

Post-Graduation Earnings Outcomes of Ontario Transfer Students

Evidence from PSE-Tax Linked Data

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Executive Summary

Objective and Research Questions

This study examines how the post-graduation earnings of Ontario PSE students (bachelor's degree and college-level diploma students) who change institutions, educational credential, and field of study compare to those of non-transfer students.

Methodology

This study constructs an analysis sample from the Education and Labour Market Longitudinal Platform (ELMLP), a data platform at Statistics Canada which allows us to link the Postsecondary Student Information System (PSIS), administrative data on Canadian Post-secondary education (PSE) students, to personal income tax information stored in the T1 Family File (T1FF).

The enrollment and graduation data of the Fall 2010 entry cohort of college-level diploma and bachelor's degree students are used to track changes in institution attended, educational credential, and field of study. For those identified as graduates, their income tax information in the T1FF is extracted to observe their employment earnings after graduation.

The mean post-graduation earnings are calculated by their transfer type status (whether they change institution, educational credential, or field of study) and compared with that of non-transfer students who stay in the same program from entry to completion.

The differences in earnings by transfer type are also adjusted by statistical modelling techniques to account for differences in other characteristics between the groups being compared.

Findings

Transfer students account for a small proportion of bachelor's degree graduates (less than five percent). In contrast, transfer students who move from diploma to bachelor's degree programs account for approximately one-fifth of college-level diploma graduates, with transfer students from different other diploma programs accounting for an additional five percent.

For bachelor's degree graduates, average earnings are \$36,200 one year after graduation, grow to \$44,400 the following year, and reach \$48,900 three years following graduation. College-level diploma graduates earn \$28,100 on average one year following graduation and their mean earnings grow steadily, reaching \$39,600 five years following graduation.

For bachelor's degree graduates, a statistically significant earnings premium of \$1,700 to \$5,000 is found for those who are transfer students who remain in a bachelor's degree program in the same field of study. On the other hand, earnings tend to be lower for transfer students who move from a college-level diploma to bachelor's degree programs than for non-transfer students, though the differences are not statistically significant for all years following graduation.

For college-level diploma graduates, transfer students who move from bachelor's degree to diploma programs in the same field of study have a statistically significant earnings premium over non-transfer students, which grows from \$2,900 to \$8,400 over the five-year period following graduation. In contrast, earnings are lower for transfer students who remain in diploma programs but in different fields of study, as well as students who change their field of study but not their institution or educational credential.

Policy Implications

While this study examines the differences in post-graduation earnings between non-transfer and transfer students, the earnings patterns identified here do not represent the causal effect of transfers as these gaps could be the result of pre-existing differences in students' ability or other factors that are unobservable but correlated with changes in PSE institution, educational credential, or field of study. An interesting avenue for future research may be to examine why students decide to transfer from one institution to another or change credential level or field of study in a more systematic manner so that it can be analysed in conjunction with other related aspects of PSE pathway: initial PSE entry decision, withdrawal or stop-out.

Transfers are, and will likely remain, an integral part of the Ontario PSE system. Through research and advocacy, we need to continue to ensure that new and interesting opportunities for students can be navigated easily and that changes in their educational journeys as seamless as possible.

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1. Introduction

Ontario's post-secondary education (PSE) system has been striving to facilitate seamless mobility among PSE institutions (Kerr, McCloy, & Liu, 2010). While there exist several studies examining differences in demographic profiles and academic outcomes between transfer and direct-entry students (Stewart & Martinello, 2012; Drewes, Maki, Lew, Wilson, & Stringham, 2012; Acai & Newton, 2015), how transfer students perform in terms of labour market outcomes has been little understood due to a paucity of suitable data. Studying this would require detailed information about student PSE enrollment histories as well as post-graduation labour market information with sufficient data points.

Statistics Canada's new Education and Labour Market Longitudinal Platform (ELMLP) fills this data gap, linking enrollment and graduation data of PSE students recorded in the Postsecondary Student Information System (PSIS) to personal income tax data in the T1 Family File (T1FF). Using this platform, Finnie, Dubois, and Miyairi (2020) find that among 2009 Ontario university entrants ages 17 to 19, those who transfer university but remain in the same field of study throughout their academic career have similar post-graduation earnings to those who remain at the same institution and field of study in the first year after graduation. On the other hand, transfer students who also change field of study have mean earnings \$3,100 lower than those who remain at the same institution and field of study, with this difference being statistically significant.

However, since moving from one university to another is not a common transfer pattern in Ontario, including students transferring from college to university and from university to college and comparing their post-graduation earnings to non-transfer students would provide a more detailed picture of the outcomes of transfer students. This would be especially interesting given Ontario's traditionally binary PSE system consisting of distinct college and university sectors unlike other provinces.

This study extends the analysis of labour market outcome of Ontario graduates by including more complex PSE mobility patterns than university-to-university transfers. Specifically, this study examines the post-graduation labour market earnings of students who transfer between PSE institutions (regardless of institution type, i.e., college or university), educational credentials (i.e., bachelor's degree or college-level diploma), or fields of study, and compare them to those of non-transfer students (i.e., those whose institution, credential, and field of study remain the same until graduation).

Although a system-wide analysis would be better, PSIS has serious data coverage gaps in the enrollment and graduation data for Ontario colleges until the 2014/15 reporting cycle, which prevents us from capturing all transfers to and from missing colleges.¹ This limitation will diminish as additional years of PSIS data with more complete coverage accumulate.

¹ Approximately half of all Ontario colleges are missing from PSIS prior to the 2014/15 reporting cycle.

This report is organized as follows. Section 2 describes the ELMLP and the construction of the analysis data. Section 3 presents the sample characteristics of the analysis dataset. Section 4 presents the descriptive and regression analyses. Section 0 concludes the report.

2. Data and Analytical Approach

2.1. The Education and Labour Market Longitudinal Platform

This study constructs an analysis sample using the Education and Labour Market Longitudinal Platform (ELMLP), a longitudinal data environment that allows researchers to link administrative data held by Statistics Canada on PSE students to personal income tax information. Specifically, the Postsecondary Student Information System (PSIS) and the T1 Family Files (T1FF), are used in this analysis.

PSIS consists of administrative records of PSE students, collected annually, from all publicly-funded colleges and universities in Canada. PSIS is thus closer to a census of all Canadian PSE students, as opposed to a sample, although there are some gaps in the ELMLP's coverage, some of which are discussed below.

Information in PSIS includes students' program (type of credential, Classification of Instructional Program [CIP] code, program name), institution (type, location), and personal characteristics (e.g., age, gender, immigration status, and current and permanent address) (Statistics Canada, n.d., *PSIS Codebook*).

In principle, PSIS includes one record per program in which a student is enrolled in each reporting cycle. Therefore, consider these three examples:

1. a student in *two programs in a year* would have *two records*,
2. a student in the *same program over two years* would also have *two records*, and
3. a student in *one program in a year and in another the next* would also have *two records*.

PSIS data on the ELMLP are available for all Canadian provinces and territories from the 2009/10 reporting cycle (generally from the Spring/Summer semester through the end of the following Winter semester) onward. However, enrollment and graduation records of almost half of Ontario colleges are missing from the ELMLP until the 2014/15 reporting cycle. The number of colleges with missing information varies from year to year, but we include all available college-level diploma program enrollment and graduation records in PSIS rather than restricting the sample to institutions that reported enrollment and graduation records for all reporting cycles.

T1FF data on the ELMLP are taken from personal income tax returns transferred to Statistics Canada by the Canada Revenue Agency and contain income from various sources, including employment income, income from government programs (such as Social Assistance, Employment Insurance, and the Child Tax Benefit), and various tax credits and deductions (PSE tax credits, CPP and RPP contributions, union dues). Also included are personal characteristics such as age, gender, and postal code (Statistics Canada, 2018). Finally, industry of employment

is also available, represented by the three-digit North American Industry Classification System (NAICS3) code.

All T1FF information is at the person (student) level except for the additional availability of some selected family-level variables, including parental income, family type, family size, and number of children. T1FF information is available for all individuals with PSIS records on the ELMLP from 2004 onward, including the years before, during, and following PSE, depending on when the student was enrolled.

2.2. Transfer Types

We measure student mobility in three dimensions. The first dimension is change in institution (i.e., transfer to a different institution). A move between parent and affiliated institutions, or between different campuses of the same university is not considered a transfer for this study.

The second dimension represents change in education credential (i.e., changes from college-level diploma to bachelor's degree program and vice versa).

The third dimension is change in field of study, represented by the primary groupings of Classification of Instructional Program (CIP) code, which consists of 13 aggregated categories of field of study (see Statistics Canada (2012) for more details of the primary groupings).

With these three dimensions, students are grouped into eight categories:

- students staying in the same institution, educational credential, and field of study,
- students staying in the same institution and educational credential, but changing the field of study,
- students staying in the same institution and field of study, but changing educational credential,
- students staying in the same institution but changing educational credential and field of study
- students transferring to a different institution but staying in the same educational credential and field of study,
- students transferring to a different institution, staying in the same educational credential and changing field of study,
- students transferring to a different institution, staying in the same field of study, and changing educational credential,
- students transferring to a different institution and changing educational credential and field of study.

The categories listed above are encoded in a variable named transfer type as in Table 1. The transfer type 0 represents students who stay in the same institution, education credential, and field of study from entry to graduation, while transfer types 4 to 7 represent transfer students, with each type representing a particular status in change in educational credential or field of study.

