

University Tuition and Persistence: An Inter-Provincial Comparison

Evidence from the Youth in Transition Survey
(YITS) in Canada

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MESAMEASURING THE EFFECTIVENESS OF STUDENT AID

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The Measuring the Effectiveness of Student Aid Project, or the MESA Project, is a four year research effort being conducted by the Canadian Education Project and the School for Policy Studies at Queen's University on behalf of the Canada Millennium Scholarship Foundation. It has been designed to answer the following four questions:

- After graduating from high school, teenagers coming from low-income backgrounds face a choice as to attend college or university, or not. For those who did attend, how do they compare to those who did not?
- Does providing more funding in a student's first few years of further education attract more low-income students to post-secondary education?
- Does providing more funding in a student's first few years of further education make it more likely for low-income students to stay in and graduate?
- Are low-income students different across Canada?

This paper is part of a series of research papers solicited from some of the leading Canadian researchers in the field of post-secondary education; the researchers were asked to write about issues of access and persistence in post-secondary education in Canada. The requirements for the papers were that the researchers use one of several currently-existing Statistics Canada databases or another source of Canadian data. Each of the papers commissioned during this project is available for downloading from the MESA Project website at www.mesa-project.org.

The findings and conclusions expressed in this paper are those of the authors and do not necessarily represent those of the MESA

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has negotiated access to its student administrative lists with each of the provinces on the project's behalf.

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Abstract

The Youth-in-Transition Survey allows identification of a series of decision points where youth already in university decide whether to continue in university or exit without graduating. This is a specific aspect of university participation. There is little evidence that either a higher level of tuition or a change in tuition alters the probability that a Canadian youth, once in university, leaves university without obtaining their degree. Thus any policy effort around university persistence for youth should focus on non-tuition factors, and the debate around the appropriate level of tuition in Canadian provinces should not focus on the interaction of tuition and persistence.

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Table of Contents

Acknowledgements.....	1
Introduction.....	1
Establishing the Persistence Sample.....	5
Variables Used in the Analysis of Persistence.....	9
Results.....	11
Conclusions and Future Work.....	16
References.....	18
Tables.....	20
Appendix A: Supplementary Tables and Figures.....	25

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Introduction

In most countries including Canada, tuition fees at public universities are significantly less than the cost of attending university and taxpayers heavily subsidize university attendance. A policy debate occurs between those who favour a lower tuition fee and larger subsidy, which is expected to encourage participation and completion, and those who favour a higher tuition fee for a wider variety of reasons. Every change in tuition fees is controversial. Increases in fees are accompanied by claims that students will be forced to leave university or that many students will choose not to attend due to higher fees. There is a great deal of research on the effects of variation in tuition fees on overall participation at university. This paper makes a specific contribution by measuring the effect of variation in tuition fees, whether levels or changes, on the decision by a student already in university to persist into their next year of study without completing their program of studies. If the student does not persist, he or she leaves the university without a degree. In Canada there is large variation in the level of tuition fees across provinces. There is very little evidence from this paper that a higher level of tuition fees is associated with a lower persistence rate. This finding is more or less consistent with the standard human capital model of the decision to attend university. The student who enters university understands the need to pay tuition over the 3 or 4 years and, even though the level of tuition is higher in one province than in another, once the initial decision is made to attend university, choices about persistence should not, in the absence of credit constraints, be much affected by the level of tuition. It is more surprising that there is also

little evidence that changes in tuition fees, even quite large increases or decreases are also unrelated to decisions to continue at university. If changes in tuition were unexpected, we might have thought some students at the margin would decide to leave university because the perceived expected net benefit of university attendance swung from positive to negative when tuition was unexpectedly higher than it was when a student made the initial decision to attend. It is also possible that the large numbers of students are borrowing to attend university and face binding credit constraints. In this situation an increase in tuition fees might prevent some students from continuing and a reduction in tuition would allow some extra students to continue. This simply does not occur in Canada over the period of very large changes (mostly increases) in tuition in a panel of data from 10 Canadian provinces studied in this paper.

There are several policy interpretations of the strong result that departure rates from university are unaffected by changes or levels in tuition fees. First, it may be that tuition fees were initially set so low and thus the net benefit of attendance is so large that the observed increases were not large enough to move any student from attendance to non-attendance. Second, it may be that there are relatively few credit constraints that prevent already-enrolled students from continuing when tuitions rise. This would occur if the various publicly-funded grant and loan programs for university students function well or if students are able to obtain the additional funds needed from other sources: work, parents, or non-government loans. The bottom line: substantial increases in tuition fees were

not accompanied by increases in drop-out rates for the respondents to the Youth-in-Transition Survey.¹

The result that neither the level of tuition nor changes in tuition alter persistence rates is difficult to link directly to other results in the literature that do find a small impact of higher tuition on overall university participation. In particular there are two remaining pieces of analysis. First, in Johnson (2008) the technique used in this paper is used to look at the transition from completing high school into university and the role of tuition in that decision. The evidence again shows that, for the period of the YITS sample, even though there were very large differences in the level of tuition fees across Canadian provinces, variation in tuition is not the central issue in variation in the access decision of Canadian youth from high school to university. There is some very weak evidence that access rates are slightly lower in higher tuition provinces. The negative relationship between access rates and tuition is found only for youth from families where neither parent has an exposure to a university education. The overall picture from the analysis of YITS is that tuition is not a central element in either access or persistence decisions. Second, it is important to understand how students (and their families) pay the increased university tuition. The financial data in the YITS survey do not allow this task to be undertaken. That task requires a different kind of data where the contributions of student earnings, student families, loans, bursaries and scholarships add to total student resources in each aca-

demical year. Such data are in the process of creation in the MESA project.²

It is important to stress that simply finding that changes in tuition do not change persistence behaviour does not mean that lower tuition (or higher tuition) is good or bad policy. The results here say nothing about whether tuition in any Canadian provinces is at the optimum level. The choice of the appropriate level of tuition is much more complex and depends on the sharing of private and public benefits of a university education. If access and completion are affected by tuition, then tuition policy relates to issues of social mobility. Even if access and completion are unrelated or very weakly related to tuition, there are equity issues related to tuition policy. Use of university is related to both current family income and future income of students who graduate. These issues are not addressed in this paper. This paper is a contribution to the literature that has simply looked at the relationship between participation and tuition and has considered neither optimality nor equity of tuition levels across Canadian provinces or American states.

