

# Schooling and Labour Market Outcomes of Ontario Transfer Students

Evidence from PSE-Tax Linked Data

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## **Executive Summary**

### **Objective and Research Questions**

This study addresses the following three questions for Ontario university students:

- What are the student and program characteristics associated with student mobility, captured by university transfers and changes in field of study?
- How are university transfers and changes in field of study related to graduation outcome?
- How are university transfers and changes in field of study related to post-graduation earnings?

### **Methodology**

This study constructs an analysis sample from the Education and Labour Market Longitudinal Platform (ELMLP), a dataset 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 Files (T1FF).

The enrollment histories and graduation outcomes of the fall 2009 entry cohort are tracked and their changes in field of study and institution attended are noted. For graduates from this cohort, their income tax information in the T1FF is extracted to calculate their employment earnings one year after graduation.

The variables of interest (transfer rates, graduation rates, and first-year employment earnings after graduation) are calculated and broken down by student and program characteristics including field of study, gender, age and immigration status.

Moreover, graduation rates and first-year employment earnings are broken down by different student mobility patterns to investigate the relationship between the outcome of interest and student transfers.

The differences are also adjusted using statistical modelling techniques to account for differences in other characteristics across the groups being compared.

### **Findings**

Field of study is the primary characteristics related to student transfers. The humanities and “other” fields of study are the two fields most associated with the change in field of study or institution. On the other hand, architecture, engineering and related technologies is the field least associated with student mobility, with students in visual and performing arts and communications technologies, health and related fields, and personal, protective and transportation services not far behind.

Little differences are found between male and female students in their propensities to transfer to a different university or to change field of study once their program and student characteristics are taken into account. On the other hand, more pronounced differences are found across immigration status, with international students and permanent residents being much more likely to change field of study than Canadian citizens.

Conditional on the first-year enrollment (i.e., fall 2009 entrants still being enrolled in fall 2010), four-year graduation rates among transfers students are lower than students who stay in the same university and field of study by 18 and 27 percentage points, depending whether transfer students also change field of study or not, respectively. While these differences narrow to 6 and 7 percentage points two years later (six-year graduation), the lower graduation rates of transfer students suggest that transfers students experience a slower academic progression.

The mean employment earnings one year after graduation of transfer students who study the in the same field throughout their academic career are not statistically different from those of students who remain in the same university and field. On the other hand, transfer students who change field of study have lower mean earnings than non-transfer students who remain in the same field of study by \$3,100, with this difference being statistically significant at the 5 percent level. However, non-transfer students who change field of study also have lower earnings than their counterparts without a change in field of study, which may suggest the lower earnings are not due to transfer to a different university, per se.

### **Policy Implications**

Whether the lower graduation rates of transfer students are due to some form of barrier in the transfer system or is related to unobservable characteristics of transfer students remain to be answered and will require further research in order to develop policies that would provide a more seamless transfer experience and also support students through to graduation.

This study provides a more comprehensive view of Ontario transfer students by taking advantage of a system-wide PSE enrollment and graduation information. By necessity due to a data coverage issue in the ELMLP for Ontario college students until the 2014/2015 reporting cycle, this study focuses on student mobility among Ontario universities only. However, university-to-university transfers have been far less studied compared to college-to-university transfers. Therefore, this study provides new and unique evidence on this relatively unexplored subject.

Moreover, this study put into practice the possibility of using the ELMLP to analyze student pathways and transfers at the system-wide level. As more complete data coverage over a longer time period become available for Ontario colleges, this study starts to lay the methodological groundwork to study college-to-university, college-to-college, as well as university-to-college transfers for future projects.

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## **1. Introduction**

As Ontario pursues a differentiated university system where “institutions build on their specific strengths, mandates and missions” (Jonker and Hicks, 2016), researchers and stakeholders in post-secondary education (PSE) argue that policies that facilitate student mobility plays an important complementary role in such a system (e.g., Weingarten and Deller, 2010; Young, Piché, and Jones 2017). In a differentiated university system, some student may need a “trial-and-error” process to find a university that fits their goals and needs or a transfer to a different institution may benefit students if their aspirations or circumstances change while attending a university.

Extensive work has already been done to examine transfer students and pathways in Ontario; however, the limited availability of data has restricted research to examining specific pathways and transfers between a pair of institutions, or a coalition of institutions, formed to examine pathways and transfers for a particular group of students.

While the Ontario Education Number (OEN), now used in the post-secondary education sector, represents a great opportunity to learn about system-wide pathways, the limited number of years available to date are not conducive to an outcome-based analysis. The Ministry of Colleges and Universities (MCU) currently uses the OEN to produce an annual student mobility report, which constitutes an accounting exercise detailing the flow of students across Ontario PSE institution.

Several other Canadian jurisdictions have pursued system-wide analyses of transfer students. Since 1991 the British Columbia Council on Admissions and Transfers (BCCAT) has prepared transfer student profile reports on a periodic basis. Their recent report (2015) included a standardized reporting template used to collect data from all publicly funded PSE institutions in the province. Meanwhile, the Maritime Provinces Higher Education Commission (MPHEC) has used the Postsecondary Student Information System (PSIS) to collect information from all PSE institutions in these provinces in order to examine a wide variety of topics, including the time to graduation for students who change programs, transfer between institutions, or do both, in comparison to students who remain in the same program and institution for the duration of their studies, as well as the overall average.

This study not only offers a first step to addressing the lag in research in student mobility in Ontario by providing a system-wide analysis of transfer students encompassing all universities in Ontario but also produce pioneering research on the labour market outcomes of transfer students.

Specifically, using Statistics Canada’s new Education and Labour Market Longitudinal Platform (ELMLP) that link PSIS to personal income tax data (T1 Family File, T1FF), this study examines the characteristics of students who transfer between Ontario universities or change fields of study, and compare their schooling and labour market outcomes (to be specific, graduation and post-graduation earnings) to those of non-transfer students.

Unfortunately, the PSIS data in the ELMLP has a severe data coverage gap in enrollment and graduation data for Ontario colleges until the 2014/15 reporting cycle, which prevents us from examining student transfer from college to universities. Because of this, we exclusively focus on

movements between bachelor's degree programs in Ontario universities as a starting point of a system-wide analysis for Ontario.

Unlike this study, most existing research on PSE transfer focus on transfers from college-level programs to university programs. Therefore, there is very little research on student mobility at the bachelor's degree level.

Some Canadian studies shed light on this subject while their main focus remains on College to University transfer, however. Using administrative data from Brock University, Stewart and Martinello (2012) find that the proportion of male students is higher among transfer students from other universities than for direct entrants from high schools (44.6 percent compared to 37.0 percent), although the difference is not statistically significant. The Faculty of General Studies is more popular among transfer students from other universities than among direct-entry students (20.7 percent compared to 10.3 percent).

In contrast, using data for new registrants at Trent University, Drewes et. al. (2012) find that female students account for more transfer students from other universities than direct-entry students (68.7 compared to 63.2 percent). Nursing is more popular among the former than the latter (19.7 compared to 8 percent), while sciences and business are less popular for transfer students than direct-entry students (18.6 percent compared to 23.1 percent, and 2.4 percent compared to 9.3 percent, respectively). These findings suggest that some program and student characteristics are associated with a higher likelihood of transfers. Therefore, taking these different student and program characteristics into account when examining differences in schooling and labour market outcomes between transfer and direct-entry students is important.

This report is organized as follows. Section 2 describes the ELMLP and the construction of the analysis data. Sections 3, 4, and 5 present the methodologies for each analysis as well as the findings for the student mobility, graduation outcome, and post-graduation earnings analyses. Section 6, then, concludes this report.

## **2. Data and Analytical Approach**

### **2.1. The Education and Labour Market Longitudinal Platform**

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

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 (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*.

Consistent with its relational database structure, PSIS does not explicitly link individuals across their different PSE records either within a given year or across years. Instead, individual's MasterID must be used to identify all records associated with a given individual in any given year. Then the information included in each record must be used to identify which records in later years represent the continuation of an earlier program and which represent new programs.

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. This data limitation significantly reduces the sample coverage for Ontario college graduates, which leads us to limit this study to bachelor's degree students in Ontario universities.

The T1FF data on the ELMLP are taken from personal income tax returns transferred to Statistics Canada by the Canada Revenue Agency and contains 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. The Transfer Type**

We measure student mobility in two 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.

The second dimension is change in field of study, where field of study is represented by the primary groupings of Classification on 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 two dimensions, students are categorized into four transfer type groups:

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

Students' institutions and field of study are captured at the Fall snapshot date, a date between September 30 and December 1 chosen by each institution. The timeframe for these changes depends on the analysis. Sometime changes are measured relative to the snapshot date in the entry year, or in other cases, they are measured relative to the previous snapshot date. Which timeframe is used is always indicated.

### **2.3. The Graduation Outcome Measure**

The schooling outcome of students is measured by four, five, and six-year graduation. As the focus of this study is the 2009 entry cohort, students graduate within four years if they graduate by August 2013, within five years if they graduate by August 2014, and so on.

