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Postsecondary Student Persistence and Pathways: Evidence From the YITS-A in Canada

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Abstract The Youth in Transition Survey is used to follow the postsecondary education (PSE) pathways and outcomes of Canadian youth over the mid 2000s. Students starting at community colleges and four year universities are analyzed separately. First program outcomes are reported, showing the proportions of students who leave their first programs but remain in PSE by switching/transferring to other programs, institutions, or levels. Multinomial regression estimates correlates of students' first program switching and leaving decisions. Five year graduation rates are calculated to show the importance of different pathways (across programs, institutions, and levels) to earning a PSE credential; in the aggregate and for subgroups of students. Transfers constitute important but not terribly large pathways for Canadian students to adjust their PSE and obtain PSE credentials. We calculate the resulting extent to which institution specific measures of persistence, PSE leaving, and graduation rates misstate the rates experienced by students. Compared to American students, university and community college starters in Canada have higher persistence and graduation rates and lower transfer rates across institutions. For community college starters, much of the difference is due to the relative lack of well defined pathways from community colleges to universities in Canada. We find that students with more family resources are better able to transfer across programs or institutions in order to obtain a PSE credential.

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There is a great deal of interest in students' progress, or lack of progress, through their postsecondary education (PSE). This interest is warranted by the large investments of time and money required for PSE (both private and public), the substantial psychic costs that can be incurred, and the large returns to PSE (both monetary and non-monetary (Pascarella and Terenzini, 1991, 2005)). The literature is huge, with a large subset examining the performance of American students; see, for example, Bean (1980); Cabrera, Nora and Casteneda (1993); DesJardins, Ahlburg and McCall (2002); Pascarella and Terenzini (1980); Shapiro et al. (2015b); Stratton, O'Toole and Wetzel (2008) and Tinto (2012) for work that concentrates on students' persistence and graduation. Studies of students' progress in other countries include Johnes and McNabb (2004) and Smith and Naylor (2001) who look the attrition of UK students and Aina (2013) and Belloc, Maruotti and Petrella (2010) who analyze the very high dropout rate in Italian post secondary institutions. Gury (2011) uses data on students enrolled at French schools to estimate their hazard rates of dropping out and Lassibille and Navarro Gómez (2008) do the same for students at a Spanish university. The progress of Australian post secondary students is studied in Shah and Burke (1999) and Marks (2007). Van Den Berg and Hofman (2005) investigate the correlates of students' progress in their programs in the Netherlands.

Studies of Canadian students' progress include Gilbert & Auger (1988), Grayson (1998), (1995), and (2003), and Montmarquette, Mahseredjian and Houle (2001); all of whom examine student progress at only one university; and Dooley, Payne and Robb (2012) who use administrative data from four Ontario universities. Chen & Oderkirk (1997) examine the graduation and dropout rates of students attending only Ontario universities while Butlin (2000) uses a representative national sample from the 1995 School Leavers Follow-up Survey to run logistic regressions on the probability of dropping out of PSE. Butlin was novel in that he also examined students starting at community colleges, with separate analyses of university and community college students.

Research on Canadian students' progress increased dramatically with the publication of the Youth in Transition Survey (YITS) which follows the education and work activities of individual Canadian youth over roughly eight years, starting in the late 1990s. Shaienks, Gluszynski and Bayard (2008), and references cited therein, use the YITS to report rates of continuing, graduating, and dropping out of PSE; often disaggregated by region, type of institution, and student and family characteristics. Several studies in the Finnie, Mueller, Sweetman, and Usher (2008) volume use cohorts A and B of the YITS to study the persistence and graduation outcomes of Canadian PSE. Mueller (2007) and Parkin and Baldwin (2009) provide surveys of the literature on Canadian students' progress.

An important finding is that student pathways through PSE are often complex, with multiple transfers across institutions and different types of institutions. Studies of American students that focus on students' transfers and alternative pathways include Adelman (2006); Bach et al. (2000); Cabrera, Burkim and LaNasa (2005); Choy (2002); Goldrick-Rab (2006); Goldrick-Rab and Pfeffer (2009); Grubb (1989); Herzog (2005); Hoachlander et al. (2003); McCormick and Carroll (1997); Radford et al. (2010); and Shapiro et al. (2015a). Finnie and Qiu (2008) and Martinello (2008) use cohort B of the YITS to report on Canadian students' pathways across PSE institutions (of the same or different types) and graduation rates.

We adopt the student-choice conceptual framework, where students make a sequence of choices about their PSE and the choices are situated in different contexts, (St. John, Asker and Hu, 2001) to address several issues. First we contribute to the international comparative literature (see references above) by reporting rates of persistence, transfer to other institutions (at the same or different levels), and graduation for Canadian students. The results section provides brief comparisons of Canadian and American students' persistence, transfer, and graduation rates.

Our emphasis on students' decisions to transfer across institutions allows us to address another important issue in the literature; namely, the differences between institution specific and system measures of persistence and degree completion that result from the complex student pathways (Adelman 2009; Herzog 2005). Although institution specific measures of retention and graduation rates are useful and important for many purposes (Pike and Graunke 2015) they provide an incomplete picture of students' actual experiences and progress in their PSE. Adelman (2009) provides a forceful critical examination of the differences between institution specific and system measures and their implications within the context of international comparisons of students' persistence and graduation rates.

The difference between institution specific and system measures of students' progress is also important for public policy since at least one Canadian jurisdiction (Ontario) follows the practice in some U.S. states (National Conference of State Legislatures 2015) and bases some of its university funding on the institutions' graduation rates (Ministry of Training, Colleges and Universities [MTCU], 2015). Further, Ontario plans to increase the proportion of its contingent funding and extend it to also consider retention rates and students' time to completion (MTCU 2015). We provide estimates of the extent to which the institutions' retention and graduation rates, which will be monitored and incentivized by the government's policy, diverge from the actual rates for students.

Last, we examine (and test in some cases) the theoretical proposition that context matters for students' decisions; where context is determined by the student characteristics, academic preparation, parents' characteristics, family background, the stage (year) of PSE, and PSE experiences (St. John et al. 2001). Student characteristics include whether they are non-traditional students; e.g. older, aboriginal, or with a disability.

To accomplish the contributions we follow a representative sample of youth, ages 15 to 23, who enrolled in a PSE institution in Canada, drawn from cohort A of the YITS. Separate analyses are done for students who started at a community college and students who started at a four year university (Butlin 2000; Finnie and Qiu 2008; McCormick and Carroll 1997; Radford et al. 2010; Shapiro et al., 2015a, 2015b; Tinto 2012). For both groups we follow students' first programs and document the extent to which students continue in that program to graduation, transfer to another program, or exit PSE entirely over each of their first five years in PSE (Hoachlander et al. 2003; Radford et al. 2010; Shapiro et al. 2015a). Transfers are broken down further to show whether they are within the same institution or to another institution, and whether the new programs are at different levels than the first (e.g. two year certificate programs rather than four year bachelors, or the reverse). The across institution transfers show the size of the differences between institution and system measures of students' persistence in PSE.