The American literature on postsecondary participation and tuition fees is reviewed in Leslie and Brinkman (1988), Heller (1997) and updated in Heller (1999). Persistence is implicit in the measures of participation used, measures like the proportion of persons within a certain age bracket at university (or with university degrees). If more students were to persist, then a larger proportion would be enrolled and a larger proportion

¹ The results do not then apply to adult students at university who are not included in the Youth-in-Transition Survey.

² The Millennium Scholarship Foundation in Canada is engaged in the creation of a longitudinal survey where the financial data are going to identify more precisely the sources of funding for post-secondary education.

would obtain degrees. If more youth were to access a university system, then participation rates would be higher. Participation data, which often include completed degrees, incorporate information about both access and persistence. One contribution of this paper is to separate persistence and access as components of overall participation. The large body of Canadian evidence on tuition and participation is reviewed in Looker and Lowe (2001) as well as Junor and Usher (2002, 2004). In many ways the Canadian studies are more useful than the American studies since the role of private universities in Canada is very small, and in most provinces tuition fees have been set by provincial policy at the same level across all universities within a province. In Prince Edward Island and Newfoundland, two very small provinces, there is only one university. Finally most Canadian students stay within their home province.

There has been a great deal of variation across Canadian provinces in the level and changes in tuition fees. Some studies relate this variation in tuition fees across provinces and measure the effect of tuition fee variation on overall participation rates within a jurisdiction. These studies have not produced the clear result that participation falls in jurisdictions with higher tuition fees. More recent studies of the Canadian data make use of individual data on university participation and find that higher tuition fees do reduce participation by a very small amount in well-specified models. Neill (2006) and Johnson and Rahman (2005) use the individual data from the Labour Force Survey (the LFS) from 1976 onwards. Although the main purpose of

the LFS is measurement of unemployment and participation rates, there are questions about post-secondary and university participation as well as the respondent's level of education. Both Neill (2006) and Johnson and Rahman (2005) find a statistically significant negative response for participation at university to an increase in tuition. Neither effect is large in an economic sense, the participation rate falls between 1 and 3 percentage points per one thousand dollar (measured in 1992 dollars) increase in tuition. Johnson and Rahman find this negative effect on participation relative to strong positive province-specific time trends in university participation between 1976 and 2003. Neill includes Canada-wide year fixed effects as well as province fixed effects in obtaining her estimates of the negative effect of higher tuition levels on enrolment probabilities. One limitation of the LFS is that very little information is available on family background. The education level of the parent is known for about 60% of Neill's LFS sample.³ Coelli (2004) makes some progress around this important limitation by using individual responses concerning post-secondary choices in the Survey of Labour Income Dynamics (SLID). He finds that access by lower income families is reduced when tuition is increased. The number of low-income youth in SLID is very small particularly at the provincial sub-samples used. The studies cited above consider university participation rather than university persistence specifically.

There is a much smaller literature studying the university persistence decision. Reviews of both the American and the more limited

³ The LFS comes in two versions, a public use file used by Johnson and Rahman without links to parental education, and a master file used by Neill where links to parental education exist for a subset of the file.

Canadian literature are found in Grayson and Grayson (2003), McElroy (2005) and Mueller (2007). The data studied are usually administrative records of specific post-secondary institutions. It is clear that the most common dropout point is the end of year one. Students do not continue at university for a wide variety of reasons. Students continue at widely differing rates across institutions and, in America, across different types of institutions. There is a strong correlation between family background and university completion. Most of the literature is descriptive and the estimated models focus on sociological rather than economic variables. Marks (2007) concludes, in a study very similar to my study in this paper, that once a student enters the Australian university system, the socioeconomic background of students has little association with completion of degrees. This is indirect evidence that financial factors are not central in persistence. In Australia tuition is set at the national level. Stinebricker and Stinebricker (2007) use direct survey evidence for a sample from Berea College to conclude that financial issues are not central in the persistence decision.

My paper is not the first study to use the YITS or similar data to consider persistence issues in Canada. Barr-Telford et.al. (2003) use data from a survey similar to YITS, the Postsecondary Education Participation Survey (PEPS). PEPS is a single sample of 5000 persons across Canada aged 17-24 in 2002. Persistence is inferred from the respondent's educational history. Barr-Telford et.al (2003) report that of the PEPS respondents who started post-secondary education in September 2000, 75% were still in post-secondary education 18 months later. Of the remaining

25%, 7% had graduated and 16% left without graduating. Of the 16% that had left, only 29% reported they had left for financial reasons.