### **2.4. 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.<sup>1</sup>

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, however, 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

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<sup>1</sup> 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>.

corporation to individuals themselves would, however, be included in the earnings measure as employment income.

## **2.5. Selection of 2009 Entry Cohort**

We focus on students pursuing a bachelor's degree in Ontario universities, where the definition of bachelor's degree programs corresponds to the undergraduate degree program under Statistics Canada's classification of programs and credential. This means that students in programs in law, medicine, dentistry, pharmacy, optometry, and veterinary medicine are excluded from the analysis sample.

At the time of this study, PSIS data are available for Ontario PSE institutions from 2009/2010 reporting cycle to the 2016/2017 reporting cycle, while the T1FF information is available from 2004 through to 2015. It typically takes five years for the majority of students to graduate from university with a bachelor's degree in Canada, meaning that typical students starting university in Fall 2010 or later do not have income information for the first full-year after graduation. In other words, the 2009 entry cohort is the only group for which both graduation and post-graduation labour market outcomes are likely observed for a large majority of students, leading us to select the 2009 entry cohort for this analysis.

To identify the 2009 entry cohort, we employ the following multi-step procedure. First, we identify a pool of 2009 entrants who are reported as having university enrollment records with original start dates falling in the second half of 2009 (July to December 2009).

Not all of these students enter the Ontario university system in 2009 for the first time. For example, if a student has entered a bachelor's program in 2008 and then switched to an honour bachelor's program in 2009, the original start date of the latter program may be recorded the 2009 Fall semester. Thus, these students should not be considered as 2009 entrants.

However, without enrollment data before 2009, it is not possible to identify 2009 entrants with prior PSE experience to exclude them from the analysis using PSIS. In the absence of information indicating that the 2009 enrollment records represent students' first university program, we only include individuals age 17 to 19 at the end of 2009 to increase the likelihood that students in the sample are indeed all 2009 university entrants.<sup>2</sup> Further, for students included this way, we scan all enrollment records from all reporting cycles available to see if they have any enrollment records with starting dates before the second half of 2009. If so, those individuals are not considered 2009 entrants and are excluded from the sample.

## **2.6. Tracking University Enrollment and Graduation**

Once 2009 entrants are identified, enrollment records from the 2009/10 to 2016/17 reporting cycles are extracted for these individuals to construct their enrollment histories, which consist of

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<sup>2</sup> To gauge the effectiveness of this age restriction to limit 2009 entrants to students without prior PSE experience at the university level, we apply the same method to select 2010 entrants, and then use the 2009/10 PSIS data to find how many students in that cohort have enrollment records in that period. Approximately 14 percent of this group indeed have enrollment record in 2009.

sequences of institutions and fields of study at each fall snapshot date. Enrollment histories are tracked until the first time individuals graduate from university, or the first time their enrollment records are not found in the extracted PSIS data. The latter case occurs for various reasons, including withdrawal, stop out, or transfers to Ontario colleges or to PSE institutions in different provinces or territories.

For each 2009 entrant, enrollment records across different reporting cycles having the same MasterId, institution code, and CIP code are linked together to form spells of bachelor's programs started by this individual. Once program spell data are constructed in this way, we track institution and field of study of students on each snapshot date, starting with their program starting in Fall 2009. If an ongoing spell ends without graduation and another spell appears on the next snapshot date, then we continue with the new spell. If more than one program spell starts, in this case, we select only one of them as the main program according to the following order of priority:

- Programs at the same institution and field of study as the previous program
- Programs at the same institution but a different field of study from the previous program
- Programs at a different institution but the same field of study as the previous program
- Programs at a different institution and a different field of study from the previous program.

In order to focus on bachelor's program students, students are excluded from the sample if their enrollment histories indicate they have spells of professional degree program.

Moreover, if enrollment histories indicate that student graduated in less than 3 years from entry, they are excluded from the sample, as bachelor's degree generally takes 3 years of study or more.

A very small fraction of 2009 entrants have multiple enrollment records on the 2009 Fall snapshot date and these students are excluded from the analysis.

## **2.7. Construction of Post-Graduation Earnings Sample**

For students who graduate from a bachelor's program, T1FF data is extracted to obtain their first-year earnings after graduation. Tracking of post-graduation outcome starts in the first full year after graduation. Therefore, for those graduating in 2013, the first year correspond to 2014. As the most recent tax-year for which T1FF information is available is 2015, our graduate samples are restricted to those who graduate by 2014.

Three additional sample restrictions are imposed. First, individuals who do not file taxes are excluded for that year. This restriction applies to approximately 10 percent of the sample.

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. For bachelor's degree graduates, this restriction applies to approximately 40 percent of the sample one year following graduation.

Third, in order to focus on graduates who are meaningfully engaged in the labour market, those whose total before-tax earnings are lower than \$1,000 are excluded from the sample. This restriction applies to approximately 3 percent of the sample.

## 2.8. Sample Characteristics

Table 1 presents the sample characteristics of the Fall 2009 entrants. The most common field of study at entry is the humanities (21 percent), closely followed by social and behavioural sciences and law (19 percent), and business, management and public administration (16 percent). Female students account for a majority of the sample (57 percent), and the most common age at entry is 18 (67 percent), followed by 19 (31 percent). Canadian citizens account for over 90 percent of the sample, while permanent residents and international students account for 5 percent each.

Table 1. Sample Characteristics at Entry (N = 63,471)

	Distribution (%)
<i>Field of Study at Entry</i>	
Education	1.9
Visual and performing arts, and communication technologies	4.5
Humanities	20.6
Social and behavioural sciences and law	18.9
Business, management and public administration	16.1
Physical and life sciences and technologies	13.7
Mathematics, computer and information sciences	2.9
Architecture, engineering and related technologies	9.8
Agriculture, natural sciences and conservation	1.5
Health and related fields	8.4
Personal, protective and transportation services	0.6
Other	1.0
<i>Sex</i>	
Male	42.6
Female	57.4
<i>Age at Entry</i>	
17	1.5
18	67.2
19	31.2
<i>Immigration Status</i>	
Canadian citizen	90.2
Permanent resident	5.3
International student	4.5

Over time, the sample size gradually decreases as students leave or graduate from Ontario universities. Table 2 presents the enrollment status of the fall 2009 entry cohort on the fall snapshot date for each academic year. The enrollment rate declines greatly from 2012 to 2013, and 2013 to 2014 again, mainly because they are the 4<sup>th</sup> and 5<sup>th</sup> academic years of fall 2009 entrants and most of them graduate over that period. In fall 2014, only 6 percent of the students remain enrolled in university.

Table 2. Enrollment Status by Year (%) (N = 63,471)

Year	Enrolled	Not enrolled
2009	100.0	0.0
2010	92.0	8.0
2011	86.6	13.4
2012	77.7	22.3
2013	32.2	67.8
2014	6.1	93.9
2015	1.4	98.6

Table 3 presents the characteristics of the graduate sample (i.e., graduates from the 2009 entry cohort whose first-year earnings are included in the sample). As shown below, 70 percent of the 2009 entrants graduate within five years and the post-graduation sample restrictions (i.e., non-filers, those who pursue further PSE, and low earners) affect roughly 50 percent of graduates. Therefore, the sample size is reduced from 63,471 graduates to 22,130.

Table 3. Characteristics of the Graduate Sample (N = 22,130)

	Distribution (%)
<i>Field of Study at Graduation</i>	
Education	1.2
Visual and performing arts, and communications technologies	5.3
Humanities	8.8
Social and behavioural sciences and law	27.6
Business, management and public administration	20.0
Physical and life sciences and technologies	7.9
Mathematics, computer and information sciences	2.6
Architecture, engineering and related technologies	12.4
Agriculture, natural resources and conservation	2.1
Health and related fields	10.7
Personal, protective and transportation services	0.9
Other	0.4
<i>Sex</i>	
Male	42.4
Female	57.6
<i>Age at Entry</i>	
17	1.3
18	68.7
19	30.1
<i>Immigration Status</i>	
Canadian citizen	92.0
Permanent resident	4.9
International student	3.0

Unlike upon university entry in fall 2009, the most common field of study is social and behavioural sciences and law (27.6 percent), followed by business, management and public administration (20.0 percent), and the proportion of humanities graduates is much lower (8.8 percent as opposed 20.6 percent at entry). This decrease is partly because of humanities students' higher tendency to switch to different fields, discussed further below, as well as their higher tendency to pursue further education after graduation.

The gender distribution of the graduate sample is unchanged from that of the entrant sample, with female students accounting for 58 percent. The distribution of age and immigration status at entry of the graduate sample is relatively unchanged from those of the entrant sample.

### 3. Analysis of Student Transfer

#### 3.1. Descriptive Analysis

Table 4 presents how students chose university and field of study relative to the previous year on each fall snapshot date from 2010 to 2015.