Multinomial logit regression analysis is then used to estimate relations between the probabilities of students' first program outcomes (continuing, switching to another program, or leaving PSE) and student, parent, and family characteristics; with and without controls for high school and PSE performance and experiences (Cabrera et al. 2005; Dougherty and Kienzl 2006; McCormick and Carroll 1997 for community college starters;

Table 1 Descriptive Statistics of Main Control Variables, Percentages (or means where indicated)

	First program at a	
	Community College	Four Year University
Gender		
Female	50.1	59.3
Aboriginal		
Aboriginal	2.4	1.6
Disability or Activity Difficulties		
Disability, Activity Difficulty	12.5	8.3
Starting Age of first PSE program		
Younger	8.4	24.0
Normal	47.0	59.4
One Year Older	25.2	10.9
Two or more Years Older	19.4	5.7
Family Structure		
Two Parents	82.1	86.5
Single Mother	13.5	10.9
Parental Education		
Below High School	7.8	2.1
High School Completed	22.8	24.3
Some PSE	7.3	4.2
College	34.6	25.1
University-below Bachelors	5.1	4.8
University-Bachelors	16.3	23.9
University-post Graduate study	6.1	14.8
Other/unknown	0.1	0.8
Family Income		
$5,000 to 25,000	7.5	5.0
$25,000 to 50,000	25.9	19.3
$50,000 to 75,000	30.3	26.3
$75,000 to 100,000	22.4	27.1
$100,000 and up	13.9	22.2
High School Location		
Rural High School	26.9	18.9
High School Performance		
Overall High School Grade, mean	75.1	82.8
Math Grade, mean	71.0	79.5
Language Grade, mean	73.7	81.7
Science Grade, mean	73.4	82.1
PISA Reading Score, mean	532	588.3
Academic Engagement Index, mean	−0.006	0.4
Social Engagement Index, mean	−0.026	0.1
First Year PSE Grades		
Below 60 %	3.9	3.9
60–69 %	15.1	21.3

Table 1 continued

	First program at a	
	Community College	Four Year University
70–79 %	40.0	45.7
80–89 %	28.3	20.5
Above 90 %	8.0	3.4
Don't Know	4.6	5.2
Number of observations	5,172	7,189

and Goldrick-Rab 2006; Herzog 2005; McCormick et al. 1997 for four year university or college starters).

Last, we report graduation rates, five years after the start of students' first program, broken down by pathway (i.e., graduation from their first program, or after switching to another institution or level) for the whole samples and for sub-groups of students according to student and family characteristics (Adelman 2006; Choy 2002; Radford et al. 2010; Shapiro et al. 2015b; Tinto 2012). These show the importance of alternative pathways for students' completion of post secondary credentials and the extent to which institution specific graduation rates understate the true system wide graduation rates.

Materials and Method

Data

The data consist of five cycles of the YITS, Cohort A (YITS-A), which track the education and work activities of a stratified representative sampling of 29,687 Canadian youth who were 15 years old (and typically in grade 10 of high school) as of December 31, 1999. The first YITS-A interviews included the Program for International Student Assessment (PISA) and interviews with parents. Subsequent interview were done every two years with the fifth covering 2006 and 2007, at ages 22–23. Cohort B of the YITS (YITS-B) also follows a representative sample of Canadian youth through their PSE, but it is not used here because it contains less information on student and family characteristics. For example, the YITS-B does not report family income or students' PISA reading scores. Further, the first cycle of the YITS-B interviewed 18–20 year olds, so much of the data on their high school courses, grades, and experiences (engagement) are retrospective and more likely to suffer from recall error. See Motte, Qiu, Zhang and Bussière (2008) for more details on the YITS surveys.

The final sample includes 12,361 respondents whose first PSE program was at a Canadian institution: 5,172 in community colleges and 7,189 in universities. Table 1 shows the percentages (or means) of the student and family characteristics variables that are the main focus of the analysis. Student disability or activity difficulty includes physical, sensory or cognitive disabilities plus difficulties in or restrictions on activities at home, school, or elsewhere; as reported by parents. Starting age is measured relative to the usual starting age for PSE in the student's jurisdiction. Rural means attending a high school that was outside the Metropolitan Influence Zone of any urban centre. All of the variables except starting age and PSE grades are as of the student's age 15.

The universities are all four year institutions that award Bachelors degrees, and most also award higher level degrees. Students attending universities can also graduate with lower level credentials such as certificates or diplomas although (as shown below) only small numbers of students do so. A diploma is like an associate degree but the latter term is not commonly used in Canada. Community colleges typically offer one, two, or three year programs and award certificates, diplomas, or trade designations. Some colleges do award bachelors level degrees but it is not very common and it was even more rare in the years covered by the sample.

Note that education in Canada falls under provincial jurisdiction so each province has its own system. There are some private PSE institutions in Canada but their enrolments are very, very small compared to total PSE enrolments. Traditionally, the provincial community college and university systems have operated independently of one another, with little coordination or cooperation. This is highlighted by the fact that most provinces do not have well established pathways for students to complete one or two years of study at a community college and then transfer into the second or third year of a four year university program. Currently the Alberta and British Columbia PSE systems are the leaders in providing such pathways and other provinces are attempting to establish them. But there were fewer such pathways over the sample years.

A student's PSE program is the basic unit of observation for the analysis. It is defined by the institution attended and the type or level of credential awarded (e.g. certificate, diploma, or bachelors). Students are classified as switching programs if they transferred to another institution (at the same or different level) or transferred to a program that awards a credential with a different name. The latter case could be a transfer to a different level (e.g. from a four year bachelors to a two year diploma) or a transfer to a program at the same level but with a different name (e.g. from a Bachelor of Science to a Bachelor of Arts program). Students who transfer across programs with the same graduation credential (e.g. from English to Sociology, both Bachelor of Arts programs), within the same institution, are classed as continuers in their programs and not switchers.

Procedure

We adopt the student-choice conceptual framework for the analysis, where students make a sequence of choices about their PSE and the choices are situated in different contexts (St. John, Asker and Hu 2001). We concentrate on the choices (and their outcomes) that are made after students have started their PSE; namely, the decisions to continue in their first program, switch to another program (possibly at a different institution or level), or leave PSE (Tables 2 and 3). We also consider the sequences of choices or pathways, over as many programs as the students choose, to their first graduation (Tables 4 and 5). Different contexts for the students' decisions result from different student characteristics (including non-tradition age, disability, or aboriginal status) and parent and family characteristics; all of which we consider here.