Table 1. Transfer Type Variable

Transfer type	Change in Institution	Change in Education Credential	Change in Field of Study
0	No	No	No
1	No	No	Yes
2	No	Yes	No
3	No	Yes	Yes
4	Yes	No	No
5	Yes	No	Yes
6	Yes	Yes	No
7	Yes	Yes	Yes

2.3. The Earnings Measure

This study focuses on total before-tax employment earnings, which are calculated by combining all paid employment income (wages, salaries, and commissions) reported on T4 slips, positive net income earned from self-employment (business, professional, commissions, farming, and fishing), Indian exempt employment income, and other taxable employment income that is not reported on a T4 slip, such as tips and gratuities.² Earnings are adjusted to constant 2016 dollars using the national level Consumer Price Index (CPI).

One important caveat of the self-employment income category is that it includes only unincorporated earnings. In some cases, graduates may form corporations and earnings may be transmitted through dividends, allocated to family members, or retained within the corporation, all of which are not available on the ELMLP. Earnings paid out in salary from the corporation to individuals themselves would, however, be included in the earnings measure as employment income.

2.4. Sample Selection and Identifying Transfer Status

We focus on a cohort of students who entered college-level diploma or bachelor's degree programs in Ontario in the fall of 2010 who are between 17 and 19 years of age at entry, inclusively.³

² For employment income to be considered Indian exempt, the location of the employment duties is a major factor, as most on-reserve work is classified as tax exempt. However, CRA also recognizes that employees of bands, tribal councils, or organizations that operate on behalf of bands or tribal councils may perform most of their activities off reserve. If the employer is a resident on a reserve and the employed is in a non-commercial activity for the social, cultural, educational, or economic development of Indigenous peoples who for the most part live on reserves, the income of their employees is also tax exempt. For more information on the guidelines covering Indian exempt employment income under Section 87 of the Indian Act, visit <https://www.canada.ca/en/revenue-agency/services/aboriginal-peoples/indian-act-exemption-employment-income-guidelines.html>.

³ Technically, college-level diploma and bachelor's degree programs correspond to career, technical and professional diploma programs and undergraduate degree programs under Statistics Canada's classification of programs and credential, respectively. This means that students in university programs in law, medicine, dentistry, pharmacy, optometry, and veterinary medicine are excluded from the analysis sample.

To identify a sample of 2010 entrants, we take a similar approach as Statistics Canada (2019), and select individuals who were enrolled in the relevant PSE programs in fall 2010 but were not in the 2009 academic year.⁴ Under this criterion, approximately 60 percent of 17 to 19-year-old students enrolled in Fall 2010 are selected as Fall 2010 entrants.

An entrant student with multiple starting programs in the same institution, credential, and field of study is included in the analysis sample as a single student record. On the other hand, entrants who have multiple starting programs with different institutions, credentials, or fields of study in 2010 are excluded from the analysis sample due to the absence of clear selection criteria and the proportion of the sample these instances represent. This sample restriction affects less than one percent of the sample.

Once 2010 entrants are selected, we search for their first graduation events in the period covered by the 2010/11 to 2016/17 reporting cycles of PSIS. If a student has multiple graduation records during this period, the first graduation event is determined by the program end date information in PSIS.⁵ Then we check whether the institution, credential, or field of study have changed from entry to graduation and assign the transfer category code accordingly.

Typically, a bachelor's degree program takes at least three years of study while diploma programs takes at least two years. If enrollment histories indicate that students graduate in less time, they are excluded from the sample. This restriction affects less than 1.5 percent of the sample.

2.5. Construction of the Post-Graduation Earnings Sample

For students who were reported as having graduated from their programs, their T1FF data are merged with their PSE information to obtain their earnings after graduation. The tracking of post-graduation outcomes starts in the first full year following graduation. Therefore, for those graduating in 2013, the first year corresponds to 2014. As the most recent T1FF information available is 2017, and the earliest year of graduation is 2012 and 2013 for college-level diploma and bachelor's degree graduates, which means that there are five and four years of post-graduation earnings records, respectively. However, there is only a small number of earnings observations four years following graduation for bachelor's degree graduates as they are only available for students graduating in 2013, and this group accounts for a small proportion of bachelor's degree graduates, as shown in the following section. As a result, we track post-graduation earnings only up to three years following graduation for bachelor's degree graduates.

Three additional sample restrictions are imposed. First, individuals who do not file taxes are excluded for that year. This restriction applies to approximately six to 10 percent of bachelor's degree graduates over the four-period following graduation, and approximately six percent of the

⁴ Statistics Canada (2019) states that for this age range, not having an enrollment record in the same credential level in the previous reporting cycle is a good indication of PSE entry to the program of this level.

⁵ If multiple graduation records are found for the first graduation event of a given individual, we employ a tie-breaking rule that selects the one with the lowest transfer type code. If this tie-breaking rule does not resolve multiple first graduation records, we exclude the corresponding students from the analysis sample. This restriction affects less than 0.5 percent of the sample.

college-level diploma graduates in any given year during the five-year period following graduation.

Second, individuals are also excluded from the analysis if they are identified (through the full-time PSE education tax credit information included in T1FF) as pursuing further full-time PSE after graduation. This restriction is imposed because further schooling typically leads to less active engagement in the labour market while the individual is in school, and new skills or credentials acquired following a return to school could lead to an earnings premium upon labour market re-entry. This restriction applies to approximately 35 and 23 percent of bachelor's degree and college-level diploma graduates one year following graduation, respectively. It applies to half the bachelor degree graduates three years following graduation, and 40 percent of college-level diploma graduates four years following graduation.

Third, in order to focus on graduates who are meaningfully engaged in the labour market, earnings records for graduates whose total before-tax earnings are lower than \$1,000 are excluded from the sample. This restriction applies to approximately one to three percent of the sample in any given year following graduation.

3. Sample Characteristics

Table 2 presents the sample characteristics of the Fall 2010 entrants by educational credential. For bachelor's degree entrants, social and behavioural sciences and law is the most common field of study (19.7 percent), closely followed by the humanities (17.7 percent) and business, management and public administration (16.4 percent). Female students account for a majority of entrants (56.3 percent). Age 18 is by far the most common age at entry (75.1 percent).⁶ Canadian citizens account for 89.9 percent of the sample, with permanent residents and international students accounting for 5.8 and 4.2 percent, respectively.

Table 2. Sample Characteristics at Entry by Educational Credential at Entry

	Bachelor's Degree	College-level Diploma
<i>Number of Observations</i>	70,971	22,164
<i>Field of Study at Entry (%)</i>		
Education	1.9	0.5
Visual and performing arts, and communication technologies	5.0	9.4
Humanities	17.7	1.9
Social and behavioural sciences and law	19.7	14.0
Business, management and public administration	16.4	26.0
Physical and life sciences and technologies	14.5	0.8
Mathematics, computer and information sciences	2.9	3.1
Architecture, engineering and related technologies	9.9	18.8
Agriculture, natural sciences and conservation	1.4	1.1
Health and related fields	9.1	9.4
Personal, protective and transportation services	0.8	14.8
Other	1.0	0.1
<i>Sex (%)</i>		

⁶ Entry age represents students' age on December 31, 2010.

	Bachelor's Degree	College-level Diploma
Male	43.7	53.5
Female	56.3	46.5
<i>Age at Entry (%)</i>		
17	1.6	0.7
18	75.1	49.4
19	23.2	49.9
<i>Immigration Status (%)</i>		
Canadian citizen	89.9	93.1
Permanent resident	5.8	3.1
International student	4.2	3.9

For college-level diploma entrants, the most common field of study at entry is business, management and public administration (26 percent), followed by architecture, engineering and related technologies (18.8 percent), and then personal, protective and transportation services (14.8 percent). In contrast to bachelor's degree entrants, male students account for a majority of college-level diploma entrants (53.5 percent). Ages 18 and 19 account for almost all the sample in terms of age at entry (both nearly 50 percent). Canadian citizens account for over 93 percent of the sample, while permanent residents and international students account for 3.1 and 3.9 percent, respectively.

Table 3 presents how Fall 2010 entrants are grouped into different transfer type categories by educational credential at entry. Firstly, note that 21.4 and 46.8 percent of bachelor's degree and college-level diploma students have missing transfer type values, as no graduation record is found for these students. This could be explained by withdrawal from PSE programs, transfer to a different province, territory, or country, or switching to a PSE program other than bachelor's degree or college-level diploma programs. The particularly high proportion for college-level diploma entrants with missing transfer type values is likely due to the incomplete PSIS reporting by half of Ontario colleges up to the 2014/2015 reporting cycles.

Table 3. Transfer Status of Entrants by Educational Credential at Entry

Transfer Type	Change in Institution	Change in Educational Credential	Change in Field of Study	Bachelor's Degree (%)	College-level Diploma (%)
0	No	No	No	53.1	44.3
1	No	No	Yes	18.4	3.9
2	No	Yes	No	0.04	0.3
3	No	Yes	Yes	0.04	0.1
4	Yes	No	No	1.5	1.4
5	Yes	No	Yes	1.6	2.1
6	Yes	Yes	No	1.4	0.6
7	Yes	Yes	Yes	2.5	0.8
	Unknown	Unknown	Unknown	21.4	46.8

Roughly half of entrants stay in the same institution, educational credential, and field of study for both bachelor's degree and college-level diploma programs (53.1 and 44.3 percent, respectively).

3.1 percent of bachelor's degree entrants transfer to a different institution for a different bachelor's degree program (of which roughly half stay in the same field of study). 1.4 percent of bachelor's degree entrants switch to college-level diploma programs in the same field of study, while 2.5 percent of them move to a college-level program in a different field of study.