Table 4. Rates of Transfer and Change in Field of Study from Previous Fall Snapshot Date (%)

Year	No transfer, no FOS change	No transfer, FOS Change	Transfer, no FOS change	Transfer, FOS change	N
2010	79.3	18.7	0.9	1.2	58,410
2011	90.4	8.3	0.5	0.7	54,975
2012	95.1	4.4	0.2	0.3	49,341
2013	95.8	3.8	0.1	0.3	20,418
2014	94.4	4.8	0.2	0.6	3,861
2015	93.8	5.2	0.7	0.3	921

Each year, a large majority of continuing students stay at the same university and remain in the same field of study, which account for close to 80 percent of the sample in 2010, and over 90 percent from 2011 onward. University transfers, whether they involve a change in field of study or not, are uncommon events for students, together accounting for at most 2 percent.

Most students who transfer institution or change field of study are indeed those who only change field of study. Changes in field of study are by far the most frequent in 2010, at 19 percent, and the frequency steadily declines over time, to 8 percent in 2011 and to less than 6 percent from 2012 onward.

Because a large majority of university transfers and field of study changes occur in the first two years of university, we focus our analysis on these two years for the remainder of this section.

Table 5 breaks down transfer rates from fall 2009 to fall 2010 by field of study, gender, age, and immigration status in 2009.

Table 5. Transfer Rates from 2009 to 2010 by Characteristics (%)

	No transfer, no FOS change	No transfer, FOS Change	Transfer, no FOS change	Transfer, FOS change	N
All students	79.3	18.7	0.9	1.2	58,410
<i>Field of Study in Fall 2009</i>					
Education	67.0	31.4	0.3	1.3	1,137
Visual and performing arts, and communications technologies	91.1	6.2	0.8	1.1	2,529
Humanities	55.5	42.1	0.8	1.6	11,712
Social and behavioural sciences and law	85.7	11.8	1.5	1.1	10,824
Business, management and public administration	86.0	12.0	1.0	0.9	9,603

Physical and life sciences and technologies	79.9	18.3	0.7	1.1	8,160
Mathematics, computer and information sciences	77.0	20.8	0.7	1.4	1,698
Architecture, engineering and related technologies	93.9	4.5	0.5	1.0	5,778
Agriculture, natural resources and conservation	79.3	18.7	0.7	1.3	897
Health and related fields	91.7	6.7	0.6	0.9	5,088
Personal, protective and transportation services	90.0	9.2	0.0	0.8	390
Other	33.3	62.6	0.0	4.0	594
<i>Gender</i>					
Male	82.1	15.9	0.8	1.2	24,633
Female	77.3	20.7	0.9	1.2	33,777
<i>Age at entry</i>					
17	77.2	21.5	0.3	1.0	906
18	78.2	19.7	0.9	1.2	39,777
19	81.7	16.3	0.9	1.0	17,333
<i>Immigration Status</i>					
Canadian citizen	79.4	18.5	0.9	1.2	52,782
Permanent resident	80.0	18.1	0.6	1.4	3,099
International student	75.4	22.9	1.1	0.7	2,532

The likelihood of remaining in the same university and field of study varies widely across field of study, with the humanities and “other” field of study being the two groups least likely to remain in the same university and field of study (55.5 and 33.3 percent, respectively).

Approximately two-fifths of humanities students change their field of study while staying enrolled in the same university, and just over 2 percent of them transfer to a new university – the majority of which also change field of study (1.6% compared to 0.8 percent who remain in the same field).

Students in the “other” field have an even a higher likelihood to choose a different field of study from the previous fall than humanities students, with 62.6 percent of them changing field of study within the same university and 4 percent moving to a different university to study a different field. This high rate of change in field of study may be expected for this group of students because the large majority of detailed fields of study under this category are multi-disciplinary programs.

Students in physical and life sciences and related technologies, mathematics, computer and information sciences, and agriculture, natural resources and conservation have also a moderately high likelihood of moving to a different field of study, at approximately 20 percent.

At the opposite end, students in architecture, engineering and related technologies are most likely to stay in the same university and field of study, with 94 percent of them choosing to do so. Over 90 percent of students in visual and performing arts and communications technologies, health and related fields, and personal, protective and transportation services also stay in the same university and field of study.

In contrast to change in field of study, transfers are much more infrequent across field of study. The “other” field category is associated with the highest likelihood of student transfers at 4 percent, while personal, protective and transportation service has the lowest likelihood at 0.8 percent. The likelihood of student transfer for the rest of the fields is approximately 2 percent,

essentially the same value as the overall rate of student transfer in the sample (regardless of whether they change field of study or not).

Male students (82.1 percent) are more likely to stay in the same university and study the same field of study from the previous period than female students (77.3 percent). This difference mirrors female students' higher likelihood (20.7 percent) to change field of study within the same university than male students (15.9 percent), while the likelihood of student transfer is virtually the same for male and female students, whether or not transfer involves change in field of study.

Higher age at entry is related a higher likelihood of staying in the same university and field of study, and a lower likelihood of changing field of study within the same university. Transfer rates, whether student also change their field of study or not, are indistinguishable across entry age.

International students are less likely to stay in the same university and field of study, and more likely to change their field of study than Canadian citizens and permanent residents.

Table 6 breaks down the rates of transfers from fall 2010 to fall 2011 by field of study in 2010, as well as gender, age, and immigration status at entry (i.e., fall 2009).

Table 6. Transfer Rates from 2010 to 2011 by Characteristics (%)

	No transfer, no FOS change	No transfer, FOS Change	Transfer, no FOS change	Transfer, FOS change	N
All students	90.4	8.3	0.5	0.7	54,975
<i>Field of Study</i>					
Education	88.6	10.7	0.0	0.7	813
Visual and performing arts, and communications technologies	93.0	5.8	0.4	0.4	2,832
Humanities	79.7	18.6	0.7	1.0	7,563
Social and behavioural sciences and law	91.9	6.8	0.7	0.7	13,731
Business, management and public administration	93.2	5.5	0.8	0.5	8,739
Physical and life sciences and technologies	89.3	9.5	0.4	0.8	7,407
Mathematics, computer and information sciences	84.5	14.3	0.3	0.9	1,722
Architecture, engineering and related technologies	96.7	2.7	0.1	0.5	5,481
Agriculture, natural resources and conservation	89.8	9.3	0.3	0.6	1,002
Health and related fields	94.4	4.9	0.3	0.4	4,998
Personal, protective and transportation services	94.4	4.0	0.0	1.6	375
Other	74.3	21.8	0.0	4.0	303
<i>Gender</i>					
Male	90.8	8.0	0.5	0.7	22,932
Female	90.2	8.6	0.6	0.7	32,043
<i>Age at Entry</i>					
17	90.5	7.7	1.1	0.7	852
18	90.1	8.6	0.5	0.7	37,755
19	91.2	7.8	0.5	0.5	16,365
<i>Immigration Status</i>					
Canadian citizen	90.6	8.1	0.5	0.7	49,686
Permanent resident	89.0	9.6	0.6	0.8	2,952
International student	87.9	11.3	0.5	0.3	2,340

The likelihood of remaining in the same university and field of study is substantially higher in this period (3<sup>rd</sup> fall) than the previous period (2<sup>nd</sup> fall) for all fields of study, while qualitative differences across field of study largely remains the same, with students in the humanities and the “other” field being the least likely to stay, and those in architecture and engineering and related technologies the most likely to do so.

The likelihood of transferring to a different university remains at the same level as the previous period at 4 percent for students in the “other” field, while the corresponding rates are below 2 percent for students in other 11 fields of study.

The differences in the likelihood to transfer to a different university with respect to gender, age and immigration status are much smaller than in the previous period, with male and female students in particular resembling each other in this regard. Students entering universities at age 17 have a slightly higher likelihood to transfer to a different university than their older counterparts (by close to 2 percentage points). International students are slightly more likely to change field of study within the same university than Canadian citizens or permanent residents. The differences in likelihood to transfer to a different university across immigration status is very small, being at most 0.5 percentage point.

### **3.2. Modelling Analysis**

#### ***The Model***

While the observed differences in the transfer rates presented in Tables 5 and 6 suggest that, while some student characteristics are more associated with transfer to a different university and change in field of study than other, these differences may be partly explained by differences in other characteristics among groups. As shown above, humanities students are more likely to change their field of study than engineering students, and gender composition between these two fields are very different, with female students choosing humanities more and engineering less than male students. These differences in chosen field of study between male and female may account for the differences in transfer rates between the two groups. By accounting for multiple factors related to transfers at the same time, a statistical modelling analysis can disentangle the complex interrelationship.