Five papers to date, Bowlby and McMullen (2002); Lambert et. al (2004); Shaienks et. al (2006); Day (2007); and Finnie and Qiu (2007) use YITS to consider various aspects of persistence. The first three papers do not estimate a model of persistence, they describe the data. There is a general sense that the same social factors that are associated with post-secondary access decision are those associated with post-secondary dropout decision. Women are more likely to attend and persist at post-secondary education. Respondents from families with both parents present during high school and with at least one parent with a high degree of education are more likely to attend and persist at post-secondary education. Students with better grades and with a better attitude to post-secondary education are more likely to enter and to persist. YITS does ask if respondents perceive a financial barrier to post-secondary participation. For the persons who leave post-secondary education, 34% report financial barriers to continuing. For the persons who stay in post-secondary education, 29% report a financial barrier. Day (2007) limits her study of persistence in YITS to students who enroll in a post-secondary program in September 1999 and then measures the effect of financial aid variables on the status of these students as of December 31, 2001. Leavers are less likely to have received financial aid. Finnie and Qiu (2007) take a very long view of persistence using YITS-B responses from 1996 to December 31, 2003. They focus on the role of family variables and on the variation in

drop-out rates by age of enrolment in a post-secondary program. Students who are older when starting a program are more likely to drop out. All studies find there is substantial variation across provinces in the rate at which respondents leave post-secondary education after it has commenced. The very specific contribution of my paper is to link the level and changes in tuition (as well as changes in the tax treatment of tuition) in the sample years across Canadian provinces to the respondent record and then to ask whether the level or change in tuition and tax treatment has, given the other observable characteristics of the respondent, any impact on the decision to persist at university.

The paper proceeds as follows. The extraction of measures of persistence and stage of education at university from the Youth-in-Transition survey is described in the next section. In the third section there is a discussion of the social and economic variables that can be constructed, both from YITS and from other sources. I then estimate models of the persistence decision where the effect of either the level of tuition or the change in tuition on persistence is measured. There is a brief conclusion and a discussion of extensions to the paper.

Establishing the Persistence Sample

The responses to the Youth-in-Transition Survey (YITS) are used to create a sample of specific periods of time, defined between academic years, where a young person currently enrolled in a bachelor's program makes a choice to either continue in university for an-

other year at a university in that province or to stop their studies at the end of the first year in the pair of academic years without completing their bachelor's degree. YITS is a Canadian longitudinal survey with two groups of youth: Cohort A aged 15 on December 31, 1999 (26,055 participants as of December 31, 1999) and Cohort B aged 18, 19 or 20 on December 31, 1999 (22,378 participants as of December 31, 1999). YITS is a complex survey where each respondent represents a component of the entire population of Canada in the age categories above. Young persons in small provinces are enormously over-sampled to allow statistical work to be undertaken at the provincial as well as the national level. Responses to interviews undertaken between January and June 2000 describe the respondent's background and family as well as their educational and other activities during the year 1999 and earlier in their lives. Cycle 2 re-interviews describe activity during 2000 and 2001, Cycle 3 re-interviews describe activity during 2002 and 2003. The weights on observations in Cycle 2 and Cycle 3 are adjusted so that at each cycle, the observations continue to represent the universe of Canadian youth in the relevant age group. To remind the reader, the relevant universe represented by YITS A and B together is slightly odd; it is the population of youth in Canada aged 15, 18, 19 or 20 on December 31, 1999. The remainder of the analysis works with the Cycle 3 data and the population weights.

Persistence and transition issues at university do not take usually take place over calendar years. The most common entering month for

a program is September, the beginning of the academic year, and the exiting months, with or without completion, are heavily concentrated in April and May.⁴ The changes in tuition occur “between” academic years. The activities reported by YITS respondents are sorted into activities by academic year, province, and bachelor’s program to investigate the role of tuition in persistence issues at universities. The spring and summer between two academic years is treated as a decision point where one new piece of information is the level of tuition in the second academic year of each pair considered. Each person reports the start and end of an educational program where the program is, for this analysis, obtaining a bachelors degree in a provincial university system. A respondent persists if, when enrolled in a bachelor’s program he or she stays stay for an additional academic year toward obtaining the bachelor’s degree.⁵ If the respondent leaves without obtaining a

degree, they are a leaver. If the person obtains a bachelor’s degree in the first of the pair of academic years studied, they neither persist nor leave. Pairs of academic years listed in Table 1 (and Table A-1 define potential persistence decisions between academic years. Persistence choices can be identified as early as the pair of years 1996-97 to 1997-98. The data end with the pair of academic years 2002-03 and 2003-04.⁶

Because YITS-B and YITS-A represent information on different age groups in Canada, the number and structure of observations of persistence decisions between a specific pair of academic years is quite different. In the Cohort B sample, the respondents were 18, 19, or 20 as of December 31, 1999 and thus many, but not all, of the respondents are already in post-secondary education or a bachelor’s program at that time. Some respondents complete university degrees be-

⁴ Universities in Canada typically operate with three terms: Fall- September to December; Winter - January to April; and Spring - May to August; with relatively few classes offered in the Spring Term.

⁵ It is also possible in the data to work with a series of start dates and end dates at specific post-secondary institutions, colleges and universities. Some of the earlier versions of this study also used definitions of persistence defined by institutions rather than program. No results were affected by this choice.

⁶ In a sense, all respondents exit YITS as of December 31, 2003. Some respondents also exit YITS at the end of Cycle One on December 31, 1999 and at the end of Cycle Two on December 31, 2001. Persistence choices from 1998-99 to 1999-00 could be recorded for those who exit on December 31, 1999 using the Fall Term information from September 1999 to December 1999. Persistence choices from 2000-01 to 2001-2002 can be recorded for those who exit on December 31, 2001 using the Fall Term information from September 2001 to December 2001. This adds about 10 percent more observations of persistence but means that analysis with weights so that the sample represents the Canadian population is no longer possible. There is no difference in the analysis of the effect of tuition between the weighted and unweighted samples. Results are presented in the paper only for weighted samples and thus use respondents who remained in YITS through December 2003.