The start of a student's first PSE program is designated as "Year 1" regardless of the calendar year or the student's age. Students' progress and outcomes are then tracked over subsequent years (up to Year 5) starting from the start of their first PSE program. The first part of the analysis describes the outcomes of students' first PSE programs over each of the first five years of PSE. Regression analysis is then used to estimate correlates of the first program outcomes. The second part concentrates on PSE graduates. Graduation rates for the various pathways to graduation are reported and disaggregated according to student, parent and family characteristics. In every case, separate analysis is done according to

Table 2 Transition Rates from First Program by Year, Percentages

	Number of obs.	Continuers	Graduated	Switchers					Don't know	Leavers
				Total	Same institution		Different institution			
					Same level	Diff. level	Same level	Diff. level		
First Program at a Community College										
Hazard transition rates										
Year 1	5,172	58.8	14.3	11.5	5.4	0.4	3.8	1.0	1.0	15.4
Year 2	3,042	43.3	39.7	7.4	3.2	0.2	1.9	1.4	0.7	9.6
Year 3	1,319	30.6	55.7	4.6	2.0	–	1.1	0.8	0.4	9.2
Year 4	403	28.2	55.4	6.3	–	–	–	2.1	–	10.1
Year 5	114	30.9	–	–	–	0.0	0.0	0.0	0.0	–
Cumulative transition rates										
Year 1	5,172	58.8	14.3	11.5	5.4	0.4	3.8	1.0	1.0	15.4
Year 2	5,172	25.5	37.6	15.9	7.3	0.5	4.9	1.8	1.4	21.0
Year 3	5,172	7.8	51.8	17.0	7.8	0.6	5.2	2.0	1.5	23.4
Year 4	5,172	2.2	56.1	17.5	7.9	0.7	5.3	2.1	1.6	24.2
Year 5	5,172	0.7	57.4	17.6	7.9	0.7	5.3	2.1	1.6	24.3
First Program at a Four Year University										
Hazard transition rates										
Year 1	7,189	80.4	1.4	11.6	4.5	0.6	3.8	2.1	0.7	6.6
Year 2	5,783	85.0	2.3	8.6	4.4	0.3	2.3	1.1	0.4	4.1
Year 3	4,915	85.5	7.9	4.3	2.4	0.5	0.9	0.5	0.1	2.3
Year 4	4,202	47.0	48.7	2.5	1.5	–	0.7	0.1	0.1	1.8
Year 5	1,974	30.3	66.8	2.0	0.3	–	–	–	–	0.9
Cumulative transition rates										
Year 1	7,189	80.4	1.4	11.6	4.5	0.6	3.8	2.1	0.7	6.6
Year 2	7,189	68.4	3.3	18.5	8.0	0.9	5.6	3.0	1.0	9.9

Table 2 continued

	Number of obs.	Continuers	Graduated	Switchers						Leavers
				Total	Same institution		Different institution		Don't know	
					Same level	Diff. level	Same level	Diff. level		
Year 3	7,189	58.4	8.7	21.4	9.7	1.2	6.2	3.3	1.1	11.5
Year 4	7,189	27.5	37.1	22.9	10.5	1.2	6.6	3.4	1.1	12.5
Year 5	7,189	8.3	55.5	23.4	10.6	1.2	6.9	3.5	1.2	12.8

Note—indicates results suppressed due to Statistics Canada confidentially requirements

Table 3 Multinomial logit regression of first program outcomes: probabilities of switching programs or leaving PSE. Estimated marginal effects

	Community college students				University students			
	(1)		(2)		(1)		(2)	
Variable	Baseline		High school and PSE variables		Baseline		High school and PSE variables	
	Switcher	Leaver	Switcher	Leaver	Switcher	Leaver	Switcher	Leaver
Gender (Male)								
Female	0.006	−0.040***	0.011	−0.025*	0.004	−0.015***	0.003	−0.013**
	(0.012)	(0.015)	(0.012)	(0.015)	(0.007)	(0.005)	(0.007)	(0.005)
Aboriginal (not Aboriginal)								
Aboriginal	−0.018	0.100*	−0.030	0.031	−0.013	0.069***	−0.015	0.049**
	(0.037)	(0.054)	(0.035)	(0.048)	(0.022)	(0.024)	(0.021)	(0.020)
Family Structure (Two parents)								
Single Mother	−0.012	−0.021	−0.018	−0.020	−0.022**	0.002	−0.024**	−0.004
	(0.021)	(0.023)	(0.020)	(0.023)	(0.010)	(0.009)	(0.010)	(0.008)
High school location (Rural)								
Urban High School	0.008	0.019	0.002	0.007	−0.004	−0.007	−0.004	−0.008
	(0.015)	(0.016)	(0.015)	(0.016)	(0.008)	(0.005)	(0.008)	(0.005)
Disability or Activity Difficulties (None)								
Disability, Activity Difficulty	0.066***	0.017	0.063***	0.020	0.013	0.017*	0.012	0.012
	(0.024)	(0.024)	(0.023)	(0.024)	(0.014)	(0.010)	(0.013)	(0.009)
Starting age (Normal)								
Younger	0.008	−0.024	0.006	−0.011	0.008	0.006	0.006	0.005
	(0.021)	(0.022)	(0.020)	(0.023)	(0.009)	(0.007)	(0.009)	(0.007)
One Year Older	−0.001	0.019	0.005	0.022	0.013	0.023***	0.015	0.014*
	(0.017)	(0.019)	(0.017)	(0.018)	(0.013)	(0.008)	(0.013)	(0.008)