To understand what characteristics are associated with university transfers and changes in field of study while controlling for other characteristics, we perform a multinomial logit analysis. In this analytical framework, the probability of transferring to a different university and/or changing field of study from the previous fall is expressed as a function of observed characteristics as follows:

$$Pr(\text{No transfer, FOS change}) = \frac{\exp(X\beta)}{1 + \exp(X\beta) + \exp(X\gamma) + \exp(X\delta)},$$

$$Pr(\text{Transfer, no FOS change}) = \frac{\exp(X\gamma)}{1 + \exp(X\beta) + \exp(X\gamma) + \exp(X\delta)},$$

and

$$Pr(\text{Transfer, FOS change}) = \frac{\exp(X\beta)}{1 + \exp(X\beta) + \exp(X\gamma) + \exp(X\delta)}$$

respectively. The probability of staying in the same university and field of study is,  $1 - Pr(\text{No transfer, FOS change}) - Pr(\text{Transfer, no FOS change}) - Pr(\text{Transfer, FOS change})$ , which is rewritten as

$$Pr(\text{No transfer, no FoS change}) = \frac{1}{1 + \exp(X\beta) + \exp(X\gamma) + \exp(X\delta)}$$

$X$  represents a set of explanatory variables including the field of study in the previous fall, gender, age, and immigration status at entry. Both  $X\beta$ ,  $X\gamma$ , and  $X\delta$  express linear combinations of the explanatory variables, through which transfer and these characteristics are linked to the likelihoods to transfer to a different university and to change field of study.

One category from each characteristic in the explanatory variables needs to be omitted from the model to make estimation possible. These omitted categories define the profile of the baseline group in the analysis, but choice do not affect the implications of estimation results and therefore can be arbitrary. In what follows, we select social and behavioural sciences and law, male student, 18 years of age, and Canadian citizen as the omitted categories from field of study, gender, age, and immigration status at entry, respectively.

The model is estimated by the maximum likelihood method. The estimation results from fall 2009 to fall 2010 and from fall 2010 to fall 2011 are presented in Appendix Tables A1 and A2.

### ***The Findings***

To analyze how a particular student characteristic is related to students' decisions to transfer university or change their field of study while all other characteristics are also taken into account, the likelihood to belong to each of the four university transfer/field of study change categories is predicted for each student in the sample while one of the student and program characteristics is assumed to be the same for all students with the other characteristics being unchanged from the observed profile for each student. Then the resulting likelihoods are averaged over every student in the sample. In this way, for example, a difference between male and female students can be evaluated while both student groups are assumed to be the same in terms of field of study, entry age, and immigration status.

Table 7 presents, within each student and program characteristic, how the transfer rates of each category differ from the transfer rates of the given baseline category based on the estimated multinomial logit model of fall 2009 to fall 2010 transfers. For comparison, the corresponding values from the simple descriptive statistics are presented in the parentheses directly below.

Table 7. Differences in Transfer Rates from the Baseline Categories, from 2009 to 2010 (%)

	No transfer, no FOS change	No transfer, FOS Change	Transfer, no FOS change	Transfer, FOS change
<i>Field of Study (Base: Social and behavioural sciences and law)</i>				
Education	-18.7* (-18.7)	19.9* (19.6)	-1.2* (-1.2)	0.1 (0.3)
Visual and performing arts, and communications technologies	6.5* (6.2)	-5.8* (-5.6)	-0.7* (-0.6)	0.1 (0.0)
Humanities	-30.2* (-30.2)	30.3* (30.4)	-0.7* (-0.7)	0.5* (0.5)
Business, management and public administration	1.0* (0.3)	-0.4* (0.2)	-0.5* (-0.4)	-0.1 (-0.1)
Physical and life sciences and technologies	-5.0* (-5.8)	5.8* (6.5)	-0.8* (-0.8)	0.0 (0.0)
Mathematics, computer and information sciences	-8.1* (-8.7)	8.5* (9.1)	-0.7* (-0.8)	0.3 (0.4)
Architecture, engineering and related technologies	8.8* (8.2)	-7.7* (-7.3)	-1.0* (-0.9)	-0.1 (0.0)
Agriculture, natural resources and conservation	-6.7* (-6.4)	7.2* (6.9)	-0.8* (-0.8)	0.3 (0.3)
Health and related fields	6.2* (6.0)	-5.1* (-5.1)	-0.8* (-0.9)	-0.2 (-0.1)
Personal, protective and transportation services	5.1* (4.3)	-2.8 (-2.5)	-1.5* (-1.5)	-0.8* (-0.3)
Other	-51.8* (-52.4)	50.3* (50.8)	-1.5* (-1.5)	2.9* (3.0)
<i>Gender (Base: Male)</i>				
Female	-1.0* (-4.8)	1.1* (4.7)	0.0 (0.0)	-0.1 (0.0)
<i>Age at entry (Base: 18)</i>				
17	-1.1 (-1.1)	1.7 (1.9)	-0.3 (-0.5)	-0.3 (-0.3)
19	3.9* (3.5)	-3.7* (-3.3)	0.0 (0.1)	-0.2* (-0.2)
<i>Immigration status (Base: Canadian citizen)</i>				
Permanent resident	-4.0* (0.5)	4.0* (-0.4)	-0.2 (-0.3)	0.2 (0.2)
International student	-9.0* (-4.1)	9.2* (4.4)	0.3 (0.2)	-0.5* (-0.5)

Notes: \* indicates that values are statistically significant at the 5 percent level. Values in parentheses are calculated from the regular sample averages.

Generally, accounting for gender, immigration status, and age at entry do not affect the differences in transfer rates across field of study.

Differences between male and female students are predicted to be smaller by the multinomial logit model, with female students being less likely to choose the same university and field of study as the previous period than male students by 1 percentage point, as opposed to 5 percentage point found in the simple sample averages.

Differences in transfer rates across age at entry is mostly unchanged from the simple sample statistics. In contrast, differences in transfer rates across immigration status are magnified once

other student and program characteristics are taken into account. The estimation results from the multinomial logit model indicate that permanent residents and international students are less likely to remain in the same university and field of study as the previous period than Canadian citizens by 9 and 4 percentage points, respectively, as opposed to 1 and 4 percentage points found in the simple sample averages.

Table 8 conducts the same exercise as Table 7, but the results are based on the multinomial logit model of fall 2010 to fall 2011 transfers.

Table 8. Differences in Transfer Rates from the Baseline Categories, from 2010 to 2011 (%)

	No transfer, no FOS change	No transfer, FOS Change	Transfer, no FOS change	Transfer, FOS change
<i>Field of Study (Base: Social and behavioural sciences and law)</i>				
Education	-4.0* (-3.3)	4.5* (3.9)	-0.7* (-0.7)	0.2 (0.1)
Visual and performing arts, and communications technologies	1.2* (1.1)	-1.0* (-0.9)	-0.3 (-0.3)	0.0 (0.1)
Humanities	-12.5* (12.1)	12.3* (11.9)	0.0 (0.0)	0.3* (0.3)
Business, management and public administration	1.8* (1.3)	-1.6* (-1.2)	0.1 (0.1)	-0.2* (-0.2)
Physical and life sciences and technologies	-2.3* (-2.6)	2.5* (2.7)	-0.3* (-0.3)	0.0 (0.1)
Mathematics, computer and information sciences	-6.1* (-7.4)	6.4* (7.5)	-0.3* (-0.3)	0.1 (0.2)
Architecture, engineering and related technologies	5.2* (4.8)	-4.4* (-4.1)	-0.5* (-0.6)	-0.3* (-0.2)
Agriculture, natural resources and conservation	-1.8 (-2.1)	2.6* (2.5)	-0.6* (-0.4)	-0.2 (-0.1)
Health and related fields	2.5* (2.5)	-1.9* (-1.9)	-0.3* (-0.4)	-0.3* (-0.3)
Personal, protective and transportation services	2.9* (2.5)	-2.8* (-2.8)	-0.7* (-0.7)	0.6 (0.9)
Other	-17.5* (-17.6)	14.8* (15.0)	-0.7* (-0.7)	3.4* (3.3)
<i>Gender (Base: Male)</i>				
Female	0.5 (-0.7)	-0.3 (0.7)	0.0 (0.1)	-0.1 (-0.1)
<i>Age at entry (Base: 18)</i>				
17	-0.1 (0.4)	-0.6 (-0.9)	0.5 (0.5)	0.2 (0.0)
19	1.6* (1.0)	-1.4* (-0.8)	-0.1 (-0.1)	-0.2** (-0.2)
<i>Immigration Status (Base: Canadian citizen)</i>				
Permanent resident	-3.4* (-1.6)	3.1* (1.4)	0.1 (0.1)	0.2 (0.1)
International student	-4.9* (-2.7)	5.5* (3.1)	-0.1 (0.0)	-0.5* (-0.4)

Notes: \* indicates that values are statistically significant at the 5 percent level. Values in parentheses are calculated from the regular sample averages.

The differences in transfer rates predicted from the model are generally similar to those obtained by the simple descriptive statistics, except for those across immigration status. The differences among Canadian citizens, permanent residents, and international students are more pronounced in the multinomial logit model than in the simple sample averages, which is also found for the previous period. The multinomial logit model indicates that permanent residents and international students are less likely to remain in the same university and field of study than Canadian citizen by 3.4 and 4.9 percentage points, respectively, as opposed to 1.6 and 2.7 percent obtained from the simple sample averages.