tween 1999 and 2003. In the Cohort A sample, the typical respondent is in Grade 10 on December 31, 1999. Table A-1 illustrates the “normal” path of a respondent in different provinces at the time, through secondary school, and if they go, to university. If a Grade 10 respondent in December 1999 progresses through secondary school at the “normal” pace and then moves directly into post-secondary education from Grade 12 (the case in 8 or 10 provinces) then Grade 12 would be completed in June 2001 and the student would enter post-secondary education in September 2001. The two provinces where this was not the case are the two largest provinces, Ontario and Quebec. In Ontario a 1999-00 Grade 10 student would normally have completed Grade 13 in 2002-03, enter university in 2003-04 and not be observed making a university transition decision in the sample period.⁷ In Quebec, students finish secondary school at the end of Grade 11 and then university-bound students attend a college (a CEGEP in the French acronym) for two years. As in Ontario, a Quebec Grade 10 student from December 1999 would not enter university until 2003-04 and not be observed making a university transition decision. Most of the YITS-A university persistence decisions observed are at the end of first year univer-

sity in the 8 Canadian provinces excluding Ontario and Quebec.⁸

The left-hand side of Table 1 presents approximate counts of the total number of leavers and persisters between each pair of academic years studied. These observations combine respondents from YITS-A and YITS-B. Combining YIT-A and YITS-B both increases the number of observations of persistence decisions and allows study of a much longer period of time with more variation in tuition. These observations are then weighted with Cycle 3 weights to measure the percentages (found on the right hand side of Table 1) of the population of Canadian youth aged 15, 18, 19 or 20 on December 31, 1999 who are attending university in the first of the pair of academic years listed and who either leave or persist between that pair of academic years. All samples are quite large except for the first pair of years (1996-97 to 1997-98) where the actual number of persons in the sample is suppressed.⁹ This is not surprising, the persons in YITS-A are 12 years old and the oldest person in YITS-B is 17 years old on December 31, 1996. If you were from the universe of Canadian persons aged 15, 18, 19 or 20 on December 31, 1999 and you were enrolled in university in 1996-97, the probability that you continued into university in 1997-98 was

⁷ In Ontario, the last formal Grade 13 year ended in 2002-03, a considerable number of students actually stay for an additional year after Grade 12 taking further university-level courses or repeat courses already taken to raise high school grades. This practice of staying in secondary school for the additional year is known as the “victory lap.” It is estimated (very roughly) that 30% of students in the Waterloo Region stay for the victory lap. There is no provincial data on this choice. In the 2001-02 academic year, some high school students who would have finished Grade 13 in 2002-03 actually completed one year early to avoid competition for post-secondary spots in the larger 2002-03 group that finished high school, the “double” cohort year where those completing Grade 12 and those completing Grade 13 both entered post-secondary education. In provinces outside Ontario and Quebec Grade 12 students also may choose to stay for an extra year of high school.

⁸ A fourth cycle of YITS A and YITS B interviews covers the years 2003 and 2005 but the results of these interviews are not yet released. A fifth cycle of interviews covering the period 2006 and 2007 will take place after January 2008.

⁹ This suppression of small cell numbers is required by Statistics Canada when surveys housed at Research Data Centres are used in research. It ensures the preservation of confidentiality of survey respondents.

99 percent. These are clearly very unusual students who are enrolled in university at such a young age and are not the normal pool. In the remainder of the table, the persistence rates are more similar across years but they are not identical across the pairs of academic years considered. One reason is that the stage of university varies across these years within the YITS-A and YITS-B cohort, that is, the cohort nature of the analysis creates important composition effects.

Table 1 also presents one measure of the characteristics of this particular group of decision makers by stage of post-secondary education. This is an important but not straightforward variable. The ideal variable would distinguish clearly between respondents in the early stage of a program where dropping out is less costly, and respondents in a stage of a program where the respondent is closer to degree completion.¹⁰ YITS does not directly identify the year of a respondent's bachelor's program. In any case, such a response may not be that useful. In Canada bachelor's programs in some provinces and some institutions are 3 years in length and others are 4 years in length. A second year student could be either 1 or 2 years from completion under "normal" conditions. Many students have slower than expected progress through what is normally a 4 year program so that in year three they may be either one or two years from graduation.

The variable constructed from YITS counts the number of academic years since the respondent was a full time high school student. There is an adjustment for observations from Quebec to reflect the 2 years normally spent in pre-university CEGEP after completion of Grade 11, that is, for a Quebec respondent, the count begins two years after Grade 11 completion. Thus each academic year for each respondent was tagged as 1,2,3,4,5,6 and 7 years after last "high school" or, if you like, non-post-secondary, attendance. If the respondent was in the first (third in Quebec) academic year after high school then a dummy variable for Year One was equal to one otherwise this variable was set equal to zero. Similar indicator variables with the appropriate Quebec adjustment (Year Two and Year Three) were created for the second academic year after graduation and the third academic year after high school graduation.¹¹ Table 1 shows the percentages of the Canadian university student population aged 15, 18, 19 and 20 on December 31, 1999 who making a persistence decision in university and who were in the first academic year after last high school enrolment. Table 1 tells us that the mix of students in pairs of academic years is different, that is, there are composition effects. It is not surprising that the first pair of academic years with the very small group of persons aged 17 at university is dominated by Year One students. As the YITS B sample ages, there are fewer students in

10 For example such a variable might be the ratio of the number of years at normal load of completed credits in the program at the end of the first academic year to the number of years at normal load needed to graduate. This is the kind of data we do not have. When we think of a student in year 2 of a program who had dropped 2 of 10 credits in year one, what year are they actually in?

11 Two other variables were also used in the analysis. A dummy variable was created if the academic year in the first of the pair of academic years was the first year of the bachelor's program. A dummy variable was created if the persistence decision observed in one pair had been immediately preceded in time by a previous persistence decision. Results on tuition were not sensitive to the choice of stage of PSE variable used.

the initial academic year after leaving high school. The percentage of Year One students is lowest in the 2001-02 to 2002-03 transition. Then the transition from 2002-03 to 2003-04 contains a larger percentage of Year One students as the non-Ontario and non-Quebec students on the “normal” path to university enter their first year after high school (see Table A-1).