Of college-level diploma entrants, 1.4 percent transfer to a different institution for a college-level diploma program in the same field of study, while 2.1 percent transfer to a different institution for a college-level diploma program in a different field of study. Just 1.4 percent of college-level diploma entrants transfer to a different institution to start a bachelor's degree program (transfer types 6 and 7).

Table 4 Table 4 presents the sample characteristics of bachelor's degree and college-level diploma graduates. For bachelor's degree graduates, the three most common fields of study are social and behavioural sciences and law (27.4 percent), business, management and public administration (16.8 percent), and physical and life sciences and technologies (12.7 percent). The proportion of humanities graduates is much lower than that at entry (10.0 percent as opposed 17.7 percent). Female students account for close to 60 percent of the graduates. The distribution of immigration status is virtually unchanged from entry. The most common age at graduation and year of graduation are 22 and 2014, respectively.

Table 4. Characteristics of the Graduates by Educational Credential at Graduation

	Bachelor's Degree	College-level Diploma
<i>Number of Observations</i>	53,286	14,280
<i>Field of Study at Graduation (%)</i>		
Education	1.2	0.7
Visual and performing arts, and communication technologies	5.4	9.4
Humanities	10.0	1.3
Social and behavioural sciences and law	27.4	15.7
Business, management and public administration	16.8	25.7
Physical and life sciences and technologies	12.7	0.7
Mathematics, computer and information sciences	3.0	2.3
Architecture, engineering and related technologies	9.8	16.3
Agriculture, natural sciences and conservation	1.6	1.1
Health and related fields	11.0	11.9
Personal, protective and transportation services	0.6	14.6
Other	0.6	0.5
<i>Sex (%)</i>		
Male	40.9	47.0
Female	59.1	53.0
<i>Immigration Status (%)</i>		
Canadian citizen	89.9	93.2
Permanent resident	5.8	2.9
International student	4.3	3.9
<i>Age at Graduation (%)</i>		
19	-	0.5
20	0.1	22.2
21	6.4	34.0
22	46.8	21.3
23	34.0	10.9

	Bachelor's Degree	College-level Diploma
24	10.9	6.7
25	1.7	3.6
26	0.03	0.8
<i>Year of Graduation (%)</i>		
2012	-	43.0
2013	7.4	24.3
2014	55.9	16.6
2015	30.2	7.9
2016	6.4	6.0
2017	0.1	2.3

For college-level diploma graduates, the three most common fields of study are business, management and public administration (25.7 percent), social and behavioural sciences and law (15.7 percent), and personal, protective and transportation services (14.6 percent). Female students account for 53 percent of college-level diploma graduates, and Canadian citizens comprise 93.2 percent of the sample. The most common age at graduation is 21 at 34 percent, and the most common year of graduation is 2012 at 43 percent.

Table 5 presents the distribution of transfer type by educational credential at graduation. 70.7 percent of bachelor's degree graduates stay in the same institution, educational credential, and field of study, while approximately a quarter of bachelor's degree graduates change field of study only. These two groups account for most of bachelor's degree graduates in the sample.

Table 5. Transfer Type Status of Graduates by Education Credential at Graduation

Transfer Type	Change in Institution	Change in Educational Credential	Change in Field of Study	Bachelor's Degree (%)	College-level Diploma (%)
0	No	No	No	70.7	68.7
1	No	No	Yes	24.5	6.0
2	No	Yes	No	0.1	0.2
3	No	Yes	Yes	0.03	0.2
4	Yes	No	No	2.0	2.1
5	Yes	No	Yes	2.1	3.2
6	Yes	Yes	No	0.2	7.0
7	Yes	Yes	Yes	0.3	12.5

4.1 percent of bachelor's degree graduates are transfer students who are originally enrolled in different bachelor's degree programs (transfer types 4 and 5), of which roughly half stay in the same field of study. Less than one percent of bachelor's degree graduates are originally enrolled in college-level diploma programs (transfer types 2, 3, 6, and 7).

Nearly 70 percent of college-level diploma graduates make no change in institution, educational credential, or field of study from entry to completion.

Approximately one-fifth of college-level diploma graduates are originally enrolled in different institutions for a bachelor's degree, of which nearly two-thirds change field of study as well

(transfer types 6 and 7). Approximately 5 percent of college-level diploma graduates come from another college-level diploma program in different institutions (transfer types 4 and 5).

For both bachelor's degree and college-level diploma graduates, change in educational credential in the same institution is rare (transfer types 2 and 3). This is because these types of transition are only possible in colleges as only colleges offer both college-level diploma and bachelor's degree programs in Ontario. These small sample sizes do not provide reliable estimates for post-graduation earnings for these groups, and in some cases, do not meet the minimum sample-size requirements set by Statistics Canada to protect confidentiality of PSIS-T1FF data. As a result, we exclude these groups from the ensuing analysis of post-graduation earnings.

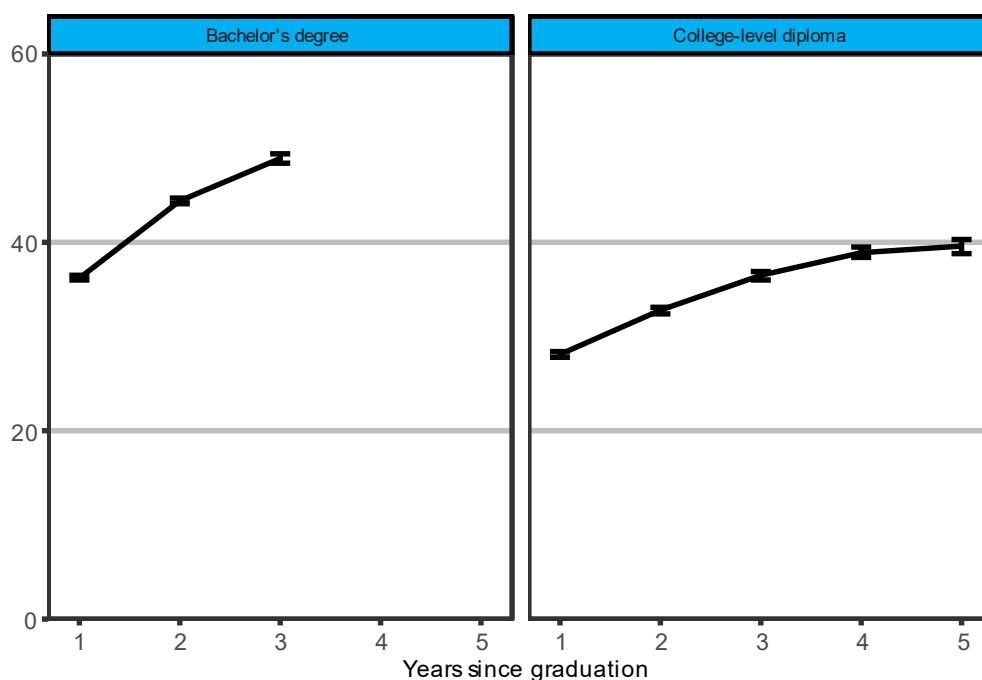
4. Analysis of Post-Graduation Earnings

4.1. Descriptive Analysis

All Graduates by Educational Credential

Figure 1 presents the mean earnings trajectories of bachelor's degree and college-level diploma graduates with the 95 percent confidence interval represented by error bars.

Figure 1. Mean Post-graduation Earnings by Educational Credential
(2016 constant dollars, \$1,000)



For bachelor's degree graduates, the post-graduation earnings are \$36,200, on average, one year following graduation, grow to \$44,400 two years following graduation, and reach \$48,900 three years following graduation.

College-level diploma graduates earn \$28,100, on average, one year following graduation. Their mean earnings then grow steadily, reaching \$39,600 five years following graduation.