Table 3 continued

Variable	Community college students				University students			
	(1)		(2)		(1)		(2)	
	Baseline		High school and PSE variables		Baseline		High school and PSE variables	
	Switcher	Leaver	Switcher	Leaver	Switcher	Leaver	Switcher	Leaver
Two Years Older	−0.054***	0.060**	−0.041**	0.072***	0.025	0.058***	0.023	0.036**
	(0.017)	(0.025)	(0.018)	(0.025)	(0.021)	(0.020)	(0.022)	(0.016)
Family income ($50,000 to 75,000)								
$5,000 to 25,000	−0.006	0.002	−0.006	−0.006	−0.005	0.020	−0.007	0.015
	(0.026)	(0.036)	(0.025)	(0.034)	(0.018)	(0.019)	(0.017)	(0.018)
$25,000 to 50,000	−0.008	−0.004	−0.007	−0.010	0.011	0.001	0.009	−0.003
	(0.015)	(0.021)	(0.015)	(0.020)	(0.010)	(0.007)	(0.010)	(0.007)
$75,000 to 100,000	0.047***	−0.038*	0.047***	−0.040**	0.012	0.001	0.012	−0.004
	(0.018)	(0.020)	(0.018)	(0.020)	(0.009)	(0.007)	(0.009)	(0.007)
$100,000 and up	0.037*	−0.056**	0.034	−0.051**	0.015	−0.010	0.016	−0.013*
	(0.022)	(0.023)	(0.021)	(0.023)	(0.010)	(0.007)	(0.010)	(0.007)
Parents Education (High school completed)								
Less than HS	−0.020	0.051	−0.020	0.038	0.011	−0.022*	0.004	−0.028***
	(0.022)	(0.034)	(0.023)	(0.033)	(0.024)	(0.012)	(0.021)	(0.010)
Some PSE	0.061*	0.001	0.054*	−0.016	−0.003	0.014	0.000	0.021
	(0.032)	(0.032)	(0.031)	(0.032)	(0.016)	(0.013)	(0.016)	(0.014)
Trade/College	0.003	0.019	0.001	0.004	0.004	−0.008	0.006	−0.007
	(0.016)	(0.020)	(0.016)	(0.020)	(0.011)	(0.009)	(0.011)	(0.008)
University-below Bachelors	0.049	−0.013	0.044	−0.020	−0.005	−0.010	−0.005	−0.011
	(0.031)	(0.035)	(0.031)	(0.035)	(0.016)	(0.014)	(0.015)	(0.012)
University-Bachelors	0.016	−0.029	0.016	−0.033	−0.007	−0.016*	−0.003	−0.011
	(0.020)	(0.023)	(0.021)	(0.023)	(0.011)	(0.009)	(0.010)	(0.008)

Table 3 continued

Variable	Community college students				University students			
	(1)		(2)		(1)		(2)	
	Baseline		High school and PSE variables		Baseline		High school and PSE variables	
	Switcher	Leaver	Switcher	Leaver	Switcher	Leaver	Switcher	Leaver
University-post Graduate	−0.001	−0.019	−0.011	−0.043	0.002	−0.012	0.005	−0.005
	(0.023)	(0.035)	(0.022)	(0.034)	(0.013)	(0.011)	(0.013)	(0.011)
Other/unknown	−0.119***	0.220	−0.121***	0.229	−0.028	0.202	−0.023	0.174
	(0.013)	(0.262)	(0.013)	(0.239)	(0.050)	(0.181)	(0.053)	(0.173)
High school grades, Age 15, 10 point increments								
Overall High School Grade			0.009	−0.044***			0.004	−0.008*
			(0.011)	(0.013)			(0.007)	(0.005)
High School Math Grade			0.002	0.001			−0.001	−0.004
			(0.006)	(0.006)			(0.004)	(0.003)
High School Language Grade			0.004	0.011			0.001	−0.000
			(0.007)	(0.009)			(0.005)	(0.003)
High School Science Grade			−0.008	0.005			−0.004	−0.005*
			(0.006)	(0.007)			(0.005)	(0.003)
PISA Reading Score—Age 15								
PISA Reading Score			0.007	0.010			0.000	0.001
			(0.010)	(0.010)			(0.005)	(0.003)
High School Engagement—Age 15								
Academic Engagement			0.003	0.001			−0.000	−0.002
			(0.007)	(0.009)			(0.004)	(0.003)
Social Engagement			0.005	−0.006			0.005	−0.000
			(0.006)	(0.007)			(0.004)	(0.002)

Table 3 continued

Variable	Community college students				University students			
	(1)		(2)		(1)		(2)	
	Baseline		High school and PSE variables		Baseline		High school and PSE variables	
	Switcher	Leaver	Switcher	Leaver	Switcher	Leaver	Switcher	Leaver
First Year PSE Grades (70 to 79)								
Below 60			0.058	0.202***			0.046**	0.089***
			(0.036)	(0.043)			(0.019)	(0.014)
60 to 69			0.042**	0.055**			0.021**	0.035***
			(0.019)	(0.023)			(0.010)	(0.007)
80 to 89			−0.033**	−0.065***			−0.002	−0.012***
			(0.013)	(0.016)			(0.008)	(0.005)
Above 90			−0.036	−0.119***			0.004	0.004
			(0.029)	(0.018)			(0.015)	(0.018)
Don't Know			0.033	0.196***			0.029	0.074**
			(0.038)	(0.063)			(0.026)	(0.031)
Number of individuals	3,777		3,299		6,802		6,035	

Note. Estimated standard errors are in parentheses. All specifications also include controls for the year in PSE, region, linguistic minority, immigrant and Canadian born visible minority, immigrant not visible minority, single father and other family structures. The specifications with the high school and PSE variables also control for first year PSE impressions about whether instructors are interested in students, there are people to talk to, and students are obtaining useful skills. Unreported estimates are available upon request

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 4 Graduation Rates by Year and by Characteristics, Percentages—Students starting PSE at Community College

	Number of obs.	Total	Same (first) program	Switchers					Don't Know
				Total	Same Institution		Different institution		
					Same Level	Diff. Level	Same Level	Diff. Level	
Cumulative Graduation Rates by Year—All Students									
Year 1	1,025	14.4	14.3	–	–	0.0	–	0.0	–
Year 2	2,254	39.8	37.5	2.0	0.8	–	1.1	0.1	0.3
Year 3	2,871	57.6	51.1	5.7	2.3	0.2	2.9	0.3	0.8
Year 4	3,151	66.8	55.2	10.1	4.2	0.5	4.7	0.6	1.5
Year 5	3,294	72.7	56.4	13.4	5.5	0.6	6.0	1.2	3.0
Five Year Cumulative Graduation Rates by Characteristics									
Gender									
Male	1,553	69.0	53.8	13.2	5.3	0.9	5.5	1.5	1.9
Female	1,741	76.6	59.0	13.6	5.8	0.4	6.5	0.9	4.0
Aboriginal									
Aboriginal	85	59.6	47.9	7.9	6.0	0.0	–	–	3.8
Non Aboriginal	3,204	73.1	56.7	13.6	5.5	0.7	6.1	1.2	2.8
Family Structure									
Two Parents	2,863	73.8	56.6	14.8	6.3	0.8	6.5	1.2	2.4
Single Mother	346	70.2	59.6	7.5	1.9	0.0	4.1	1.4	3.2
Disability or activity difficulties									
Either or both	398	73.7	54.0	15.5	8.9	–	5.7	0.6	4.2
None	2,895	72.6	56.7	13.1	5.1	0.7	6.0	1.3	2.8
High School Location									
Rural High School	1,410	76.8	64.2	10.5	3.5	–	5.4	1.1	2.2
Non-Rural High School	1,835	71.4	53.9	14.3	6.2	0.7	6.1	1.2	3.2
Parental education									
Below High School	274	66.1	55.0	8.2	2.1	–	4.0	–	2.9
High School Completed	744	73.3	60.1	12.1	5.8	0.8	4.4	1.1	1.2
Some PSE	213	64.0	49.5	12.5	3.4	–	7.4	–	2.1
College	1,239	74.5	58.0	11.6	5.0	0.3	5.2	1.1	5.0
University-below Bachelors	155	67.8	45.4	18.3	11.3	0.0	3.0	4.0	4.0
University-Bachelors	475	75.4	54.7	18.9	7.2	–	10.5	–	1.9
University-post Graduate	190	75.0	56.5	16.0	4.3	–	7.4	2.6	2.4
Family income									
$5,000 to 25,000	268	66.7	55.6	9.2	2.9	–	3.8	–	1.9
$25,000 to 50,000	988	72.0	57.5	10.8	4.7	–	5.1	0.7	3.8
$50,000 to 75,000	992	71.1	55.4	12.3	4.8	–	5.6	1.5	3.4
$75,000 to 100,000	618	75.3	55.5	17.5	9.2	0.8	6.5	1.1	2.3
$100,000 and up	390	76.4	59.2	15.2	4.1	1.5	8.2	1.4	2.0