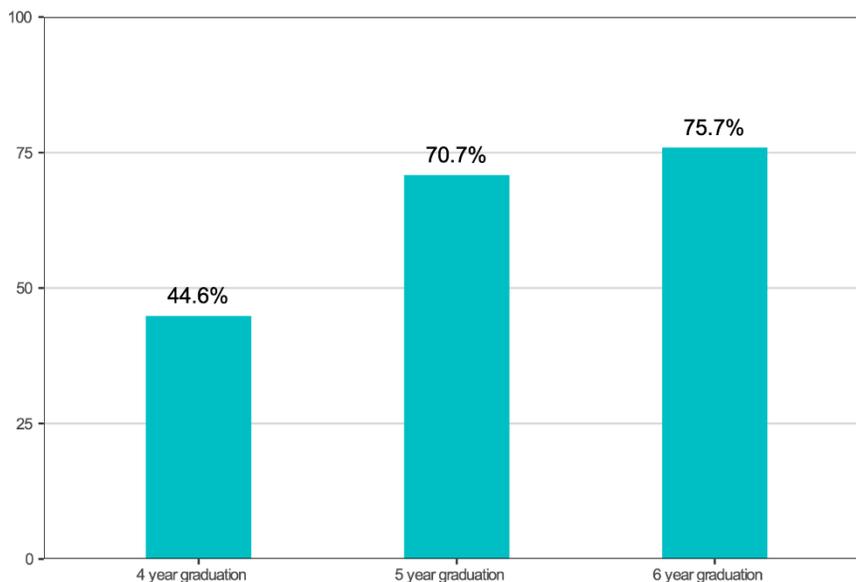
These results indicate that field of study is the primary characteristic related to students' likelihood to transfer to a different university as well as to choose a different field of study from the previous period. Immigration status and age at entry are related to these decisions to a lesser extent. Transfers and change in field of study do not seem strongly related to gender once other characteristics are taken into account.

## 4. Analysis of Graduation Outcome

### 4.1. Descriptive Analysis

Figure 1 presents the four, five, and six-year graduation rates for the fall 2009 entry cohort. Close to a half of them graduate in 4 years. The graduation rate reaches 71 percent after 5 years of university enrollment and 76 percent after 6 years.

Figure 1. Four, Five and Six-year Graduation Rates, 2009 Entry Cohort



When analyzing the relationship between graduation and university transfer, it is important to recognize that university leavers are always classified as non-graduates, and they are less likely to be classified either as transfer students or students who change field of study. For example, students who leave in the first year never have chance to change university nor field of study,

and therefore would be classified as non-transfer students remaining in the same institution and field of study, which lowers graduation rates for this transfer group.

Therefore, to control the effect of student persistence on transfer and graduation, we produce two subsamples of the fall 2009 entry cohort, by including 1) only students who continued to be enrolled in fall 2010 and 2) those who continued until fall 2011. We calculate the graduation rates among these subsamples and then breakdown the graduation rates by transfer type to see if university transfers and changes in field of study up to these points are related to graduation.

Table 9 compares the four, five, and six-year graduation rates obtained in these two subsamples with those for the full fall 2009 cohort sample.

Table 9. Graduation Rates from Different Points in Time (%)

Sample	4 Year Graduation	5 Year Graduation	6 Year Graduation
All students	44.6	70.7	75.7
Students who stay enrolled in fall 2010	48.3	76.5	82.0
Students who stay enrolled in fall 2011	51.1	81.0	86.8

Unsurprisingly, graduation rates in the two subsamples are higher than those for the whole sample, because the sample restriction excludes first- and second-year university leavers. For example, the four-year graduation rate conditional on students still being enrolled in fall 2010 is 48.3 percent as opposed to 44.6 percent among the full cohort. Overall, these differences are not large as the leaving rate of the fall 2009 cohort is low.

Figure 2 presents the four, five, and six-year graduation rates broken down by transfer type for the subsample restricted to students who stay enrolled in fall 2010. Students are grouped into different transfer types based on university transfer and change in field of study from fall 2009 to fall 2010.

Figure 2. Graduation Rates by Transfer Type (Conditional on Being Enrolled in Fall 2010)



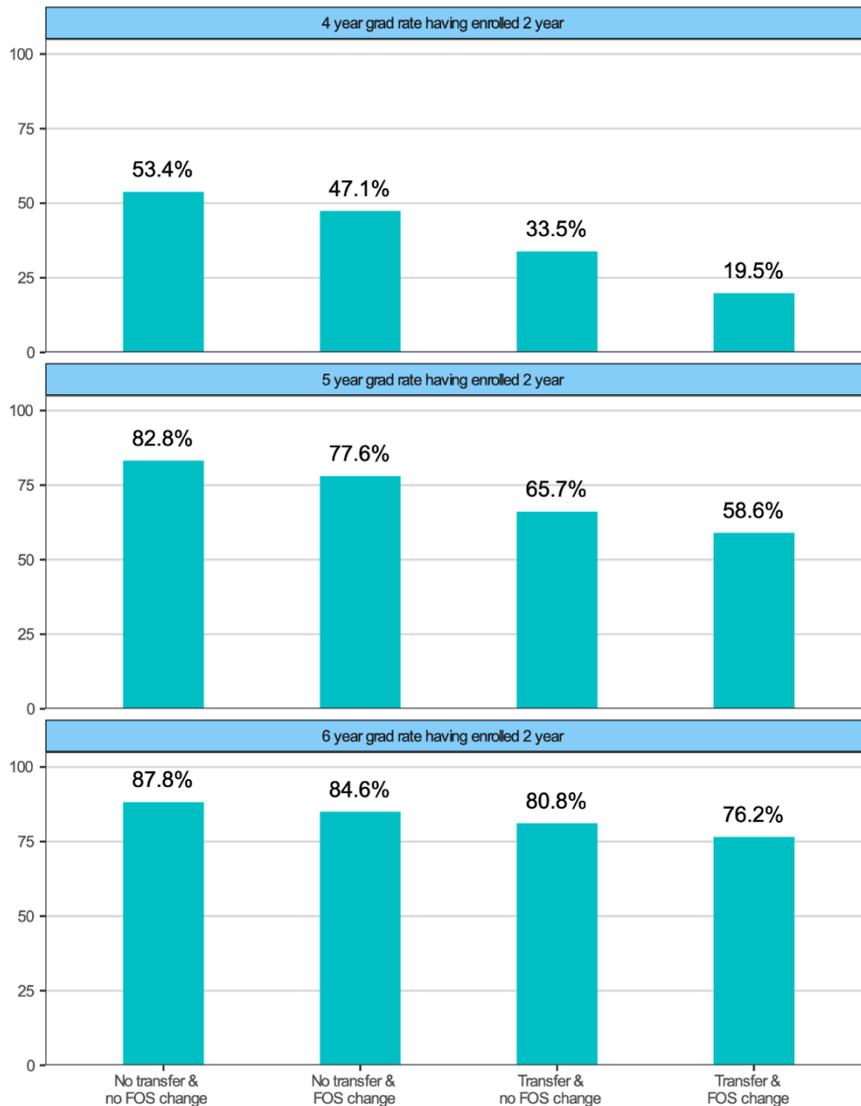
Students who remain the same university and field of study have the highest graduation rates, with 49.3, 77.4, and 82.5 percent for their four, five, and six-year graduation rates. Non-transfer students who change their field of study have slightly lower but comparable graduation rates, with a 3 percentage point difference at most.

In contrast, transfer students have appreciably lower graduation rates, whether they have changed their field of study or not. In particular, the four-year graduation rate is 32.9 percent for transfer students who remain in their field, and 21.5 percent for transfer students who change theirs.

Transfer students catch up on graduation over time with non-transfer students, however. The differences in graduation rates between non-transfer students who remain in the same fields of study narrow to approximately 7 percent after 6 years.

Figure 3 presents the graduation rates broken down by transfer type group for the four, five, and six-year graduation among the subsample who stay enrolled in fall 2011. This time, students are grouped into different transfer types based on their change in university and field of study from fall 2009 to fall 2011.

Figure 3. Graduation Rates by Transfer Type (Conditional on Being Enrolled in Fall 2011)



The patterns in differences in graduation rates across transfer group in this subsample are qualitatively the same as those in the other subsample: transfer students have lower graduation rates, particularly for four-year graduation.

The differences in graduation rates between transfer students who change field of study and their counterparts who remain in the same field are more pronounced in this subsample than the other

subsample, with the former having noticeably lower graduation rates than the latter (by 14, 7, and 5 percentage points for the four, five, and six-year graduation).

## **4.2. Modelling Analysis**

### ***The Model***

In this section, we conduct a statistical analysis using the same approach as the analysis of characteristics of transfer students above. With just two possible outcomes to consider (graduation or not), the multinomial logit model is reduced to a regular logit model, expressed as

$$\Pr(\textit{Graduated}) = \frac{\exp(X\beta)}{1 + \exp(X\beta)}.$$

The explanatory variables include students' transfer types as well as other observed characteristics (the field of study in the fall 2010 or 2011, depending on a subsample used, gender, age, and immigration status at entry).