Table 2 presents the persistence rates by province for all university transitions, for end of Year-One transitions and then for transitions in all other years after high school completion. Table 2 confirms the finding in the rest of the literature that a student earlier in a program is more likely to drop out. This is true in every province. There is very large variation in persistence rates across provinces, both overall, in Year One and in other years. The remainder of the paper presents estimates of the role of tuition and other variables in explaining the variation in persistence rates across provinces.

Variables Used in the Analysis of Persistence

There are three types of variables that are considered in the analysis of the persistence decision in this paper. Two are at the level of the province: various measures of tuition and

a measure of the business cycle. YITS-A and YITS-B provide a variety of variables at the individual and family level.

Respondents are identified by age, gender, language spoken at home (official or non-official), as a member of a visible minority, and by the age at which they entered Canada. Some responses, marital status and number of children, make reference to a specific date: December 31, 1999; December 31, 2001 or December 31, 2003.¹² The individual data include a self-reported average grade (by range) for their last year in high school as well as their grade (again by range) for their last high school mathematics course. The survey also reports a grade point average and a self-reported measure of educational effort, a range of hours of work done outside of class, in the first year of their PSE experience. However both variables are reported with too many missing observations to allow their use. The survey also reports the number of high schools attended over their high school career.

There are two variables associated with the respondent’s family. YITS-A and YITS-B report slightly different information about parental education. The variable that can be constructed from both surveys indicates whether

¹² There are some small inconsistencies across reference dates. The most interesting ones for this study are found when a respondent indicates on one reference date that they have attended a specific educational program and then, on the subsequent reference date appears to forget they ever attended such a program. Fortunately this is a rare occurrence.

at least one parent figure related to the youth has some university education or a university degree. A second indicator variable measures the perception of the youth as to their parent's attitude about the importance of education beyond high school. Finally there is an indicator variable that asks if the youth lived with one or two adults during most of their high school period, a family structure variable. It is noteworthy that there is no family income variable in YITS-B. The respondent's family provides a measure of family income when the youth is aged 15 in YITS-A. Thus there is no family income variable in this study.¹³

There are three measures of the level of tuition. Statistics Canada provides an average over all universities in a province of the level of nominal tuition in an arts and science program. This measure, shown in Figure 1, does not include compulsory fees paid by students. The year labeled 1996 is 1996-97. Nominal tuition in arts and science programs is set by provincial policy. Usher (2006) constructs a similar nominal measure of tuition which includes compulsory fees paid by students.¹⁴ These fees are generally self-

imposed by student governing bodies and include activity fees, extended health care fees, bus passes, and contributions to various capital projects and other academic projects. Usher's measure of tuition and compulsory fees (Figure 2) is adjusted for inflation using the Consumer Price Index for each province calculated over the 12-month academic year beginning in September. If provinces were slow to adjust nominal tuition in step with inflation then real fees drop gradually. Two provinces, Manitoba and Newfoundland, reduce nominal tuition fees in this period. Usher (2006) calculates (Figure 3) a measure of the real savings in taxes related to university attendance in each academic year in each province. The tax savings vary quite substantially across provinces and over time.¹⁵ If the values in Figure 3 are subtracted from the corresponding values in Figure 2, the result is the level of net real tuition. Then the results of two further calculations, the change in real tuition and the change in net real tuition are presented in Figures 4 and 5 respectively. These measures of tuition fees and changes in fees are joined to the individual respondent data by province and academic year. The level of tuition relevant to

13 There is limited and difficult-to-interpret information in YITS on income earned and income spent by the respondent. In principle, it would seem that you might be able to calculate, in a year when tuition increased, how the increase was paid for. In practice, the data are not up to this task. The income data only refer to the second of the two calendar years between cycles, that is the calendar years 2001 and 2003. The questions relating to debt levels refer to the reference dates. There is some information on employment periods as well as some information on scholarships and bursaries. Investigating the interactions between employment and persistence is a task that remains to be undertaken with the YITS data. Day (2007) begins to use the income and other financial data by defining a persistence cycle for respondents who start postsecondary education in September 1999. The status of these respondents as of December 2001 is then considered so that the persistence data better match the available financial data.

14 As an example of such fees, Acadia University charged a mandatory annual fee of \$1906 in 2006-07, the highest in the nation. Tuition was slightly over \$6000 at Acadia.

15 There is a non-refundable but transferable to parents tax credit for tuition with an annual cap. However unused credits can be carried forward until the student graduates and is employed. There is also a tax credit associated with each month of being a full time or part time student. There is now a book tax credit. Provinces have different rates for each of these credits. Recent tax changes have complicated the system even further.

the persistence decision from 1996-97 to 1997-98 is the level of tuition in 1997-98, or the change in tuition from 1996-97 to 1997-98. The pattern repeats for the other pairs.

The second provincial variable added to the model of the individual decision proxies for the provincial business cycle. An unemployment rate by gender, defined as the average of monthly levels of the provincial unemployment rate over each academic year from September to August for persons aged 15-24, controls for youth labour market conditions in the province. The effect of higher aggregate unemployment in the province for youth of that gender on the persistence decision is not obvious. Higher aggregate unemployment may induce persons to persist since they may believe getting the extra qualification may give them an advantage in the weaker labour market. Higher aggregate unemployment may make it more difficult for a youth to persist if the probability of employment and thus income was lower during the spring term that fell before the second of the two academic years. In fact, the unemployment variable plays little role in the persistence decision.