Note—indicates results suppressed due to Statistics Canada confidentially requirements

whether students started PSE at a community college or a university and their results are compared. Brief comparisons to the American literature are also provided.

An important caveat to the analysis is that students self-select or sort themselves into colleges or universities, and the different pathways that we consider thereafter. This almost certainly yields students with systematically different characteristics across the various choices that, in turn, can yield biased results. Even in the regression analysis, which controls for many different characteristics, it is impossible to control for all of the relevant differences across the groups, some of which may be unobservable. We cite a likely instance of such a self-selection effect in the results section below.

First Program Outcomes

Table 2 reports the transitions or outcomes of students' first PSE program. For each year, hazard rates show the percentage of students (in that year) who graduated, switched to another program, left (exited) PSE, or continued in their first program into the next year. The switchers category is broken down further to show whether students transferred to a different institution or changed levels. To keep the analysis manageable we focus solely on the outcomes of students' first programs. So, after each year, the graduates, switchers and leavers are removed from the sample and only the continuers are included in the rates for the subsequent year. The examination of graduation rates (Tables 4 and 5 below) follows students across all program transfers and stopouts to their first graduation (if it occurs within five years).

Table 2 also reports the cumulative effects of the hazard (or yearly) transition rates. The cumulative rates show the percentages of the original total sample of students who graduated, switched programs, left PSE, or are continuing in their first program, up to and including that year.

Multinomial logit regression analysis is used to estimate correlates of the probabilities of the first program transitions, controlling for other factors (Table 3). Three regression equations are specified and their respective dependent variables are the probabilities of students: (a) continuing in their first PSE program, (b) switching to another PSE program, or (c) leaving (exiting) PSE. Identification in a multinomial logit model requires that the coefficients of one equation be set equal to zero (Long, 1997). The 'continuing in their first PSE program' equation is chosen for this restriction so Table 3 reports on only the 'switching programs' and 'leaving PSE' equations. The two equations are estimated jointly (not independently) so students' continuing choices are implicitly included in the estimation. Note that Table 3 does not report the multinomial logit regression coefficient estimates. Table 3 shows the estimated marginal effects of one unit changes in the independent variable, or changes from zero to one for dummy variables, on the probability of switching or leaving, calculated from the estimated regression coefficients and evaluated at the mean of the samples.

Each student-year counts as a separate observation in the regressions and dummy variables are included to control for the year of the observation in the student's program. Only students' first PSE programs are considered so students are removed from the sample after they graduate, switch to another program, or leave PSE. Again, this is done to keep the regression model manageable. Including regression equations for the probabilities of second program outcomes, or returns to PSE after exits, would yield a much more complicated regression model.

Two specifications show the estimated marginal effects of the student, parent and family characteristics; one without and one with controls for: (a) PISA reading scores, (b) high

Table 5 Graduation Rates by Year and by Characteristics, Percentages—Students starting PSE at a Four Year University

	Number of obs.	Total	Same (first) program	Switchers					Don't know
				Total	Same Institution		Different Institution		
					Same Level	Diff. level	Same level	Diff. level	
Cumulative Graduation Rates by Year—All Students									
Year 1	105	1.6	1.4	–	–	0.0	–	–	–
Year 2	325	4.3	3.3	0.7	0.1	–	0.1	0.5	0.3
Year 3	777	12.2	8.7	2.9	0.4	0.2	0.3	2.0	0.7
Year 4	2,565	48.0	37.4	9.3	3.8	0.3	1.9	3.2	1.3
Year 5	3,658	74.2	56.3	16.1	6.7	0.5	4.2	4.7	1.8
Five Year Cumulative Graduation Rates by Characteristics									
Gender									
Male	1,336	68.4	53.9	13.0	5.5	0.3	2.6	4.6	1.5
Female	2,322	78.3	58.1	18.2	7.5	0.7	5.2	4.8	2.0
Aboriginal									
Aboriginal	62	52.2	32.7	18.1	6.3	–	–	7.8	1.5
Non Aboriginal	3,587	74.6	56.7	16.1	6.7	0.5	4.2	4.7	1.8
Family Structure									
Two Parents	3,318	74.9	57.3	15.8	6.9	0.5	4.1	4.4	1.8
Single Mother	279	71.2	54.4	15.6	5.3	–	3.6	6.6	1.2
Disability or Activity Difficulties									
Either or both	304	59.8	43.2	14.9	4.7	2.0	2.9	5.3	1.7
None	3,354	75.6	57.6	16.2	6.9	0.4	4.3	4.6	1.8
High School Location									
Rural High School	1,306	73.1	53.3	17.1	6.0	0.4	4.6	6.1	2.7
Non-Rural High School	2,301	74.2	56.6	16.0	6.9	0.6	4.1	4.5	1.6
Parental Education									
Below High School	91	62.4	41.9	17.3	10.3	0.0	2.0	5.0	3.2
High School Completed	493	71.7	52.3	16.9	6.2	1.5	3.8	5.4	2.5
Some PSE	188	66.0	50.5	13.1	3.6	–	3.3	4.8	2.4
College	1,140	73.3	56.1	14.7	4.7	0.4	3.2	6.4	2.4
University-below Bachelors	197	79.0	59.6	18.6	5.9	–	2.8	9.7	0.8
University-Bachelors	968	77.6	60.0	16.5	8.3	–	4.5	3.5	1.1
University-post Graduate	580	75.1	56.8	17.0	8.2	–	6.3	1.9	1.3
Family Income									
$5,000 to 25,000	153	61.8	48.7	12.5	5.3	–	2.5	3.9	0.6
$25,000 to 50,000	803	69.4	53.3	13.3	5.0	–	2.8	5.4	2.9
$50,000 to 75,000	1,047	74.6	57.5	15.9	6.3	–	4.6	4.2	1.3
$75,000 to 100,000	930	74.8	57.3	15.4	6.2	0.6	4.4	4.2	2.0
$100,000 and up	700	79.4	59.2	18.7	9.4	0.4	4.9	4.0	1.5

