a difference of $4,065.

Final estimates

Cells by accounting perspective in Tables 3, 4 and 5.

[17] Using the weighting approach described in footnote 7.

APPENDIX B: ESTIMATION UNDER ASSUMPTION OF FULL TIME ENROLMENT EQUIVALENT TO 100% COURSE LOAD

Table 20 Costs of non-completion relative to non-participation under assumption of full-time equivalent to 100% course load

	Accounting perspective				
	Participants	*Institutions*	*Ontario Government*	*Federal Government*	*Society*
Non-completers – non-participants costs (if negative = benefit)					
Tuition and compulsory fees	$17,378	-$17,378	$0	$0	$17,378
Other educational expenditures	$3,376	$0	$0	$0	$3,376
Non-educational expenditures					
Government direct funding to institutions	$0	-$23,927	$23,718	$210	$23,927
Foregone earnings	$86,090	$0	$0	$0	$86,090
Prime working life earnings	-$401,907	$0	$0	$0	-$401,907
Provincial and federal taxes	$118,695	$0	-$39,408	-$79,287	$0
EI premium and CPP contribution	$6,044	$0	$0	-$6,044	$0
EI and social assistance payout	$15,012	$0	-$11,053	-$3,959	$0
Government Financial Aid to Students	-$34,352	$0	$19,377	$14,975	$0
Administration costs (e.g., student aid, admissions)	$0	$58,560	$0	$0	$0
Total	***-$189,664***	***$17,255***	***-$7,366***	***-$74,105***	***-$271,136***

Table 21 Costs of completion relative to non-participation under assumption of full-time equivalent to 100% course load

	Accounting perspective				
	Participants	*Institutions*	*Ontario Government*	*Federal Government*	*Society*
Completers – non-participants costs (if negative = benefit)					
Tuition and compulsory fees	$19,389	-$19,389	$0	$0	$19,389
Other educational expenditures	$3,767	$0	$0	$0	$3,767
Non-educational expenditures					
Government direct funding to institutions	$0	-$26,696	$26,462	$234	$26,696
Foregone earnings	$94,827	$0	$0	$0	$94,827
Prime working life earnings	-$1,028,358	$0	$0	$0	-$1,028,358
Provincial and federal taxes	$309,169	$0	-$104,389	-$204,780	$0
EI premium and CPP contribution	$10,906	$0	$0	-$10,906	$0
EI and social assistance payout	$57,260	$0	-$56,986	-$273	$0
Government Financial Aid to Students	-$37,839	$0	$21,344	$16,495	$0
Administration costs (e.g., student aid, admissions)	$0	$65,336	$0	$0	$0
Total	***-$570,881***	***$19,251***	***-$113,569***	***-$199,231***	***-$883,680***

Table 22 Net costs of non-completion under assumption of full-time equivalent to 100% course load

	Accounting perspective				
	Participants	*Institutions*	*Ontario Government*	*Federal Government*	*Society*
Non-completers - completers costs (value in table 3 – table 4)					
Tuition and compulsory fees	-$2,011	$2,011	$0	$0	-$2,011
Other educational expenditures	-$391	$0	$0	$0	-$391
Non-educational expenditures					
Government direct funding to institutions	$0	$2,769	-$2,744	-$24	-$2,769
Foregone earnings	-$8,737	$0	$0	$0	-$8,737
Prime working life earnings	$626,451	$0	$0	$0	$626,451
Provincial and federal taxes	-$190,474	$0	$64,981	$125,493	$0
EI premium and CPP contribution	-$4,862	$0	$0	$4,862	$0
EI and social assistance payout	-$42,248	$0	$45,933	-$3,685	$0
Government Financial Aid to Students	$3,486	$0	-$1,966	-$1,520	$0
Administration costs (e.g., student aid, admissions)	$0	-$6,776	$0	$0	$0
Total	***$381,216***	***-$1,996***	***$106,203***	***$125,125***	***$612,545***

SRDC SRSA
SINCE 1991 DEPUIS
INNOVATION • EXPERIMENTATION • EVALUATION

OTTAWA • VANCOUVER • CALGARY • HAMILTON

MONTREAL • REGINA • TORONTO • WINNIPEG

www.srdc.org • 1 866 896 7732 • info@srdc.org