Results

What is the expected effect of tuition and tuition changes on persistence decisions? In the introduction, two cases were considered. If universities in a province accept all students who are willing to pay, then the last

student admitted should equate the expected cost of attendance, including the tuition and other costs, to the discounted present value of benefits. An unexpected increase in tuition would cause the student to reassess the decision and leave if the cost then exceeded the benefits. In this model an increase in tuition, if unexpected, reduces persistence and induces leaving.¹⁶ The second possible (and in my view more likely) interaction of tuition and persistence relates to borrowing constraints. Consider a student who entered university expecting to borrow to finance their education. If the capacity for loans is limited to a fixed and binding amount, then an unexpected increase in tuition without an increase in borrowing limits could induce leaving. It is also possible in the credit constrained world that a higher level of tuition in one province might make leaving more likely to occur in that province. If we had two provinces with similar borrowing constraints but in one province the tuition level was higher, then the “same” individual bad luck in the high tuition province, for example, fewer hours of employment than expected, could induce leaving in the high tuition province and have no impact in the low tuition province. In this case persistence behaviour could be related to the level of tuition. In the empirical work that follows, the goal is to look for patterns in the response of persistence rates to the level of nominal and real tuition, to the level of net real tuition and to the change in real and real net tuition. The priors, from the theory briefly outlined

¹⁶ It is not perfectly clear that the university system in any given province takes the last student willing to pay. The political language used to describe access policy usually refers to all “qualified” students. It is clear that in multi-university provinces access to specific universities and to specific programs within specific universities are rationed using high school grades. It is also clear that some universities do take students with weak academic records. The implicit assumption in the analysis is that a student who wanted a space could find a space somewhere in the university system in their province. The interaction of academic ability and family background on access is an area that needs further research.

above, is that the level of tuition will have less impact on persistence decisions than a change in tuition. The results actually find no relationship of any type between either tuition levels or tuition changes and persistence rates.

The estimated equations take the form:

$$\begin{aligned} \text{Persist}_{i,j,t} = & \\ & f(\text{Observable Personal Characteristics}) \\ & + g(\text{tuition measure}) \\ & + h(\text{indicator variables relating to province and year}) \\ & + c(\text{unemployment measure}) + \text{error} \\ & (1) \end{aligned}$$

where $\text{Persist}_{i,j,t}$ equals 1 if the individual “i” in province j between pairs of academic years t is enrolled in both academic years at university. Persist takes on a value of zero when the individual is enrolled only in the first academic year of the pair of academic years. A zero value denotes a leaver. The discussion above presented the types of variables available for inclusion in the estimated equations. Table 3 presents coefficients on estimates of two models that do not contain tuition variables: a linear probability model and a Probit model where marginal effects of a one-unit change in the dependent variable are presented. In both models, the coefficient interpretations are the same. A coefficient in either model is the effect on the probability of persistence when there is a one unit change in the dependent variable in the model. Many of the variables are indicator variables and the change is from a value of zero to a value of one as the state marked by the indicator variable comes into play. For the continuous variables the marginal effects for the Probit are calculated from the mean value in

the sample. In both models Prob. Values on the null hypothesis that the coefficient is zero are reported. There is frequently more than one observation on an individual since the same individual in a multi-year program faces a persistence decision from year 1 to year 2, then year 2 to year 3 and perhaps year 3 to year 4 and even year 4 to year 5 and so on. The error term in (1) will contain elements that are associated with an individual’s unobserved characteristics and the standard errors on the coefficients are adjusted for clusters at the individual level. The parameter estimates are interpreted as parameters describing choices by Canadian youth aged 15, 18, 19, and 20 as of December 31, 1999 as a whole because observations are weighted by the Cycle 3 weights.

The estimated equations in Table 3 include Canada-wide year effects, that is, an indicator or dummy variable for each pair of academic years that takes on the value of one for all observations across all provinces in Canada for that pair of years. The coefficients on the year effects are usually statistically different from zero and have a distinct pattern. One such pattern in the linear probability model is found in Table A-2. Except for the coefficient on the dummy variable for participants in the 1996-97 to 1998 transition, the very small and unusual group already discussed, the coefficients on the year dummies, where the transitions from 2002-03 from 2003-04 represented the omitted base year, are negative, and generally show an increase in absolute value in the linear probability model as the academic years move further back in time. Thus, over time in Canada, persistence has generally increased in all provinces for reasons not related to the other variables in the

model. This is confirmed if the model is estimated with a simple trend variable in place of the specific year dummies. That coefficient on the trend is 0.027 (also presented in Table A-2) indicating an average increase in persistence rates across all individuals in all Canadian provinces over the sample of 2.7 percentage points per year over the short period of time in the YITS sample. The equations in Table 3 also include a province fixed effect, an indicator variable for all observations from a province in all years. The coefficients on these variables reflect differences in persistence for reasons associated with a province in all sample years and not associated with included variables in a model. Ontario is the omitted province. Again the set of coefficients on provincial dummies for the linear probability model with year effects is presented in Table A-2. The coefficients on the province dummies indicate that persistence is significantly lower in Alberta, Saskatchewan, and Manitoba than in Ontario. None of the other provinces have significantly different persistence rates than Ontario after controlling for the values of the other variables.¹⁷ Table 3 then presents coefficients that measure the association of other variables with the persistence decision using both the linear probability model and the Probit model.

The set of variables that predict persistence is partly consistent with those in the literature. A person is much more likely to persist out of the later years of post-secondary education. Using the linear probability model, the coefficient on the indicator variable for the first year following high school completion is -0.023 (Prob. Value 0.11) indicating that the persistence rate is 2.3 percentage points lower than in the base year, that is, than any year other than year 2 and year 3. This Year One effect is, oddly enough, not statistically significant in either the linear probability model or the Probit model. But it is negative. The significant coefficient in the Probit model is the 0.012 coefficient on the Year 3 indicator variable. The interpretation here is that persistence is 1.2 percentage points higher in Year 3 than in the base year, and since the other coefficients on Year One and Year Two are not different from zero, then persistence is significantly higher in Year Three than in the other years.¹⁸ This is the same pattern, close-to-entry persistence is lower and close-to-completion persistence is higher. The Probit is a non-linear representation of the persistence process. The general pattern of the coefficients on the three indicator variables associated with years after high school partly duplicate the results in studies of administrative data mentioned in

¹⁷ There are a number of important differences across provinces in their educational systems that could account for these fixed effects. Four readily come to mind. Alberta, British Columbia, and Quebec have province-wide medium stakes high school examinations. Alberta and British Columbia have post-secondary systems where college-university transfers are common. Ontario has the largest non-university college system but college to university transfers are difficult. The four Maritime provinces have much smaller college systems than does the rest of the country. There may be other differences represented by the province fixed effects.