Note—indicates results suppressed due to Statistics Canada confidentially requirements

school grades (overall and in specific subjects: math, language, and science), (c) academic and social engagement in high school, (d) first year PSE grades, and (e) first year PSE impressions about whether instructors are interested in students, there are people to talk to, and students are obtaining useful skills. All specifications also include controls for the year in PSE (noted above), region, linguistic minority, immigrant and Canadian born visible minority, immigrant but not visible minority, single father, and other family structures. The estimated regression coefficients on these control variables and the first year PSE impressions are unremarkable and not reported to save space. There are no controls for whether students received more math or science preparation by completing senior high school math or science courses.

Graduation Rates

Graduation rates over different pathways to graduation are reported in Tables 4 and 5. The top panels show the cumulative graduation rates over each of five years. The panels that follow report the five year cumulative graduation rate for subgroups of students. In every case the rates show the percentage of starting students who graduated from their first PSE program or after switching to another program. Switchers are followed over as many programs as they attended, over the stated time period, until they graduated. The switching graduates are classified according to whether they changed institutions or levels of study but we do not distinguish between the types of credentials received. Students who stopped or dropped out for some period of time and then returned (and graduated) are included in the graduation rates.

Results

First Program Outcomes: Rates

The rightmost entry of the top row of Table 2 shows that the first year dropout rate (i.e., leaving PSE entirely) for students who start their PSE at a community college is 15.4 %. The dropout rate is lower in each of the next three years which supports the conventional wisdom that the first year of PSE is critical for student persistence. The cumulative leaving rate shows that 24.3 % of starting community college students have left PSE (without graduating) after five years, so over half of those who leave PSE do so in the first year (15.4 vs. 24.3 %).

A similar pattern occurs with switching PSE programs. 11.5 % of community college students switch to a different program within their first year. The rate falls to 7.4 % in the second year and is smaller in subsequent years. Over half of those who transfer out of their first program within five years do so in their first year (11.5 vs. 17.6 %).

First program community college graduation rates are naturally quite low in the first year (14.3 %), since most programs are two or three years, and they rise in subsequent years (39.7, 55.7 and 55.4 % in Years 2, 3, and 4, respectively). The cumulative rates show that most of those who are going to graduate from their first program do so by their third year (51.8 % by Year 3 vs. 57.4 % after five years). In fact, well over half of those who graduate within five years do so by the end of their second year (37.6 vs. 57.4 %).

For university students, we find that the first year dropout rate is much lower than for the community college sample (6.6 vs. 15.4 %). Like college students, the highest hazard

dropout rate occurs in first year, but university dropout rates continue to fall while the college rates remain roughly constant after the first year and even increase slightly in Year 4. Of the university dropouts, more than half drop out in their first year, and 77 % do so by the end of their second year.

Community college and university switching rates are very similar in Year 1 (11.5–11.6 %). Presumably this is due to an initial "sorting" process where students learn early on that they are not in a program that is right for them and they switch to another. The switching rate for university students falls to 8.6 % in the second year and continues to decline in subsequent years. Just under half of the university students who switch out of their first program within five years do so in their first year. After five years, the cumulative switching rate for university students is higher than the college student rate (23.4 vs. 17.6 %) so all of the extra program switching done by university students occurs after first year.

Given their longer program lengths, graduation rates are understandably quite low for university students in Years 1, 2 and 3. Only 37.1 % of all university starters graduate from their first program by their fourth year. After five years, 55.5 % of university students have graduated from their first program and this rate will surely be higher after six years.

Table 2 shows the important differences between institution retention rates and the persistence rates for the Canadian PSE system. In the first year of community college, only 15.4 % of the starting students actually dropped out of PSE. The average institution, however would also include the 4.8 % (3.8 + 1.0) who switched to another institution in their dropout rate, thereby overstating the dropout problem. For first year university students, the actual rate of leaving PSE is only 6.6 % but the average institution dropout rate would overstate it by another 5.9 % (3.8 + 2.1); almost double the actual rate.

Further analysis (not reported here) follows students over their second or third programs; up to their first graduation. Including subsequent programs reveals even larger discrepancies between institutional retention rates and system persistence rates. But the differences are not very large since relatively few students enroll in more than two programs (as defined by the YITS) over the time period. For example, 8.1 % of the original community college starting class are still enrolled in PSE but at a different institution in Year 3 after third programs are included, versus the 5.2 + 2.0 = 7.2 % shown in Table 2. For university starting students, 9.8 % are still enrolled but at a different institution in Year 3, versus the 6.2 + 3.3 = 9.5 % shown in Table 2.

PSE students in Canada are much less likely to transfer across institutions than those in the U.S. Transfer rates for American two year college starters range from 32 to 40 % (Hoachlander et al. 2003; Radford et al. 2010; Shapiro et al. 2015a), versus the 5.3 + 2.1 = 7.4 % in Table 2, but much of the difference is due to the two year to four year school transition/pathways that are much less common in Canada. The differences are smaller for four year college or university starters. Herzog (2005) reports an 11 % transfer rate across institution between first and second year for one American university, versus the 3.8 + 2.1 = 5.9 % in Table 2. Shapiro et al. (2015a) report a 7.2 % Year 1 transfer rate, but the rate increases to 13.9 % in Year 2 rather than decreasing as shown in Table 2. Goldrick-Rab (2006) and Shapiro et al. (2015a) report transfer rates of 35–37 % over eight and six years respectively, while Choy (2002) reports a 28 % five year rate, all of which exceed the 6.9 + 3.5 = 10.4 % five year rate in Table 2. We recognize that some of the comparisons cover different time periods, but the differences in rates are large enough that the different window lengths should not alter the conclusion.

First Program Outcomes: Regression Estimates

Table 3 shows the estimated marginal effects on the probabilities of students' first program transitions (continue, switch programs, or exit PSE) from multinomial logit regressions, for both college and university starters. For categorical variables, the omitted category is shown in brackets on the variable heading line. Column (1) reports the baseline case and column (2) reports the estimates when controls for PISA reading scores, high school grades and engagement, and PSE grades and experiences are also included. All unreported estimates (see above) are available upon request.