Bachelor's Degree Graduates

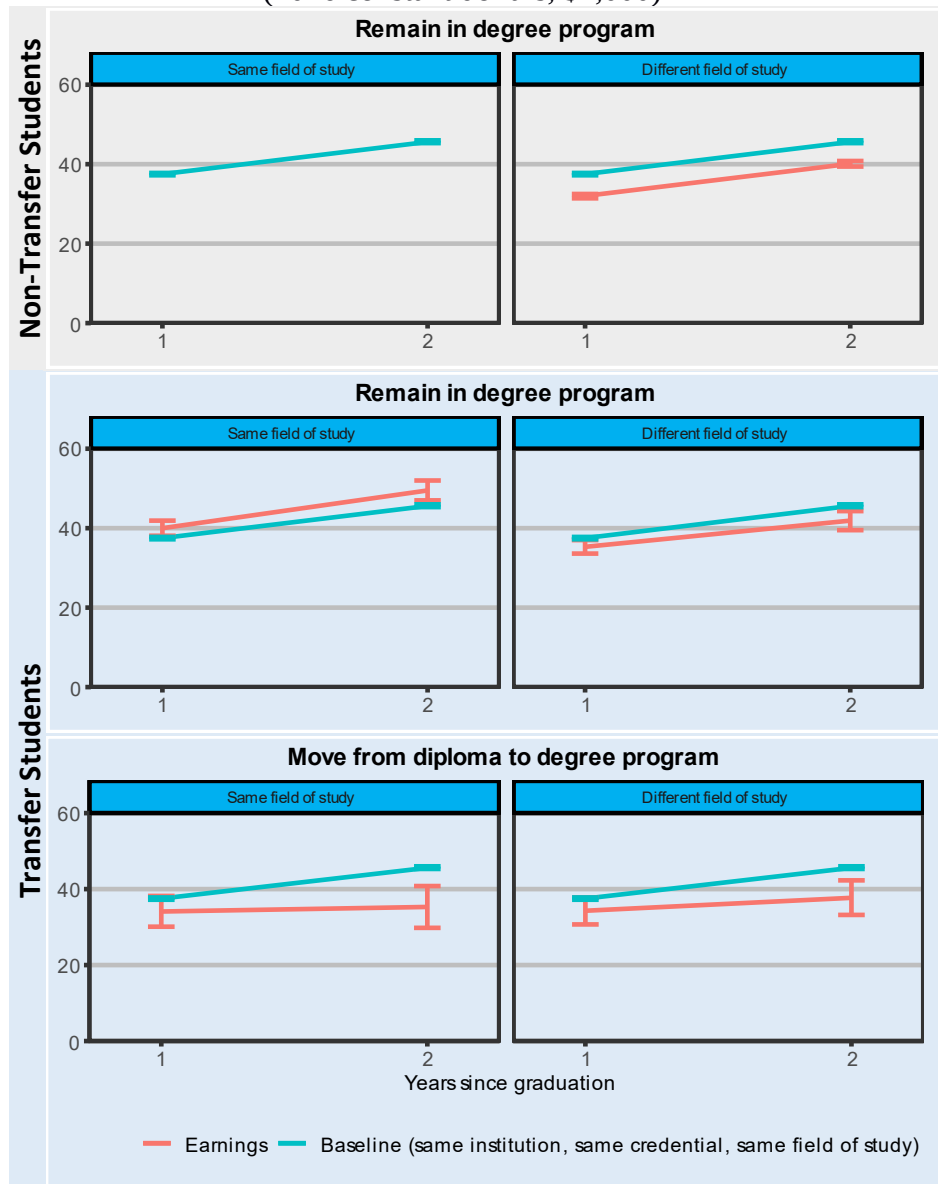
Figure 2 presents the trajectory of mean earnings of bachelor's degree graduates broken down by transfer type, with 95 percent confidence interval represented by error bars. Due to small sample sizes of graduates with earnings records in some transfer type groups three years after graduation, we can only present two years of labour market outcomes following graduation. The first section (grey section) of the graph presents two panels with the earnings of student who remain in the same institution through to graduation (i.e., non-transfer students), while the second section (blue section) presents the earnings of transfer students across two groups, those who remain in the same credential level (remain in a degree program despite transferring institution) and those who change credential level (move from diploma to degree program after transferring institution). For each transfer group, we compare those who remain in the same field of study (left panels) and those who change field of study (right panels).

The top-left panel of the figure presents the mean earnings of the baseline group: those who stay in the same institution, educational credential, and field of study. This group of graduates earn \$37,500 one year following graduation, and \$45,600 the following year. The earnings trajectory of the baseline group is slightly higher than the overall average earnings of bachelor's degree graduate presented in Figure 1.

This earnings trajectory is reproduced in other panels, where the mean post-graduation earnings of other transfer groups are presented, to provide a baseline comparison. For instance, students who transfer to a different institution (blue section) but remain in a bachelor's degree program in the same field of study earn \$2,500 and \$3,900 more than the baseline group in their first and second years following graduation, respectively, and these differences are statistically significant (middle-left panel).

The mean earnings for other transfer groups are all lower relative to the baseline group, by approximately \$2,200 to \$3,400 one year following graduation and \$3,700 to \$10,300 two years following graduation. The majority of these differences are statistically significant.

Figure 2. Mean Post-Graduation Earnings by Transfer Type – Bachelor's Degree Graduates
(2016 constant dollars, \$1,000)



Source: Appendix Table A1 provides the underlying data points for this figure

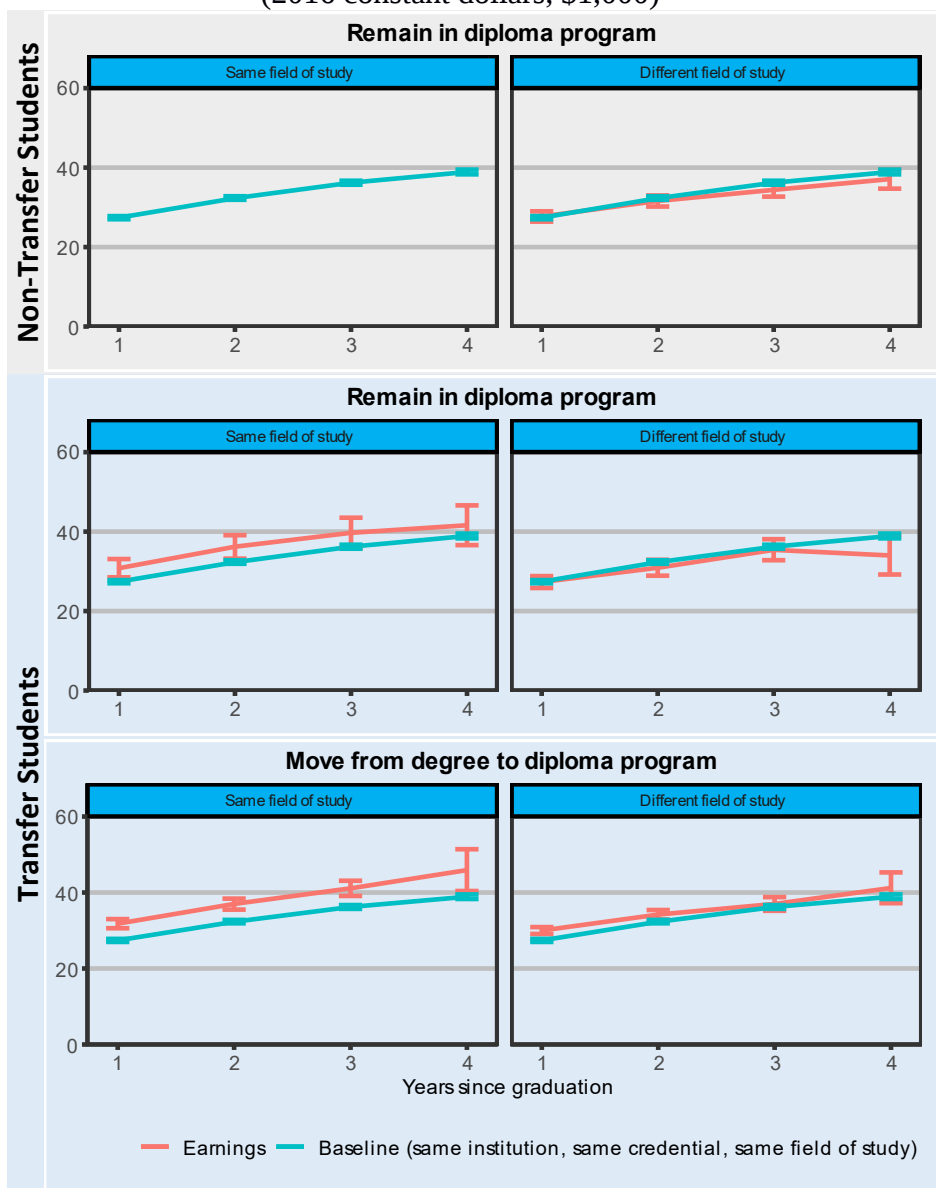
College-level Diploma Graduates

Figure 3 presents the trajectories of mean post-graduation earnings of college-level diploma students, broken down by transfer type, with 95 percent confidence intervals represented by error bars. Unlike the bachelor's degree graduate sample, diploma graduates can be followed for up to four years in the labour market following graduation, but due to small sample sizes of graduates with earnings records, we are unable to present the fifth year following graduation.

As shown in the top-left panel, on average, the mean earnings of the baseline group, again representing those who remain in the same institution, credential, and field of study to

graduation, are \$27,400 one year after graduation and grow steadily to reach \$38,900 four years after graduation. Unlike their bachelor's degree counterparts, the earnings of the baseline group is slightly below the overall average presented in Figure 1. In other panels, both similarities to and noticeable differences from the baseline group emerge. Non-transfer students who change field of study have a very similar earnings trajectory to the baseline group and the differences are not statistically significant at any point during the period covered (top-right panel).

Figure 3. Mean Post-graduation Earnings by Transfer Type – College-level Diploma Graduates (2016 constant dollars, \$1,000)



Source: Appendix Table A2 provides the underlying data points for this figure.

Compared to the baseline group, transfer students have higher or similar post-graduation earnings. However, the differences in earnings are only statistically significant over the entire analysis period for transfer students who were originally enrolled in bachelor's degree programs

and moved to a diploma program in the same field of study (bottom-left panel). For this group, the differences in earnings range from approximately \$4,400 to \$7,000, which roughly represent 14 to 18 percent earnings premia compared to the baseline group of non-transfer students.

4.2. Modelling Analysis

The Model

The observed differences in earnings presented in Figures 1 and 2 are not solely attributable to differences in student mobility patterns, and are explained to some extent by differences in other characteristics such as field of study or gender. For example, after controlling for field of study at graduation and several student characteristics (gender, age at graduation, immigration status, and year of graduation), Finnie, Dubois, and Miyairi (2020) find that the differences in post-graduation earnings between university transfer students and non-transfer students narrow by as much as 30 percent. Therefore, we also use a regression approach to control for other observable factors that are related to earnings while estimating the relationship between post-graduation earnings and student mobility patterns.

We model the relationship between earnings and various student characteristics as

$$Y = f(X) + \varepsilon.$$

In this model, the dependent variable Y , which represents graduates' earnings, is related to a set of explanatory variables X that include the transfer type variable as well as field of study at graduation, gender, immigration status at entry, age at graduation, and the calendar year of graduation. The error term ε captures a portion of earnings left unexplained by the explanatory variables in the model.