¹⁸ Other variants of the stage of university life were created and used in estimation without changing the pattern of coefficients on other variables. It was possible to try to create a variable that, by respondent, asked whether the respondent was in the first year of a bachelor's program in the first of the pair of academic years considered. All the models were re-estimated with this set of variables and the results are not sensitive to this specification change. The effect of being in first year defined in this way on the persistence decision is very strong relative to the omitted years. These omitted years are all other years of studies.

the literature review. Persistence is higher in later years of studies and lowest in the first year of studies. However the measure of stage of study does not seem to be very precise.

It is very interesting that most of the variables in Table 3 have no direct statistical association with persistence. The values in parentheses in Table 3 are Prob. Values, probabilities at which the null hypothesis that the coefficient in question is zero would be rejected. There is an effect of family structure in the expected direction with a Prob. Value of 0.04. A young person who lives with two adults during high school is 2.9 percentage points more likely to persist in the linear probability model and 1.3 percentage points more likely to persist in the Probit estimate. But this is the only statistically significant effect associated with a social characteristic in either model estimated.¹⁹ Females are no more likely to persist than males. Native born Canadians are no more likely to persist than immigrants. Visible minority status has no impact on persistence. There is no measurable effect on persistence of either the measure of a positive parental attitude to university or the parental education measure. The former measure assigns a value of one to an indicator variable if the youth perceives that the parent(s) sees post-secondary education as either “fairly important” or “very important.” The latter assigns a value of one to a respondent if at least one parent had some university education. Finally there is no effect on persistence of a youth attending an additional high school. The coefficients on the unemployment rates from youth of

that gender in that province in that academic year are not statistically significant. The presence or absence of the unemployment rate variable in the model does not affect the other coefficients.

The only variable that really matters for persistence, once the respondent is in university, is better high school grades. Better high school grades matter a lot. The grade scale is such that a one unit change in the measure of grades is a movement of the respondent from an average high school grade of 50-59 to 60-69, 60-69 to 70-79, 70-79 to 80-89, and 80-90 to over 90. Each one unit change in grades thus corresponds to a 10 percentage point increase in your high school average. The coefficient of 0.064 in the linear probability model means that a 10 percentage point increase in your high school grade average makes you 6.4 percentage points more likely to persist between any pair of years. There is no additional effect of a higher grade in high school mathematics. The effect of overall grades and the mathematics grade on persistence is similar in the Probit estimate. There an increase of 10 percentage points in the average high school grade increases the persistence probability by 3.5 percentage points. The linear probability model has, for this type of model, reasonable explanatory power with an R^2 of 0.064. Both models in Table 3 include fixed effects for each pair of academic years across Canada and for observations drawn from within the same province. As already mentioned, a set of coefficients on these fixed effects for the linear probability model is found in the Appendix Table A-2. The fixed effects, while standard in

¹⁹ You could make an argument that, because a two parent family is more likely to have two earners, this is also an economic characteristic. As noted earlier, there is no information on family income that is available in both YITS-A and YITS-B.

these models, can be difficult to interpret. The year fixed effects represent factors common across Canada in those years that affect persistence decisions in all provinces. The coefficients on the year fixed effects are precisely estimated. The coefficients on provincial fixed effects are both more difficult to interpret and generally of less statistical and economic significance. As Figures 1 and 2 show, there are large differences among provinces in the average level of real and nominal tuition over the full sample. Quebec is the obvious low tuition province. In this sense it is possible that the provincial fixed effects could actually be capturing the variation in the level of tuition. However it is also true that each province has unique features of their secondary and post-secondary education systems that could, on their own, influence persistence and that fixed effects are needed to allow these differences to be captured and allow the model to measure the effects of tuition levels and changes after these other effects are taken into account. The strategy in the face of the uncertainty about how to interpret the province fixed effects and, to a lesser extent, the year fixed effects, is to present in Tables 4 through 9 estimates of the models of the persistence process with different combinations of year and province fixed effects between provinces and years.

Tables 4 through 8 report the results of taking the base models in Table 3 and adding, separately, three measures of the level of tuition and two measures of the change in tuition to the models presented in Table 3, using the various combinations of fixed effects and an annual trend in place of year fixed effects. The sixth row of results in each table includes

both the level of real tuition and the change in real tuition. This specification allows for an effect of the real tuition change conditional on the initial level of tuition. The bottom line is that there is no specification using any combination of fixed effects and trends that leads to the conclusion that either increases in tuition or a higher level of tuition changes persistence rates.

In Table 4, there are neither province nor year fixed effects. Some coefficients on tuition measures are negative, indicating that higher tuition or increases in tuition reduce persistence. Some coefficients on the tuition variables are positive. None of coefficients on the tuition variables are statistically different from zero at reasonable levels of significance. In Table 5, there are year fixed effects but no province fixed effects. The Table 5 specification allows the relatively large differences in persistence rates across provinces to be associated with variation in the level or changes in provincial tuition policy rather than forcing province-fixed effects to absorb all or part of this variation. This allows the strongest possible case for an effect of tuition on persistence. There are a few more negative coefficients on tuition measures but again none of the coefficients are statistically significant. If we take the largest negative point estimate (which is not statistically significant) in Table 5, then you would conclude that a \$1000 increase in real tuition and fees would lead to a 0.5 percentage point decrease in the persistence rate. In Table 6, there are province fixed effects but no Canada-wide year fixed effects. When year fixed effects are excluded from the models, then there is a tendency to observe a positive relationship between tuition levels, tuition increases, and persistence.