First Program at a Community College

Table 3 shows that among community college students, females are 4 percentage points less likely to leave PSE than males, but the estimated difference is reduced to 2.5 percentage points when the high school and PSE controls are included. This suggests that differences in educational performance account for some, but not all, of women's lower likelihood of leaving PSE. Students identified by their parents as Aboriginal are estimated to be 10 percentage points more likely to leave PSE, but the effect is smaller and statistically insignificant once PSE grades and experience variables are included. Differences in family structure and attending an urban versus rural high school are all estimated to have statistically insignificant effects on switching programs or leaving PSE for starting community college students. Disabled students (as defined here) are estimated to be more likely to switch to another PSE program but their leaving estimates are small and statistically insignificant. Students who begin their first program two or more years after the normal starting age are less likely to switch programs and more likely to leave PSE in all of the specifications. All of the other starting age estimates are statistically insignificant. Students from higher income families are more likely to switch programs and less likely to leave PSE in both specifications. Those with lower incomes are not estimated to be significantly different from the middle income ($50,000 to $75,000) omitted category. Differences in parental education are estimated to be mostly statistically insignificant. The high probability of switching programs for disability students, and its weak relation to parents' income and education, results from the absence of two year to four year pathways in Canada. Community college is generally not considered a first step towards a four year degree. More details on this are provided in the graduation rates results section below.

For community college students, the third page of Table 3 shows that a ten point higher (out of 100) high school overall average grade is associated with a 4.4 percentage point lower leaving rate, even after controlling for PSE grades. The grades in specific high school courses (Math, Language and Science), PISA reading scores and engagement in high school are all estimated to have statistically insignificant relations to first program outcomes. First year PSE grades are, as expected, highly correlated with switching or leaving PSE. A community college student with overall first year PSE grades in the 80s rather than in the 70s (out of 100) is 6.5 percentage points less likely to leave PSE and 3.3 percentage points less likely to switch to another program.

First Program at a University

The rightmost four columns of Table 3 present the regression estimates for students who started PSE at university. Female university students are also significantly less likely to

leave PSE. But the difference is only 1.5 percentage points, so it is smaller than the estimate for college students and it changes little when the high school and PSE variables are included. The differences across Aboriginal status and family structure are estimated to be much more important for university students than for community college students. Aboriginal students are five to seven percentage points more likely to leave PSE after controlling for the other variables; with the smaller estimates occurring, not surprisingly, when the controls for high school and PSE outcomes are included. Students from single mother families are estimated to be less likely to switch programs, but no more likely to leave PSE, than students from two parent families in all specifications.

As with community college students, there are no statistically differences between students who attended rural or urban high schools. Unlike college students, university students with an activity disability are not more likely to switch programs, and they are again (mostly) found to be no more likely to leave PSE, but lack of significance may be due to the small sample size. Students who start their university program later are more likely to leave PSE but the estimated effects are much smaller after controlling for the high school and PSE outcomes. The estimates differ from those for college students in that the higher leaving is also shown for students just one year older, and older students are not less likely to switch programs than normal or younger starting age students.

Differences in family income are very weakly related to switching programs or leaving PSE with mostly insignificant estimates. For differences in parents' education, the only strongly significant result is lower leaving rates for those whose parents did not complete high school, which is potentially the result of stronger self selection in the decision about whether to attend university by students in this group.

The estimates for the high school and PSE variables on university student outcomes are quite similar to those reported for community college students, but the statistically significant coefficients show smaller impacts.

Graduation Rates

Starts PSE at a Community College

The last row of the top panel of Table 4 shows that 72.7 % of all the students who started their first PSE at a community college graduated from some PSE program within 5 years. The row also shows that the 72.7 % total graduation rate consists of: a) 56.4 % of starting students who graduated from their first PSE program, b) another 13.4 % who graduated after transferring to another institution and/or program, and c) 3.0 % who said they graduated but their program was unknown or missing.[1] Thus, 18.4 % of graduates chose a switching pathway, while 77.6 % graduated from the first program that they started, and 4 % are unknown.

In comparison, six year graduation rates for American students who start PSE at a public community college are much lower at around 35 % (Radford et al. 2010; Tinto 2012; Shapiro et al. 2015b). Much of this is due to American students transferring from two year to four year schools without obtaining a credential at the two year school. Hoachlander et al. (2003) show that the graduation rate increases to around 50 % if only traditional age students who expect to complete a credential are considered. Shapiro et al.

[1] The first program graduation rates in Tables 4 and 5 are slightly different from those in Table 2. This due to different treatment of programs deemed ineligible in the YITS, which is required so that students can be followed across programs and stop-outs, as is done in Tables 4 and 5.

(2015b) report higher completion rates for non-profit and for-profit two year colleges, but they are still below Canadian rates.

The bottom row of the top panel of Table 4 also shows the types of transfers made by graduates. 6.1 % (5.5 + 0.6) of starting community college students, representing 8.4 % of all graduates, stayed at their first institution but graduated from a different program. 7.2 % (6.0 + 1.2) of the starting class transferred to another institution and graduated within 5 years. In contrast, Radford et al. (2010) and Shapiro et al. (2015b) report that 13 to 14 % of American community college starters graduated after switching institutions, albeit within a six year window rather than the five year rate shown here.

A very small percentage of students (1.2 %) graduated after transferred from community college to another program, at a different level, which again illustrates that most provincial PSE systems do not have well established pathways for students to complete one or two years of study at a community college and then transfer into the second or third year of a four year program.

Consistent with Table 2, over 90 % of college students who graduated from their first program (51.1 of the 56.4 percent) did so within the first three years. Not surprisingly, those who switched programs or institutions take longer to graduate with less than half graduating by Year 3. From Year 4 to Year 5, most of the increase in the total graduation rate comes from the increase in the graduation rate of switchers.

The Year 5 row in Table 4 shows the extent to which institutional graduation rates understate the system or student graduation rates. An average institution would report a 62.5 % (56.4 + 5.5 + 0.6) graduation rate (ignoring the don't knows) while the actual graduation rate is more than ten points higher at 72.7 %.

The remainder of Table 4 shows graduation rates for subsets of the community college starter sample. As expected, women have higher graduation rates than men and it is true across all pathways with the small exception of graduating after switching to a program at a different level. Aboriginal students are much less likely to graduate, both from their first program and after switching programs. Students who lived with two parents at the time of the first interview (during high school) have a higher overall graduation rate, but are less likely to have graduated from the first program they started. This occurs because students from two parent families are proportionately much more likely to have graduated after switching to another program or institution. Students with an activity difficulty are also less likely to graduate from their first program and more likely to graduate after switching programs but the differences are not as large as those for family structure. Again, switching pathways to graduation for community college starters in Canada are unlikely to have four year schools as the destination. Students who attended high school in a rural area are less likely to graduate after switching programs, so their higher overall graduation rate results from a much higher likelihood of graduating from their first program.