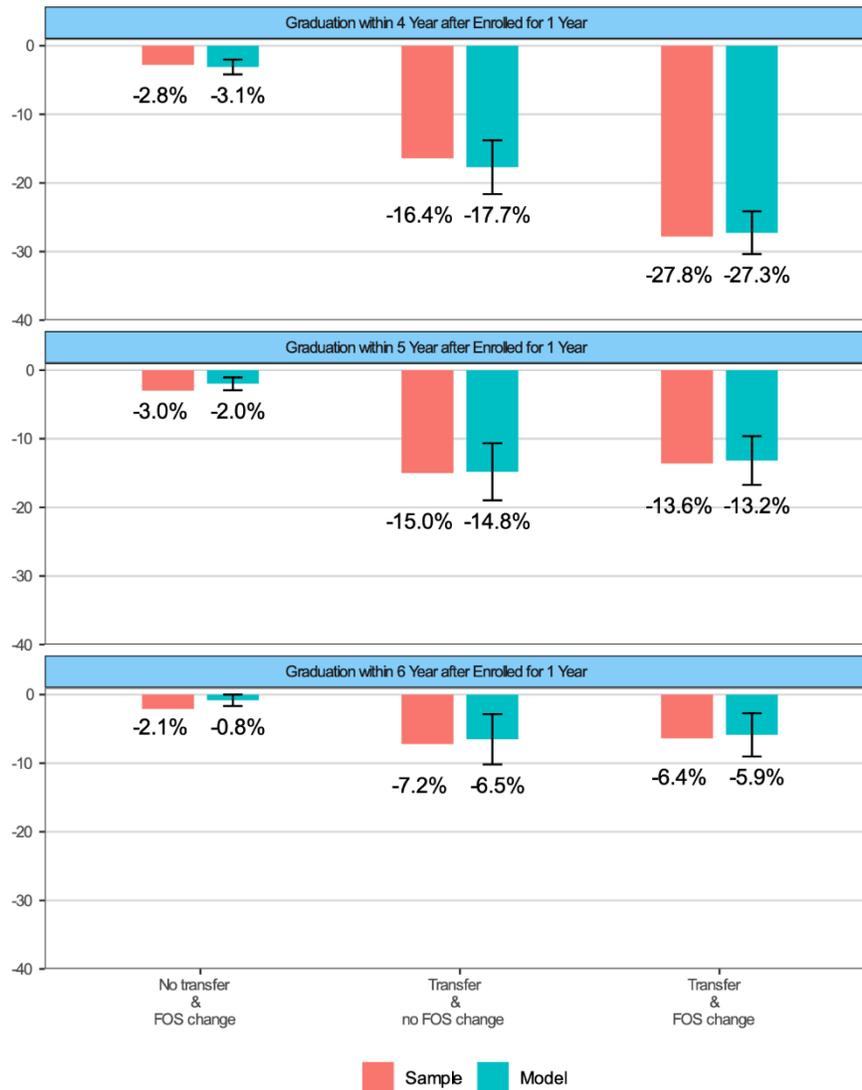
The estimation results for two subsamples of the fall 2009 entry cohort are presented in Appendix Tables A3 and A4.

### ***The Findings***

To show how accounting for student and program characteristics affect differences in graduation rate across transfer type, we use the estimation results to predict a graduation probability for every student in the sample while assuming that they belong to the same transfer type group, and then take the average of these predicted probabilities. This average predicted probability is calculated for each of the four transfer types, which results in the predicted graduation rates while accounting of the other sample characteristics.

For the subsample of fall 2009 entrants who were still enrolled in fall 2010, Figure 4 presents the predicted differences in graduation rates relative to the baseline group (blue bars), along with the corresponding values from the sample graduation rates (red bars). The vertical error bars represent the 95 percent confidence intervals for the difference in graduation rate.

Figure 4. Differences in Graduation Rates by Transfer Group (Conditional on Being Enrolled in Fall 2010)



Accounting for students’ field of study, gender, entry age, and immigration status has only minor effects in the differences in graduation rates across transfer type. If any, the difference in the six-year graduation rate narrows to less than 1 percent between non-transfer students who have chosen a different field of study and their counterparts who have remained in theirs. The difference is not statistically significant.

Figure 5 presents the differences in graduation rates predicted from the logit model for the other subsample, i.e., fall 2009 entry students who were still enrolled in fall 2011.

Figure 5. Differences in Graduation Rates by Transfer Group (Conditional on Being Enrolled in Fall 2011)



Again, accounting for student and program characteristics generally has little to no effect on the differences in graduation rates. The only notable differences are seen for the difference in the four-year graduation rate between non-transfer students who have changed their field of study and non-transfer student who remain in theirs, with the difference widening from 6.3 to 7.4 percent.

The same magnitude of change is seen for the difference in the four-year graduation rate between transfer students who remain in their fields of study and non-transfer students who also remain in their fields, although the value predicted by the model is not different from the sample counterpart at the 5 percent statistical significance level. A slightly smaller change in a

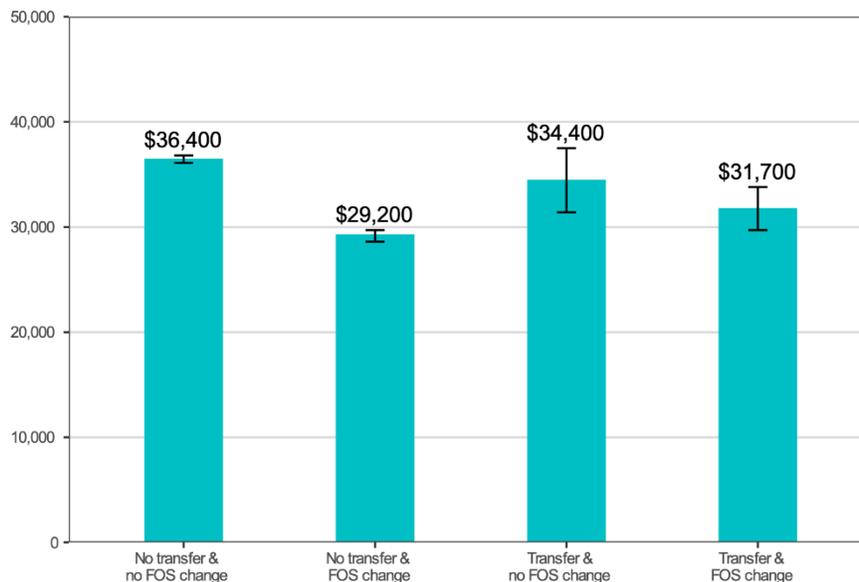
difference in graduation rate is seen for the six-year graduation rate between these two groups (by 0.8 percentage point), but this difference is not statistically significant either.

## 5. Analysis of Post-Graduation Earnings

### 5.1. Descriptive Analysis

Figure 6 presents the mean first-year earnings of graduates from the fall 2009 entry cohort by transfer type, with the 95 percent confidence interval represented by error bars.

Figure 6. Mean Earnings One Year After Graduation by Transfer Type



Mean earnings is highest, at \$36,400, for students who remained at the same institution within the same field of study throughout their studies, followed by \$34,400 for students who transferred to new institutions but remained in the same fields of study. The difference is not statistically significant, however, due to the large standard error of the mean earnings for the transfer students.

The two groups who have the lowest earnings are those associated with a change in field of study, with \$29,200 for non-transfer students who changed their fields of study, and \$31,700 for transfer students who have changed their field of study. These earnings levels are statistically different from the mean earnings of graduates who remain in the same institution and field of study.

### 5.2. Modelling Analysis

#### *The Model*

We model the relationship between earnings and various student characteristics including their student mobility outcomes 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 their changes in university and field of study, as well as field of study at graduation, gender, age, immigration status at entry, and the calendar year of graduation. The error term  $\varepsilon$  captures a portion of earnings left unexplained by the explanatory variables in the model.