This model is estimated for each year following graduation to allow the relationships between earnings and explanatory variables to change over years. For diploma graduates, the model is estimated for the first five years following graduation and the first three years for bachelor's degree graduates, where a reasonable number of earnings observations are available.

For each explanatory variable in the regression model, estimation results provide differences in earnings between a baseline category and other categories, while those being compared having otherwise the same characteristics. The baseline categories for field of study, gender, immigration status are social and behavioural sciences and law, male, and Canadian citizens, respectively. For age at graduation, 22 and 21 represent the baseline categories for bachelor's degree and college-level diploma students, respectively, while the 2014 and 2012 cohorts represent the baseline groups for the year of graduation.

The model is estimated by an ordinary least square method. It is important to note that the differences in earnings estimated in this way do not have causal interpretations. In other words, they are not solely attributable to differences in student mobility without further assumptions. The gap could result from pre-existing differences in students' ability or other factors that are unobservable but correlated with PSE transfer or change in educational credential or field of study. Identifying the causal effects of student mobility on post-graduation earnings would

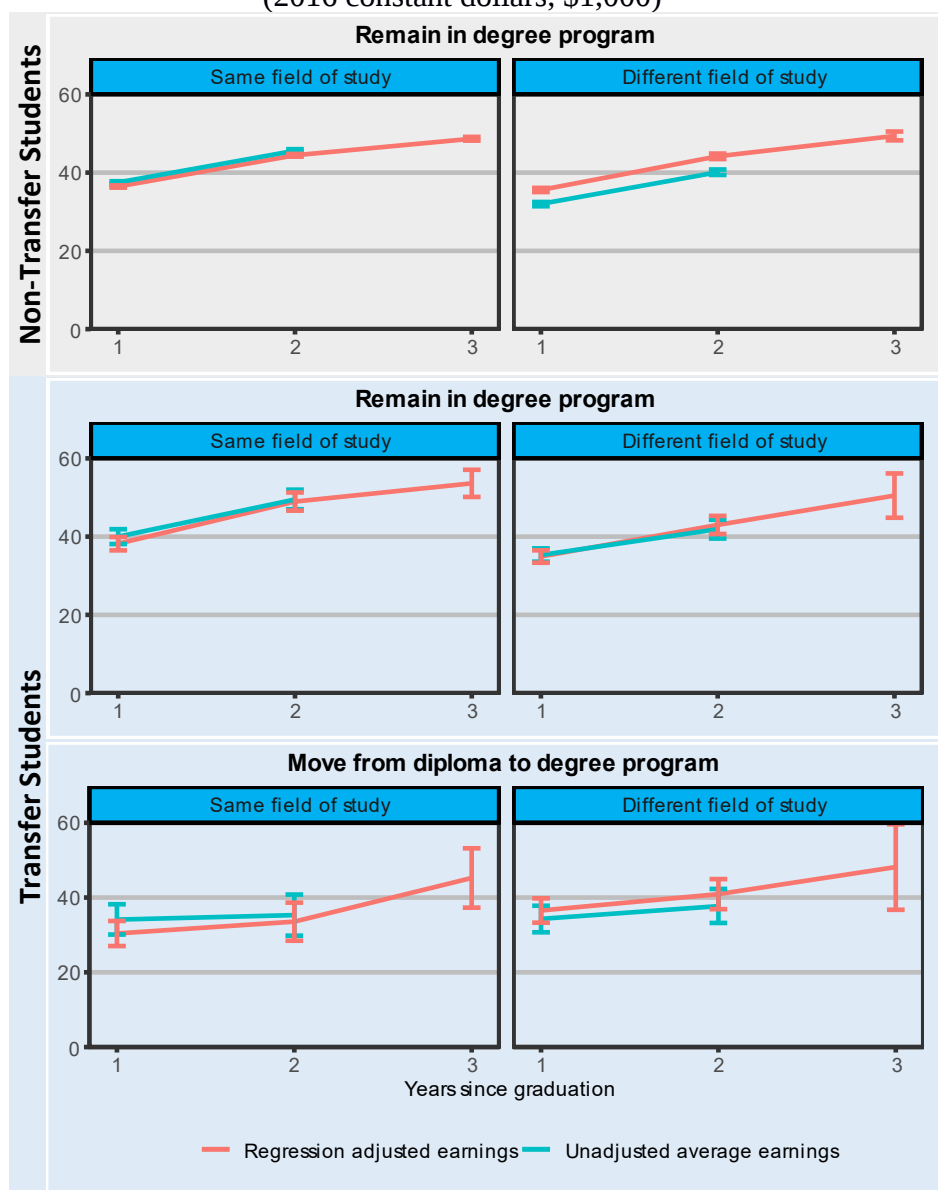
require further investigations using more complex analytical techniques or more detailed data on students in order to control for such factors, and is beyond the scope of this study.

The Findings for Bachelor's Degree Graduates

Appendix Table A3 presents the regression coefficient estimates for the earnings regression model for bachelor's degree graduates. Using the estimated regression model, the mean earnings for each transfer type group are adjusted, with the distribution of other student characteristics set to be the average characteristics of bachelor's degree graduates in the sample. The results are presented in Figure 4 and they are set against mean post-graduation earnings presented in Figure 2. The error bars represent the 95 confidence intervals.

The earnings differences between the regression-adjusted mean earnings and the unadjusted mean earnings range between \$400 to \$4,000 in terms of earnings level, or by one to 11 percent in percentage terms. The shift in earnings trajectory is particularly noticeable for three transfer type groups: non-transfer students who change fields of study (top-right panel), and both types of transfer students who move from a diploma to a degree program within the same field of study (bottom-left panel) and in a different field of study (bottom-right panel).

Figure 4. Regression-adjusted Mean Earnings by Transfer Type – Bachelor's Degree Graduates
(2016 constant dollars, \$1,000)



Source: Appendix Table A3 provides the underlying data points for this figure..

To better understand how accounting for other student characteristics affect differences in earnings across types of transfers, Figure 5 plots the estimated regression coefficients on transfer types, which represents differences in mean earnings between a given transfer type group of graduates and the baseline group (i.e., non-transfer students who remain in a degree program in the same field), while taking into account other students and program characteristics (i.e., field of study, gender, cohort, age, immigration status). In other words, the blue line represents the earnings difference between the graduates from the transfer group and the baseline group, without controlling for any student and program characteristics (i.e., unadjusted earnings differences) and the red line presents these same difference while also taking into account all

other factors available (regression-adjusted earnings differences). Error bars in the figure represent the 95 percent confidence intervals.⁷

The differences in earnings between the baseline group and non-transfer students changing field of study (top-left panel) are substantially reduced once other characteristics are accounted for, as they range between -\$900 one year following graduation and \$700 two years later. However, only the difference one year following graduation is statistically significant. Similarly, the corresponding differences for transfer students who remain in a degree program but are in different fields of study (middle-left panel) are reduced to levels that are not statistically significant.

Accounting for other characteristics does not change differences in earnings appreciably between the baseline group and transfer students who remain in degree programs in the same field of study (middle-left panel), with statistically significant differences in earnings ranging approximately from \$1,700 to \$5,000 over the three-year period following graduation.

The difference in earnings one year following graduation between the baseline group and transfer students who were originally enrolled in diploma programs in the same field of study (bottom-left panel) is reduced to \$1,500 once other student characteristics are controlled for, while the corresponding difference two years following graduation is virtually unchanged. While it is not statistically significant one and three years after graduation, the difference remains negative throughout the observed period.

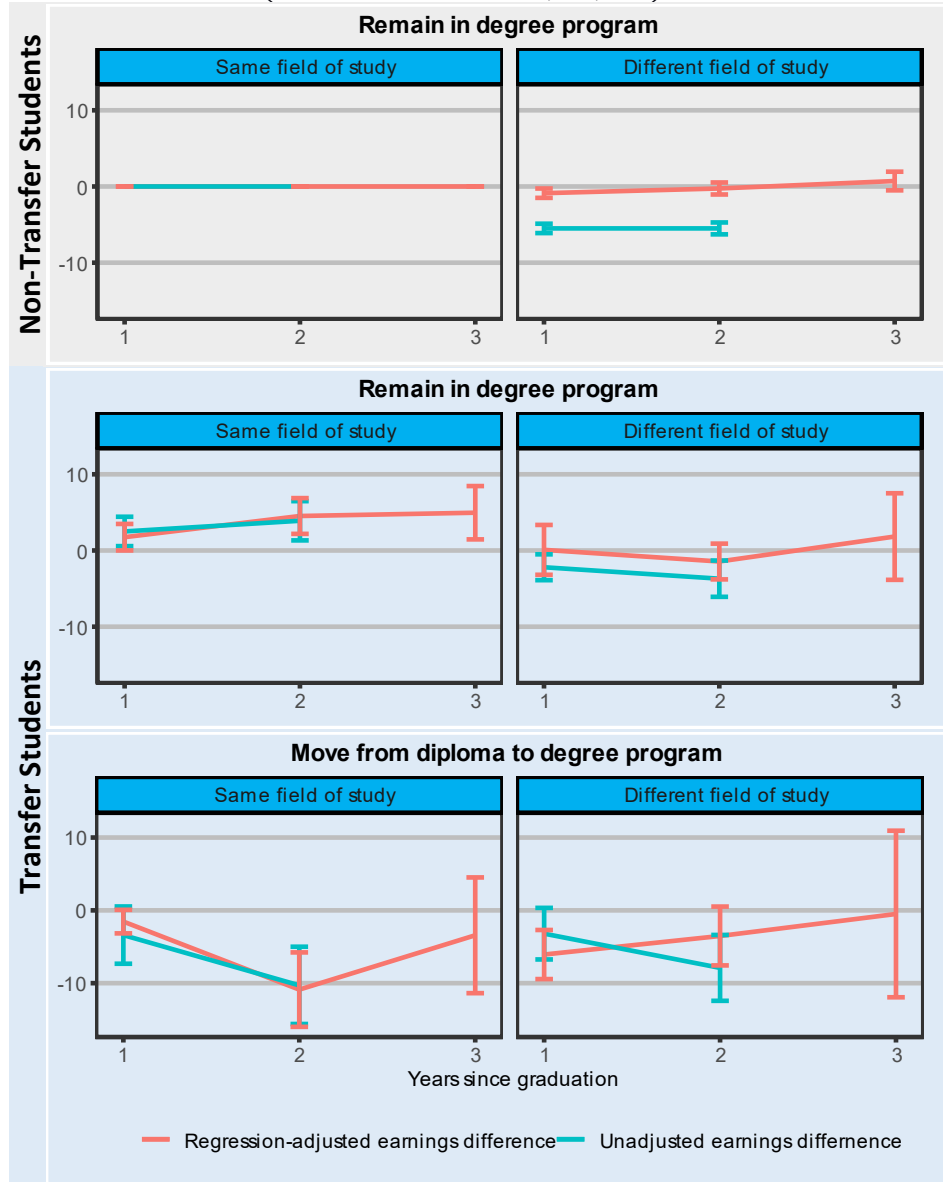
The difference in earnings between the baseline group and transfer students who move from diploma to degree programs in another field of study (bottom-right panel) stay negative during the three-year period following graduation, while evolving from \$6,100 to \$500 in magnitude, though only the difference one year after graduation is statistically significant.