The next two panels show that overall graduation rates rise with parental education and income, but the increases are not monotonic. The graduation rates from students' first programs, however, are seemingly not related to parents income or education. The differences in the total graduation rates are due to those who transferred out of their first program and switched to another program or institution. Although not monotonic, students of higher income and higher education parents are much more likely to have graduated from second or later programs or institutions. Any student may find that their first PSE program, something that they chose while still in high school, is no longer the best choice for them. It appears that higher parental socioeconomic status (SES) and two parent families make students more willing and able to make adjustments to their PSE pathway by leaving their first program and switching to another program or institution. These

adjustments or changes in their pathways result in higher total graduation rates. We suggest that higher parental SES and two parent families provide more security and financial support that allows students to make more changes along their pathway to graduation. In addition, two parents and more educated parents may provide more non-monetary resources plus direct advice about the different opportunities for switching available and how to achieve them.

This matches the evidence from the United States where students with more resources are much more likely to transfer from two year to four year schools en route to achieving a bachelors degree. But in Canada, the greater likelihood of graduating after switching occurs without the well defined pathways to four year schools that exist in the U.S. Table 4 shows that over 90 % of the transfers leading to graduation (with any credential, not just a bachelors which is the focus of much of the US literature) are not to four year schools. This suggests that greater use of the switching pathway to graduation in higher SES families represents a greater ability to adjust to adverse circumstances in students' first programs (or new opportunities) and not higher SES families using community colleges as a first step along a pathway to a bachelors degree.

Starts PSE at a University

The last row of the top panel of Table 5 shows that, after five years, 74.2 % of starting university students had graduated from some program with 56.3 % completing their first program and 16.1 % (representing 21.7 % of all graduates) graduating after switching institutions or programs. Thus the overall Canadian graduation rates of university and community college starting students are similar, but university starting students are more likely to follow a switching pathway. Given the longer university programs, most of the graduations occur in the fourth and fifth year and it is virtually certain that the university graduation rates will increase further above the college rates in Year 6.

American graduation rates for four year school starters are lower. Choy (2002) reports a 60 % five year rate while Radford et al.'s (2010) six year rate is 64.3 %. Shapiro et al. (2015b) and Tinto (2012) show that graduation rates for starters at private, not-for-profit, four year schools (71.5 and 73.4 % respectively) are quite close to the Canadian rates, but U.S. starters at other types of four year schools have much lower graduation rates. Adelman (2006) considers only bachelors degrees and reports six year graduation rates of 62–64 % which are still lower than the five year 67.2 % (56.3 + 6.7 + 4.2, same level) rate for Canadian students from Table 5.

Table 5 shows that 8.9 % (4.2 + 4.7) of Canadian university starters graduate after transferring to another institution (at the same or different level), which is below the 11–13 % American rate reported by Choy (2002), Radford et al. (2010) and Shapiro et al. (2015b). Adelman (2006) reports 8–11 % of American students graduated with bachelors degrees after changing institutions versus 4.2 % for Canadian students, albeit over only five years (Table 5). So higher proportions of American four year starters graduate after transferring across institutions but the differences are not large.

The Canadian across-institutions transfer rates mean that an average Canadian university would report a 63.5 % five year graduation rate (including all credentials and ignoring the don't knows) which understates the true system wide or student rate of 74.2 %.

The second panel of Table 5 shows that women who started PSE at university were much more likely to graduate than men. This holds across all pathways and the differences are larger than for community college starting students. Aboriginal students are much less likely to graduate than non-aboriginals after starting university. Although the sample size is

small, the difference is due to not completing their first program since aboriginal students switch programs and then graduate at a higher rate than non-aboriginals. Students from two parent families have higher graduation rates, but in this case the switching rates are very similar and the difference is due to a higher first program completion rate. In contrast to the result for community college students, university starting students with activity difficulty have a much lower overall graduation rate driven mostly by a much lower first program completion rate. Also in contrast to college starters, university students from rural areas have lower overall graduation rates driven by lower first program completion, but the differences are small and much smaller than those for college students.

As with community college starters, parental income and education levels are positively related to the total graduation rates. For university starters, however, the first program graduation rates also rise with parental education and income, and the relation between graduation after switching and parents' education level is 'U' shaped. But university starters (like the college starters) are much more likely to graduate after switching from their first PSE program if they are from higher income families. Again, the increased use of switching pathways to graduation may result from greater support that allows students the opportunity to take advantage of alternative PSE pathways. Goldrick-Rab (2006) also posits that family background (especially SES) affects students' pathways through PSE for four year school starters. She cites mixed empirical evidence for this in the American literature but her own estimates show that students with more advantaged families are better able to transfer across schools in ways that improve the likelihood of their graduation. This is confirmed in a more detailed analysis in Goldrick-Rab and Pfeffer (2009).

Discussion

The results show that transfers from students' first choice of PSE program to different programs and institutions, sometimes at different levels, constitute important but not terribly large pathways for Canadian students to adjust the course of their PSE and obtain PSE credentials. We show that students' choices and outcomes vary with student and parent characteristics thereby confirming the theoretical proposition of the student-choice framework (St. John et al. 2001) that different contexts matter.

Compared to American students, both university and community college starters in Canada have higher persistence and graduation rates, although the differences are smaller for students starting at four year institutions. Canadian students are also less likely to transfer across institutions. The difference is very large for students starting at community college; largely due to the relative lack of well defined pathways from community colleges to universities leading to a bachelors degree in Canada. Without the pathways, the positive relation between transfers of community college starters and family SES is much weaker for Canadian students, but it still exists.

Given the relative lack of formal pathways, transfers in Canada are much more likely to be responses to adverse experiences or changed opportunities. For example, the YITS shows that 48.4 % of community college starters and 36.1 % of university starters changed programs due to low marks or because they simply "Did not like it/Not for me". Another 20.6 and 12.1 %, respectively, cited health, personal or other reasons. We find that both community college and university starters with more family resources are better able to make adjustments to their PSE and transfer across programs or institutions, leading to higher graduation rates after switching.

Although Canadian students' transfer rates across institutions are not large, they still cause institutions' retention and graduation rates to diverge from the system rates that students actually experience. This becomes more important if governments tie funding to institution specific retention rates, as is the case in Ontario (MTCU 2015). Institution specific metrics of students' progress give institutions little incentive to facilitate the transfers that can help students adjust during their PSE. Based on the results above, we argue that transfers (across programs, levels, and institutions) should not be considered as negatives (even though they lower institutions' retention and graduation rates) since they provide options for students to make adjustments or corrections to their PSE choices and obtain PSE credentials.

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