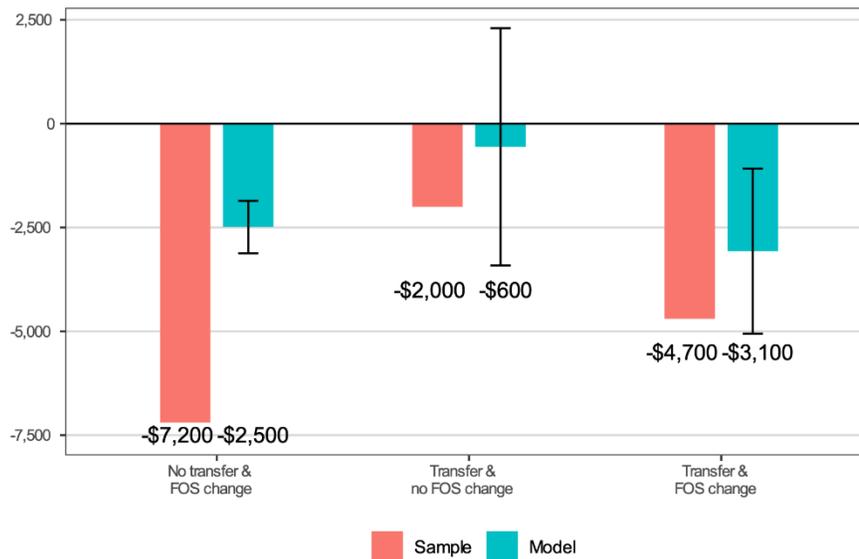
For each explanatory variable in the regression model, estimation results provide differences in earnings between a baseline category and other categories, while those being compared have otherwise the same characteristics. We set non-transfer students with no change in field as the baseline group for the indicator variable capturing a student's mobility decisions. For the year of graduation, 2013 represents the baseline group as it is the year the fall 2009 entrants in the samples graduated the most. The baseline categories for field of study, gender, age and immigration status are social and behavioural sciences and law, male, age 18, and Canadian citizens, respectively.

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 university transfer or change in 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 student in order to control for such factors, and is beyond the scope of this study.

### ***The Findings***

Appendix Table A5 presents the estimation results from the earnings regression model, and Figure 7 shows the differences in mean earnings between the baseline transfer type group (i.e. non-transfer students who have never changed their field of study) and other transfer type groups obtained from the model (blue bars). The error bars represent the 95 confidence intervals. The figure also presents the corresponding differences in mean earnings obtained from the sample mean (red bars).

Figure 7. Differences in Mean Earnings One Year After Graduation by Transfer Type



While students in the baseline group (non-transfer students who have not changed their field of study) are still the highest earners, differences in mean earnings by transfer type narrow substantially once other student and program characteristics are controlled for by the earnings regression model. Based on the estimation results, the mean earnings differences are reduced to \$2,500, \$600, and \$3,100 for non-transfer students who change field of study, transfer students who remain in the same field of study, and transfer students who change their field of study, below the baseline group.

The differences between the baseline group and students who have changed their field of study, whether or not they are transfer students, are statistically significant. In contrast, the difference in mean earnings between non-transfer students and transfer students are not statistically significant. In other words, the estimation results indicate that post-graduation earnings are unrelated to students' decisions to transfer or not as long as they do not involve a change in field of study. Transfer students earn less if they also change in field of study. These lower earnings may be due to change in field of study alone and not university transfer behaviours.

## 6. Conclusion

This report provides the findings from a system-wide analysis of transfer students among Ontario universities, which examines how student and program characteristics relate to institutional transfers and changes in field of study, and how student mobility relates to graduation and post-graduation employment earnings outcomes relative to non-transfer students. To this end, the analysis tracks the enrollment histories of the 2009 entry cohort to Ontario universities (bachelor's degree programs only), and then obtain graduation and post-graduation employment earnings from the enrollment, graduation, and personal income tax information contained in the ELMLP.

We find that transfer students account for 2 percent of 2009 entrants continuing to their second year, fall 2010, and merely 1 percent of those continuing from fall 2010 to fall 2011. Most observed year-to-year changes in either field of study or university are indeed changes in field of study within the same university, accounting for 20 percent and 10 percent of the enrollment patterns observed from fall 2009 to fall 2010, and from fall 2010 to fall 2011, respectively.

Field of study is the primary characteristics related to student transfers. The humanities and “other” fields of study are the two fields most associated with the change in field of study or institution. On the other hand, architecture, engineering and related technologies is the field least associated with student mobility, with students in visual and performing arts and communications technologies, health and related fields, and personal, protective and transportation services not far behind.

Little differences are found between male and female students in their propensities to transfer to a different university or to change field of study once their program and student characteristics are taken into account. On the other hand, more pronounced differences are found across immigration status, with international students and permanent residents being much more likely to change field of study than Canadian citizens.

Conditional on the first-year enrollment (i.e., fall 2009 entrants still being enrolled in fall 2010), four-year graduation rates among transfers students are lower than students who stay in the same university and field of study by 18 and 27 percentage points, depending whether transfer students also change field of study or not, respectively. While these differences narrow to 6 and 7 percentage points two years later (six-year graduation), the lower graduation rates of transfer students suggest that transfers students experience a slower academic progression. Whether this is due to some form of barrier in the transfer system or is related to unobservable characteristics of transfer students remain to be answered and will require further research.<sup>3</sup>

The mean employment earnings one year after graduation of transfer students who study the in the same field throughout their academic career are not statistically different from those of students who remain in the same university and field. On the other hand, transfer students who change field of study have lower mean earnings than non-transfer students who remain in the same field of study by \$3,100, with this difference being statistically significant at the 5 percent level. However, non-transfer students who change field of study also have lower earnings than their counterparts without a change in field of study, which may suggest the lower earnings are not due to transfer to a different university, per se.

Overall, this study provides a more comprehensive view of Ontario transfer students by taking advantage of a system-wide PSE enrollment and graduation information. By necessity due to a data coverage issue in the ELMLP for Ontario college students until the 2014/2015 reporting cycle, this study focuses on student mobility among Ontario universities only. However,

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<sup>3</sup> Statistics Canada (n.d.) recommends not using the PSIS variables TOTCRED and TTRANCRD included in the ELMLP, which represent the cumulative credits for programs and total transfer credits, for Ontario due to low coverage rates.

university-to-university transfers have been far less studied compared to college-to-university transfers. Therefore, this study provides new and unique evidence on this relatively unexplored subject.

Moreover, this study put into practice the possibility of using the ELMLP to analyze student pathways and transfers at the system-wide level. As more complete data coverage over a longer time period become available for Ontario colleges, this study starts to lay the methodological groundwork to study college-to-university, college-to-college, as well as university-to-college transfers for future projects.

## 7. References

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## 8. Appendix

Table A1. Multinomial Logit Model Estimates for Transfers and Change in Field of Study, Fall 2009 to Fall 2010

	Outcome (Base: no transfer & no FOS change)					
	No transfer & FOS change		Transfer & no FOS change		Transfer & FOS change	
Field of study (omitted: social and behavioural sciences and law)						
Education	1.226 (0.071)	***	-1.466 (0.584)	**	0.308 (0.295)	
Visual and performing arts, and communications technologies	-0.732 (0.088)	***	-0.746 (0.244)	***	-0.011 (0.209)	
Humanities	1.702 (0.035)	***	-0.182 (0.132)		0.832 (0.120)	***
Business, management and public administration	-0.047 (0.044)		-0.393 (0.133)	***	-0.147 (0.144)	
Physical and life sciences and technologies	0.455 (0.042)	***	-0.673 (0.157)	***	0.019 (0.145)	
Mathematics, computer and information sciences	0.637 (0.068)	***	-0.564 (0.294)	*	0.362 (0.230)	
Architecture, engineering and related technologies	-1.116 (0.072)	***	-1.185 (0.210)	***	-0.156 (0.167)	
Agriculture, natural resources and conservation	0.551 (0.091)	***	-0.709 (0.418)	*	0.307 (0.306)	
Health and related fields	-0.625 (0.063)	***	-0.911 (0.195)	***	-0.247 (0.175)	
Personal, protective and transportation services	-0.319 (0.180)	*	-15.368 (886.033)		-1.498 (1.006)	
Other	2.592 (0.093)	***	-15.390 (1 187.375)		2.238 (0.240)	***
Gender (omitted: male)						
Female	0.083 (0.024)	***	-0.013 (0.095)		-0.030 (0.082)	
Age at entry (omitted: 18)						
17	0.114 (0.089)		-0.384 (0.455)		-0.276 (0.360)	
19	-0.291 (0.026)	***	-0.048 (0.098)		-0.248 (0.088)	***
Immigration status (omitted: Canadian citizen)						
Permanent resident	0.290 (0.052)	***	-0.216 (0.238)		0.258 (0.166)	
International student	0.618	***	0.398	**	-0.345	

	(0.054)		(0.202)		(0.251)	
Constant	-1.970 (0.036)	***	-4.042 (0.111)	***	-4.283 (0.115)	***

Notes: N = 58,143. Standard errors in parentheses. \* p < 0.1; \*\* p < 0.05; \*\*\* p < 0.01

Table A2. Multinomial Logit Model Estimates for Transfers and Change in Field of Study, Fall 2010 to Fall 2011