Although we find that transfer students tend to earn less than non-transfer students, we find statistically significant positive earnings premia for transfer students who remain in bachelor's degree programs in the same field of study while Finnie, Dubois and Miyairi (2020) find a difference in earnings that is not statistically significant.⁸ Several differences in sample selection process between the two studies could explain the differences in findings. First, Finnie, Dubois and Miyairi include only students who are continuously enrolled in university from entry to completion, while this study does not have this sample selection rule. Second, this study includes bachelor's degree students in colleges, while the earlier study is restricted only to students in universities. Third, this study follows Fall 2010 entrants while the earlier study follows Fall 2009 entrants.

⁷ In the top-left panel, difference in earnings are by definition zero for both regression and descriptive results, as the baseline group is compared to itself.

⁸ Moreover, while they find that transfer students from bachelor's degree program in different fields of study earn substantially less than the baseline group, we find a small earnings premium of \$100 for this group, though this premium is not statistically significant.

Figure 5. Differences in Mean Earnings by Transfer Type – Bachelor's Degree Graduates
(2016 constant dollars, \$1,000)

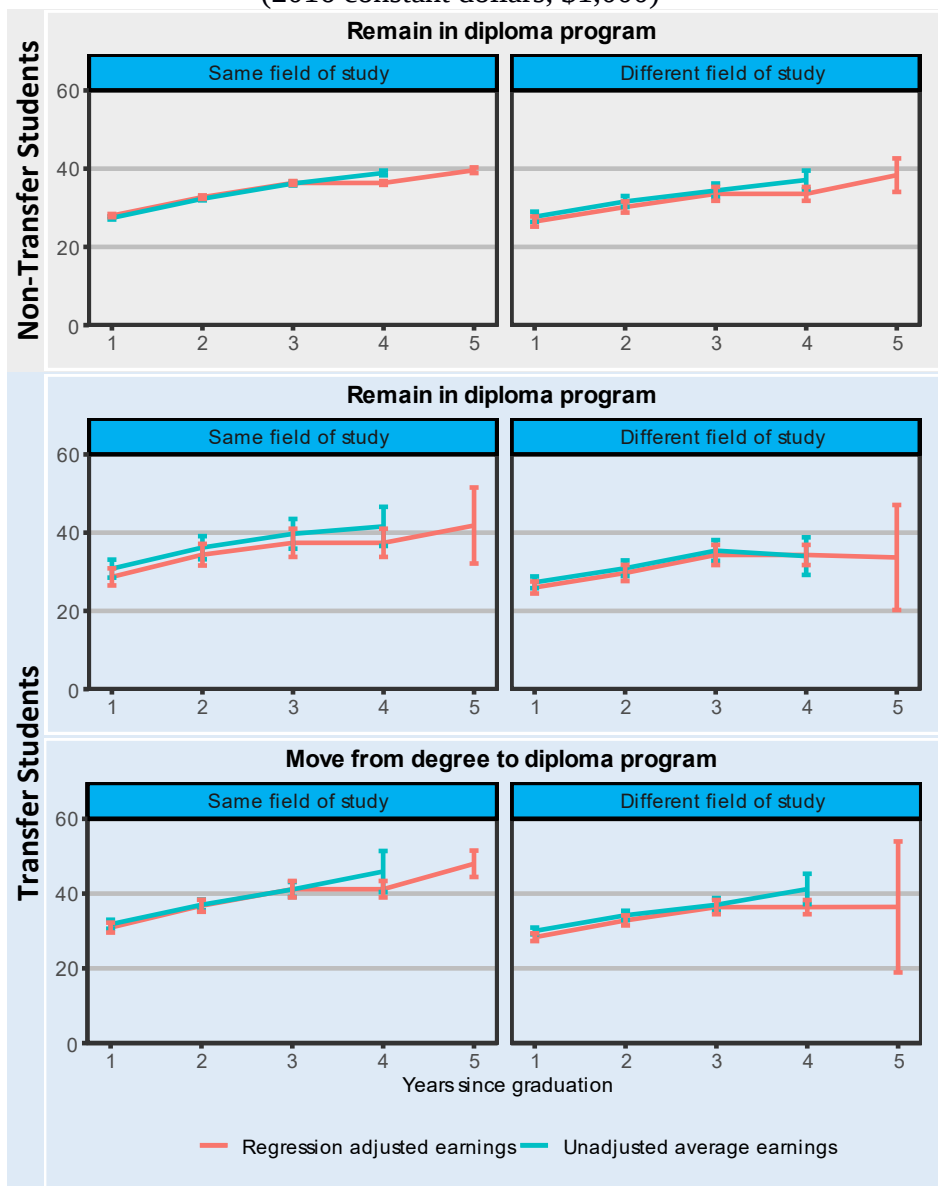


Source: Appendix Table A3 provides the underlying data points for this figure.

The Findings for College-level Diploma Graduates

Figure 6 presents the mean earnings for each transfer type adjusted by the regression model for college-level diploma graduates.⁹ Much like above, the trajectories of the sample mean earnings are also reproduced for comparison.

Figure 6. Regression-adjusted Mean Earnings by Transfer Type – Diploma Graduates
(2016 constant dollars, \$1,000)



Source: Appendix Table A4 provides the underlying data points for this figure.

⁹ Appendix Table A4 presents the regression coefficient estimates from the earnings regression model for college-level diploma graduates.

Accounting for other student characteristics shifts post-graduation earnings trajectories more moderately for college-level diploma graduates than for bachelor's degree graduates, with the differences being at most \$2,500 in terms of earnings level, and at most approximately six percent in percentage terms.

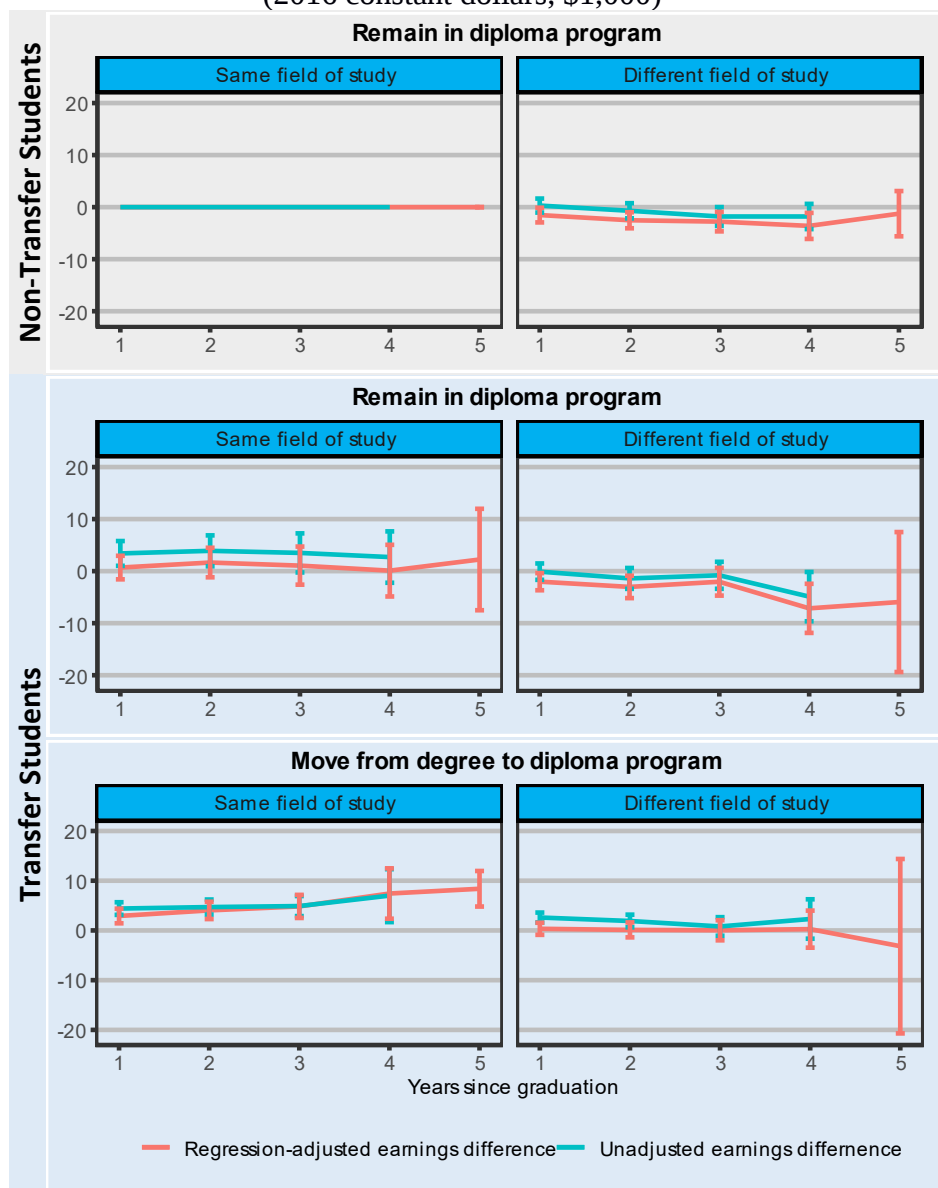
Figure 7 presents the differences in mean earnings between the baseline group (i.e., non-transfer students who remain in a diploma program in the same field) and other transfer type groups obtained from the regression-adjusted model (i.e., controlling for various student and program characteristics), together with those obtained from the unadjusted average earnings.

Overall, accounting for other student characteristics shifts down earnings differences between the baseline group and other transfer type groups. This amounts to a widening of the differences in earnings to statistically significant levels (except for five years following graduation) for the following two groups: non-transfer students who change fields of study (top-right panel), and transfer students who remain in diploma program but in different fields of study (middle-left panel). For the former group, the difference ranges from \$1,300 to \$3,600 in the five-year period following graduation, while it ranges from \$2,000 to \$7,200 for the latter group.

In contrast, the earnings premia over the baseline group associated with the following two student groups narrow to levels that are not statistically significant once other student characteristics are taken into account: transfer students who remain in diploma programs in the same field of study (middle-left panel), and transfer students who move from degree to diploma programs in different fields of study (bottom-right panel).

Differences in earnings between the baseline group and transfer students who move from degree to diploma programs in the same field of study (bottom-left panel) change very little once other student and program characteristics are accounted for. The differences grow over time from \$2,900 to \$8,400, staying statistically significant over the five-year period following graduation. This difference might suggest that this group of transfer students derive an earnings premium in the post-graduation labour market from their prior tenure in a bachelor's degree program, or it might be related to differences in observable and unobservable characteristics that affect students' choice between college-level or bachelor's degree programs when they enter PSE. This study can neither test for nor disentangle possible explanations as it cannot identify any causal effect. A deeper investigation into the source of this difference may require more complex statistical technique or more detailed data related to PSE pathways such as decisions regarding initial entry to PSE, withdrawal, and stop-out.

Figure 7. Differences in Mean Earnings by Transfer Type – College-level Diploma Graduates
(2016 constant dollars, \$1,000)



Source: Appendix Table A4 provides the underlying data points for this figure.

5. Conclusion

This report provides the findings from a system-wide analysis of transfer students among Ontario PSE institutions, which examines how PSE transfers, changes in educational credential, or field of study are related to post-graduation employment earnings outcomes relative to non-transfer students. To this end, the study matches the enrollment and graduation records of a cohort of students, age 17 to 19, entering Ontario PSE institutions in fall 2010, and identify each student's PSE mobility pattern. Then post-graduation employment earnings are obtained from personal income tax information contained in the Education and Labour Market Longitudinal Platform (ELMLP).

This study provides a more comprehensive view of Ontario transfer students than Finnie, Dubois and Miyairi (2020) by including students transferring between colleges, from college to university, from university to college as well as between universities in the analysis. However, the analysis leaves out a sizable proportion of students transitioning in and out of programs offered in Ontario colleges due to a data coverage issue in PSIS until the 2014/2015 reporting cycle. This limitation is expected to be less severe for future Ontario-wide analysis once more years of data become available in the ELMLP.

Transfer students account for a small proportion of bachelor's degree graduates (less than 5 percent). In contrast, transfer students account for a larger share of college-level graduates. In particular, transfer students from bachelor's degree programs account for approximately one-fifth of college-level diploma graduates, while transfer students from different college-level diploma programs account for approximately five percent.

For bachelor's degree graduates, the post-graduation earnings are \$36,200, on average, one year following graduation, grow to \$44,400 the following year, and reach \$48,900 three years following graduation. College-level diploma graduates earn \$28,100 one year following graduation, on average, which then grow steadily, reaching \$39,600 five years following graduation.

Among bachelor's degree graduates, a statistically significant earnings premium ranging from \$1,700 to \$5,000 is found for transfer students who remain in degree programs and in the same field of study. On the other hand, earnings tend to be lower for transfer students who move from diploma to degree programs than non-transfer students, though the differences are not statistically significant for all years following graduation.

Among college-level diploma graduates, transfer students from degree programs in the same field of study have a statistically significant earnings premium over non-transfer diploma graduates who remained in the same field of study, which grows from \$2,900 to \$8,400 over five-year period following graduation. In contrast, earnings are lower for transfer students who remain in diploma programs but change fields of study, as well as non-transfer students who change field of study.

The earnings patterns identified here do not represent the causal effect of transfers as these gaps could be the result of pre-existing differences in students' ability or other factors that are

unobservable but correlated with PSE transfer or change in educational credential or field of study.

As a next phase of research, it would be interesting to further explore why students decide to transfer from one institution or another or change credential level or field of study. One way to get closer to that answer would be to use more information on students such as academic performance, entry survey responses, students' living situation, and more. Another way would be to collect feedback from students about transfers through qualitative research activities, such as surveys, interviews, focus groups, etc.

Transfers are, and will likely remain, an integral part of the Ontario PSE. Through research and advocacy, we need to continue to ensure that new and interesting opportunities for students can be navigated easily and that changes in their educational journeys as seamless as possible.

6. References

- Acai, A., & Newton, G. (2015). A comparison of factors related to university students' learning: college-transfer and direct-entry from high school students. *Canadian Journal of Higher Education* 45(2), 168-192.
- Drewes, T., Maki, K., Lew, K., Wilson M., & Stringham K. (2012). Analysis of CAAT transfer students' academic performance at Trent University. Toronto: Ontario Council of Articulation and Transfer.
- Finnie, R., Dubois, M., and Miyairi, M. (2020). Schooling and Labour Market Outcomes of Ontario Transfer Students: Evidence from PSE-Tax Liked Data. Education Policy Research Initiative.
- Kerr, A., McCloy, U. and Liu, S. (2010). Forging pathways: student who transfer between Ontario Colleges and Universities. Toronto: Higher Education Quality Council of Ontario.
- Statistics Canada (2012) Classification of Instructional Programs (CIP) Canada 2011. Ottawa: Government of Canada.
- Statistics Canada (2018) Linkage of the post-secondary student information system (PSIS) and the T1 family file: ad hoc custom reference product for selected T1FF variables for the years 2004 to 2015. Ottawa: Government of Canada.
- Statistics Canada (2019) Persistence and graduation indicators of postsecondary students, 2010/2011 to 2015/2016. Ottawa: Government of Canada.
- Stewart, J. and F. Martinello (2012). Are transfer students different? An examination of first-year grades and course withdrawals. *Canadian Journal of Higher Education* 42(1), 25-42.

7. Appendix

Table A1. Mean Post-Graduation Earnings by Transfer Type – Bachelor's Degree Graduates

Transfer Type	Change in Institution	Change in Educational Credential	Change in Field of Study	Years since graduation	
				1	2
0	No	No	No	37,500 (160) [19,970]	45,600 (190) [16,990]
1	No	No	Yes	32,000 (270) [6,270]	40,100 (350) [4,930]
4	Yes	No	No	40,000 (970) [560]	49,500 (1,300) [410]
5	Yes	No	Yes	35,300 (850) [590]	41,900 (1,200) [330]
6	Yes	Yes	No	34,100 (2,000) [80]	35,300 (2,700) [50]
7	Yes	Yes	Yes	34,300 (1,800) [100]	37,700 (2,300) [60]

Notes: Standard errors in parentheses. Sample sizes in brackets.

Table A2. Mean Post-Graduation Earnings by Transfer Type – College-level Diploma Graduates

Transfer Type	Change in Institution	Change in Educational Credential	Change in Field of Study	Years since graduation			
				1	2	3	4
0	No	No	No	27,400 (190) [6,600]	32,300 (220) [6,160]	36,200 (250) [5,690]	38,900 (300) [4,940]
1	No	No	Yes	27,700 (660) [580]	31,600 (710) [490]	34,400 (890) [340]	37,100 (1,200) [180]
4	Yes	No	No	30,800 (1,200) [220]	36,200 (1,500) [160]	39,700 (1,900) [110]	41,600 (2,500) [60]
5	Yes	No	Yes	27,300 (780) [320]	30,900 (1,000) [240]	35,400 (1,300) [150]	34,000 (2,400) [60]
6	Yes	Yes	No	31,800 (620) [670]	37,000 (740) [530]	41,100 (1,000) [400]	45,900 (2,700) [50]
7	Yes	Yes	Yes	30,000 (470) [1,070]	34,200 (610) [730]	37,000 (920) [410]	41,200 (2,000) [110]

Notes: Standard errors in parentheses. Sample sizes in brackets.