	Outcome (Base: no transfer & no FOS change)					
	No transfer & FOS change		Transfer & no FOS change		Transfer & FOS change	
Field of study (omitted: social and behavioural sciences and law)						
Education	0.542 (0.071)	***	-14.961 (0.584)	***	0.271 (0.295)	
Visual and performing arts, and communications technologies	-0.169 (0.088)	*	-0.483 (0.244)	**	0.015 (0.209)	
Humanities	1.168 (0.035)	***	0.145 (0.132)		0.476 (0.120)	***
Business, management and public administration	-0.290 (0.044)	***	0.135 (0.133)		-0.390 (0.144)	***
Physical and life sciences and technologies	0.329 (0.042)	***	-0.457 (0.157)	***	0.091 (0.145)	
Mathematics, computer and information sciences	0.721 (0.068)	***	-0.611 (0.294)	**	0.206 (0.230)	
Architecture, engineering and related technologies	-1.071 (0.072)	***	-1.634 (0.210)	***	-0.545 (0.167)	***
Agriculture, natural resources and conservation	0.337 (0.091)	***	-1.889 (0.418)	***	-0.291 (0.306)	
Health and related fields	-0.348 (0.063)	***	-0.720 (0.195)	***	-0.527 (0.175)	***
Personal, protective and transportation services	-0.549 (0.180)	***	-15.048 (886.033)		0.603 (1.006)	
Other	1.358 (0.093)	***	-15.911 (1 187.375)		1.977 (0.240)	***
Gender (omitted: male)						
Female	-0.047 (0.024)	*	-0.019 (0.095)		-0.177 (0.082)	**
Age at entry (omitted: 18)						
17	-0.070 (0.089)		0.639 (0.455)		0.233 (0.360)	
19	-0.198 (0.026)	***	-0.162 (0.098)	*	-0.306 (0.088)	***

Immigration status (omitted: Canadian citizen)					
Permanent resident	0.379	***	0.185	0.304	*
	(0.052)		(0.238)	(0.166)	
International student	0.601	***	-0.053	-1.222	***
	(0.054)		(0.202)	(0.251)	
Constant	-2.550	***	-4.863	-4.692	***
	(0.036)		(0.111)	(0.115)	

Notes: N = 54,0975. Standard errors in parentheses. \* p < 0.1; \*\* p < 0.05; \*\*\* p < 0.01

Table A3. Logit Model Estimates for Graduation (Conditional on Being Enrolled in Fall 2010)

	Four-year graduation		Five-year graduation		Six-year graduation	
Transfer type (Base: no transfer & no FOS change)						
No transfer & FOS change	-0.233	***	-0.191	***	-0.129	***
	(0.023)		(0.026)		(0.029)	
Transfer & no FOS change	-0.780	***	-0.738	***	-0.406	***
	(0.097)		(0.094)		(0.106)	
Transfer & FOS change	-1.356	***	-0.649	***	-0.323	***
	(0.095)		(0.082)		(0.092)	
Field of study (Base: social and behavioural sciences and law)						
Education	-1.208	***	-0.640	***	-0.624	***
	(0.077)		(0.079)		(0.084)	
Visual and performing arts and communications technologies	0.004		-0.129	***	-0.118	**
	(0.041)		(0.049)		(0.054)	
Humanities	-0.456	***	-0.625	***	-0.658	***
	(0.028)		(0.032)		(0.034)	
Business, management and public administration	-0.323	***	-0.252	***	-0.232	***
	(0.028)		(0.033)		(0.036)	
Physical and life sciences and technologies	-0.267	***	-0.110	***	-0.018	
	(0.029)		(0.035)		(0.039)	
Mathematics, computer and information sciences	-1.135	***	-0.640	***	-0.402	***
	(0.058)		(0.054)		(0.059)	
Architecture, engineering and related technologies	-0.852	***	0.075	*	0.430	***
	(0.036)		(0.041)		(0.048)	
Agriculture, natural resources and conservation	-0.282	***	0.053		0.088	
	(0.065)		(0.081)		(0.090)	
Health and related field	0.316	***	0.471	***	0.564	***
	(0.035)		(0.047)		(0.054)	
Personal, protective and transportation services	0.247	**	-0.025		-0.161	
	(0.107)		(0.128)		(0.134)	
Other	-0.537	***	-0.651	***	-0.653	***
	(0.115)		(0.120)		(0.126)	
Gender (Base: male)						
Female	0.544	***	0.585	***	0.522	***
	(0.018)		(0.021)		(0.023)	

Entry age (Base: 18)						
17	0.010 (0.071)		0.111 (0.084)		0.029 (0.093)	
19	0.221 (0.019)	***	-0.183 (0.022)	***	-0.265 (0.024)	***
Immigration status (Base: Canadian citizen)						
Permanent resident	-0.412 (0.040)	***	-0.227 (0.043)	***	-0.133 (0.048)	***
International student	-0.059 (0.043)		-0.167 (0.047)	***	-0.186 (0.051)	***
Constant	-0.101 (0.024)	***	1.157 (0.028)	***	1.483 (0.031)	***

Notes: N = 58,143. Standard errors in parentheses. \* p < 0.1; \*\* p < 0.05; \*\*\* p < 0.01

Table A4. Logit Model Estimates for Graduation (Conditional on Being Enrolled in Fall 2011)

	Four-year graduation		Five-year graduation		Six-year graduation	
Transfer type (Base: no transfer & no FOS change)						
No transfer & FOS change	-0.418 (0.023)	***	-0.429 (0.028)	***	-0.129 (0.029)	***
Transfer & no FOS change	-0.917 (0.082)	***	-0.935 (0.082)	***	-0.406 (0.106)	***
Transfer & FOS change	-1.708 (0.084)	***	-1.299 (0.069)	***	-0.323 (0.092)	***
Field of study (Base: social and behavioural sciences and law)						
Education	-1.400 (0.083)	***	-0.946 (0.087)	***	-0.624 (0.084)	***
Visual and performing arts and communications technologies	0.030 (0.043)		-0.199 (0.055)	***	-0.118 (0.054)	**
Humanities	-0.358 (0.030)	***	-0.614 (0.037)	***	-0.658 (0.034)	***
Business, management and public administration	-0.386 (0.029)	***	-0.435 (0.037)	***	-0.232 (0.036)	***
Physical and life sciences and technologies	-0.275 (0.030)	***	-0.193 (0.040)	***	-0.018 (0.039)	
Mathematics, computer and information sciences	-1.238 (0.060)	***	-0.857 (0.058)	***	-0.402 (0.059)	***
Architecture, engineering and related technologies	-0.974 (0.036)	***	-0.149 (0.045)	***	0.430 (0.048)	***
Agriculture, natural resources and conservation	-0.352 (0.065)	***	0.022 (0.088)		0.088 (0.090)	
Health and related field	0.255 (0.035)	***	0.318 (0.052)	***	0.564 (0.054)	***
Personal, protective and transportation services	0.289 (0.111)	***	-0.123 (0.140)		-0.161 (0.134)	

Other	-0.467 (0.120)	***	-0.640 (0.135)	***	-0.653 (0.126)	***
Gender (Base: male)	(0.000)					
Female	0.532 (0.019)	***	0.597 (0.023)	***	0.522 (0.023)	***
Entry age (Base: 18)						
17	0.043 (0.073)		0.217 (0.096)	**	0.029 (0.093)	
19	0.277 (0.020)	***	-0.135 (0.024)	***	-0.265 (0.024)	***
Immigration status (Base: Canadian citizen)						
Permanent resident	-0.440 (0.041)	***	-0.299 (0.046)	***	-0.133 (0.048)	***
International student	-0.019 (0.045)		-0.102 (0.053)	*	-0.186 (0.051)	***
Constant	0.081 (0.025)	***	1.579 (0.032)	***	1.483 (0.031)	***

Notes: N = 54,975. Standard errors in parentheses. \* p < 0.1; \*\* p < 0.05; \*\*\* p < 0.01

Table A5: Estimation Results for Post-Graduation Earnings Regression

Transfer type (omitted: no transfer & no FOS change)	
No transfer & FOS change	-2.5 *** (0.3)
Transfer & no FOS change	-0.6 (1.5)
Transfer & FOS change	-3.1 *** (1.0)
Field of study (omitted: social and behavioural sciences and law)	
Education	0.4 (0.9)
Visual and performing arts, and communications technologies	-4.5 *** (0.5)
Humanities	-3.2 *** (0.4)
Business, management and public administration	9.3 *** (0.4)
Physical and life sciences and technologies	-0.8 (0.5)

Mathematics, computer and information sciences	19.7	***
	(1.3)	
Architecture, engineering and related technologies	22.8	***
	(0.6)	
Agriculture, natural resources and conservation	4.5	***
	(0.9)	
Health and related fields	16.0	***
	(0.6)	
Personal, protective and transportation services	-0.4	
	(1.1)	
Other	7.2	***
	(2.3)	
Gender (omitted: male)		
Female	-0.5	
	(0.3)	
Year of graduation (omitted: 2013)		
2012	-2.7	***
	(0.4)	
2014	4.0	***
	(0.3)	
Age at entry (omitted: 18)		
17	1.1	
	(1.5)	
19	-0.8	**
	(0.3)	
Immigration status (omitted: Canadian citizen)		
Permanent resident	-2.2	***
	(0.6)	
International student	-4.0	***
	(0.9)	
Constant	28.5	***
	(0.4)	

Notes: N = 22,130. The dependent variable is employment earnings (in \$1,000). Standard errors in parentheses. \* p < 0.1; \*\* p < 0.05; \*\*\* p < 0.01