Table A3. Post-Graduation Earnings Regression Results – Bachelor’s Degree Graduates

Explanatory variable	Years since graduation					
	1		2		3	
Transfer type (omitted: no transfer & no FOS change)						
Same institution, same educational credential, change in field of study	-0.88	****	-0.26		0.72	
	(0.31)		(0.40)		(0.62)	
Change in institution, same educational credential, same field of study	1.74	**	4.53	****	4.96	***
	(0.89)		(1.20)		(1.79)	
Change in institution, same educational credential, change in field of study	-1.54	*	-1.45		1.83	
	(0.83)		(1.20)		(2.90)	
Change in institution, change in educational credential, same field of study	-6.07	****	-10.89	****	-3.43	
	(1.72)		(2.61)		(4.05)	
Change in institution, change in educational credential, change in field of study	0.08		-3.52	*	-0.50	
	(1.67)		(2.06)		(5.84)	
Field of study (omitted: social and behavioural sciences and law)						
Education	-0.46		0.02		-4.48	*
	(0.89)		(1.00)		(2.30)	
Visual and performing arts, and communications technologies	-4.31	****	-6.24	****	-8.40	***
	(0.44)		(0.56)		(0.74)	
Humanities	-3.71	****	-4.02	****	-5.78	***
	(0.39)		(0.51)		(0.85)	
Business, management and public administration	11.59	****	13.29	****	14.42	***
	(0.36)		(0.45)		(0.65)	
Physical and life sciences and technologies	-0.77	*	-0.29		-2.33	***
	(0.47)		(0.61)		(0.90)	
Mathematics, computer and information sciences	19.43	****	22.86	****	21.06	***
	(1.02)		(1.36)		(2.53)	
Architecture, engineering and related technologies	22.37	****	23.78	****	20.88	***
	(0.52)		(0.63)		(1.07)	
Agriculture, natural resources and conservation	3.75	****	3.44	****	0.51	
	(0.52)		(1.03)		(1.55)	
Health and related fields	12.85	****	12.71	****	11.40	***
	(0.49)		(0.55)		(0.70)	
Personal, protective and transportation services	3.36	****	3.30	**	3.85	*
	(1.22)		(1.49)		(2.05)	
Other	5.78	****	9.50	****	6.19	
	(1.64)		(1.99)		(4.10)	

Explanatory variable	Years since graduation					
	1		2		3	
Gender (omitted: male)						
Female	-0.75	***	-2.10	***	-3.05	***
	(0.27)		(0.34)		(0.51)	
Year of graduation (omitted: 2014)						
2013	-6.73	***	-5.68	***	-8.13	***
	(0.83)		(1.08)		(1.27)	
2015	4.19	***	4.83	***		
	(0.43)		(0.53)			
2016	7.90	***				
	(0.84)					
Age at graduation (omitted: 22)						
20	-11.57	***	0.37		4.02	
	(4.32)		(6.01)		(5.31)	
21	-1.71	*	0.43		1.58	
	(0.92)		(1.31)		(1.53)	
23	-1.37	***	-2.32	***	-2.53	***
	(0.39)		(0.48)		(0.58)	
24	-3.67	***	-5.38	***		
	(0.67)		(0.82)			
25	-6.56	***				
	(1.23)					
Immigration status (omitted: Canadian citizen)						
Permanent resident	-3.82	***	-3.63	***	-5.06	***
	(0.58)		(0.73)		(1.00)	
International student	-2.51	***	-1.09		-4.74	***
	(0.72)		(0.94)		(1.13)	
Constant	29.62	***	38.00	***	45.68	***
	(0.34)		(0.42)		(0.57)	
Number of observations	27,550		22,780		12,970	

Notes: The dependent variable is employment earnings (in \$1,000). Standard errors in parentheses. * p < 0.1; ** p < 0.05; *** p < 0.01.

Table A4. Post-Graduation Earnings Regression Results – College-level Diploma Graduates

Explanatory variable	Years since graduation									
	1	2	3	4	5					
Transfer type (omitted: no transfer & no FOS change)										
Same institution, same educational credential, change in field of study	-1.52 (0.72)	** (0.79)	-2.52 (0.79)	*** (0.95)	-2.79 (0.95)	*** (1.28)	-3.61 (1.28)	*** (2.22)	-1.26 (2.22)	
Change in institution, same educational credential, same field of study	0.68 (1.15)	1.65 (1.45)	1.06 (1.87)	0.09 (2.53)	2.23 (4.97)					
Change in institution, same educational credential, change in field of study	-2.02 (0.84)	** (1.10)	-3.03 (1.36)	*** (2.41)	-2.04 (2.41)	*** (6.86)	-7.15 (6.86)	*** (8.95)	-5.94 (8.95)	
Change in institution, change in educational credential, same field of study	2.91 (0.75)	*** (0.89)	4.03 (0.89)	*** (1.18)	4.83 (1.18)	*** (2.58)	7.42 (2.58)	*** (1.82)	8.38 (1.82)	***
Change in institution, change in educational credential, change in field of study	0.33 (0.62)	0.11 (0.77)	0.03 (1.03)	0.26 (1.90)	-3.16 (8.95)					
Field of study (omitted: social and behavioural sciences and law)										
Education	-1.94 (1.31)	-3.99 (1.39)	*** (1.75)	-3.24 (1.75)	* (1.87)	-1.93 (1.87)	-3.50 (2.44)			
Visual and performing arts, and communications technologies	-4.20 (0.52)	*** (0.62)	-4.62 (0.62)	*** (0.76)	-3.82 (0.76)	*** (0.90)	-4.17 (0.90)	*** (1.38)	-4.33 (1.38)	***
Humanities	-4.19 (1.37)	*** (2.23)	-2.74 (2.23)	0.73 (3.52)	-6.52 (4.70)	-5.63 (6.30)				
Business, management and public administration	0.52 (0.43)	0.46 (0.49)	1.24 (0.61)	** (0.74)	0.65 (1.05)	1.41 (1.05)				
Physical and life sciences and technologies	1.77 (1.84)	0.63 (2.58)	-0.03 (2.84)	-3.22 (3.69)	1.33 (7.28)					
Mathematics, computer and information sciences	3.25 (1.06)	*** (1.33)	4.91 (1.33)	*** (1.62)	6.14 (1.62)	*** (2.09)	7.91 (2.09)	*** (3.58)	9.24 (3.58)	***
Architecture, engineering and related technologies	8.68 (0.60)	*** (0.69)	10.06 (0.69)	*** (0.85)	11.22 (0.85)	*** (1.08)	11.64 (1.08)	*** (1.66)	11.53 (1.66)	***
Agriculture, natural resources and conservation	2.18 (1.36)	-0.01 (1.85)	1.95 (2.59)	1.45 (3.11)	-8.15 (3.65)	** (3.65)				
Health and related fields	6.05 (0.58)	*** (0.65)	6.48 (0.65)	*** (0.74)	6.57 (0.74)	*** (0.87)	5.64 (0.87)	*** (1.10)	5.24 (1.10)	***

Explanatory variable	Years since graduation									
	1		2		3		4		5	
Personal, protective and transportation services	0.71 (0.48)		0.62 (0.59)		1.57 (0.70)	**	2.83 (0.86)	***	4.61 (1.13)	***
Other	5.69 (2.22)	**	6.60 (2.63)	**	-1.53 (3.86)		2.36 (8.73)		17.17 (0.76)	***
Gender (omitted: male)										
Female	-2.29 (0.35)	***	-3.79 (0.41)	***	-5.58 (0.50)	***	-7.60 (0.62)	***	-9.10 (0.92)	***
Year of graduation (omitted: 2012)										
2013	2.48 (0.52)	***	3.71 (0.61)	***	3.19 (0.68)	***	4.45 (0.77)	***		
2014	1.93 (0.93)	**	2.68 (1.05)	**	2.67 (1.21)	**				
2015	1.95 (1.38)		5.29 (1.54)	***						
2016	5.43 (1.84)	***								
Age at graduation (omitted: 21)										
19	2.36 (1.85)		0.40 (2.12)		2.02 (2.62)		-1.33 (3.17)		0.79 (3.70)	
20	0.05 (0.42)		0.38 (0.49)		0.35 (0.57)		1.16 (0.64)	*	0.89 (0.73)	
22	1.00 (0.61)		0.78 (0.70)		1.18 (0.79)		0.82 (0.92)			
23	2.11 (1.06)	**	0.57 (1.15)		0.92 (1.30)					
24	0.84 (1.52)		-0.95 (1.73)							
25	1.16 (1.99)									
Immigration status (omitted: Canadian citizen)										
Permanent resident	-3.93 (0.88)	***	-3.87 (1.07)	***	-5.30 (1.28)	***	-2.44 (1.56)		-2.81 (2.66)	
International student	-1.33 (0.68)	**	-0.05 (0.76)		-3.93 (1.04)	***	-5.96 (1.33)	***	-5.73 (1.78)	***
Constant	25.08	***	30.10	***	34.49	***	38.25	***	41.59	***

Explanatory variable	Years since graduation				
	1	2	3	4	5
	(0.50)	(0.58)	(0.69)	(0.82)	(1.13)
Number of observations	9,460	8,300	7,100	5,390	3,160

Notes: The dependent variable is employment earnings (in \$1,000). Standard errors in parentheses. * p < 0.1; ** p < 0.05; *** p < 0.01.