This makes sense as a description of the data. Persistence has been rising over time. In most provinces tuition has been rising and thus tuition increases have been positive. In Table 7 the year fixed effects are replaced by a Canada-wide trend. The coefficient on the trend is positive and statistically significant as suggested in Table A-2. The tendency in Table 6 to find a positive relationship between tuition measures and persistence is replaced by a series of zero coefficients on the tuition measures. Finally in Table 8, the models are estimated with both province fixed effects and year fixed effects rather than imposing the trend. This is the preferred specification given the results in Table A-2 and you may want to think of the other specifications as robustness checks. In Table 8, the Prob. values reported on tuition-related coefficients are very large. This means that the measures of tuition levels and tuition changes are not associated with variation in persistence. This is further confirmed by the small point estimates of these coefficients.

The final specification found in Table 9 allows the coefficients on the tuition-related variables to interact with the level of parental education associated with the respondent. To make this table easier to read, the parental education is switched from that in Table 3 so that a value of one for the parental education variable now identifies a youth from a family where neither parent ever attended university. This is partly a proxy for family income as well as a direct measure of rental education. If the increases in tuition were associated with increases in the drop-out rate for youth from low-education parents, then the coefficients on the interactions terms involving the tuition measures and parental education

would be negative even if the coefficients on the tuition variables in Table 8 for the aggregate of all youth were zero. The coefficients on the interactions terms are zero. There is simply no evidence that higher levels of tuition decrease persistence rates for either the overall sample of Canadian youth in university covered by YITS or the sub-sample of youth where neither parent has exposure to university.

Conclusions and Future Work

There are enormous differences in the level of tuition across Canadian provinces. Even within the sample period studied, there are examples of large increases and decreases in tuition. There is no evidence of an association between measures of either the level of tuition or the change in tuition and persistence rates. It is not as surprising that the level of tuition does not change persistence. Tuition is only a portion of the cost of attendance. Students entering university should have a sense of the level of tuition to be paid over the next 3 or 4 years and in a human capital model will have already decided that the cost of university, including tuition, is less than the benefit. It is much more surprising that the increase in tuition, which one might think of as unexpected at least in some cases, are not associated with changes in persistence. The coefficients on tuition changes, like the coefficients on tuition levels, are not different from zero. In British Columbia there were very large increase in tuition in the last two years of the data and at least the first increase was unexpected. In several provinces there were quite large decreases in tuition and it seems very likely these tuition cuts were unexpected. Many of the changes

in the tax treatment of university reduced net tuition over this period. None of this variation in tuition affected persistence. Several interpretations are possible. One is that the monetary net benefit of university completion is so large that even very large changes in tuition do not affect the persistence behaviour of students. Tuition levels may start at such a low level relative to the total cost, including opportunity cost, of university attendance. In this interpretation tuition fees are irrelevant to the decision to attend university everywhere in Canada. Another interpretation is that, in provinces where tuitions were increased substantially, student aid to existing students was also increased so there was no effect on persistence. A third interpretation is that as tuition increased, universities found it more desirable to keep students who would have previously been removed for poor academic performance. Universities could also have placed more resources into student retention strategies. In any of these interpretations of the results of this study, very large increases in tuition were not associated with any change in drop-out rates. Although provinces follow very different strategies with respect to the level of tuition fees, these do not affect persistence behaviour of students in a measurable way.

There is work left to be done. How did students pay the increased tuition? Did students take out more loans? Did they receive more parental support? Did they receive more scholarships and bursaries? Did students work more either during the school year or in the term in which they are not taking courses? The YITS surveys do contain some useful data on student-work choices. The data on student financial choices and outcomes are much more limited. Answering the financial questions may have to await a different data source.

The second task in studying the interaction of tuition and university participation behaviour in YITS links access decisions, the decision by a respondent to enter university, to tuition variation across provinces. Even if tuition variation does not affect persistence behaviour, it could affect access behaviour and thus overall university participation. The results of this analysis are presented in Johnson (2008). Although there is slightly more evidence of a negative relationship between access and tuition, the relationship is weak. The overall conclusion to both studies is that tuition is not the central issue in participation by youth at Canadian universities.

References

- Barr-Telford, L., Cartwright, F. Prasil, S., & Shimmons, K. (2003). Access, persistence and financing: First results from the Postsecondary Education Participation Survey (PEPS). Research Paper prepared for the Education, Skills and Learning Division. Statistics Canada Catalogue Number 81-595-MIE2003007. Ottawa, ON: Statistics Canada & Human Resources Development Canada.
- Bowlby, J. W., & McMullen, K. (2002). At a Crossroads: First results for the 18 to 20-Year-old cohort of the Youth in Transition Survey. Statistics Canada Catalogue Number 81-591-XPE. Ottawa, ON: Human Resources Development Canada & Statistics Canada.
- Coelli, M. (2004). Tuition increases and inequality in post-secondary education attendance. Vancouver, BC: University of British Columbia.
- Day, K. (2007). The effect of financial aid on the graduation rate of college and university students in Canada. Paper prepared for the MESA Conference, Montreal, Quebec, Canada. October 2007.
- Finnie, R., & Qiu, T. (2007). The Patterns of persistence in post-secondary education in Canada: Evidence from the YITS. Paper prepared for the MESA Conference, Montreal, Quebec, Canada. October, 2007.
- Grayson, J. P., & Grayson, K. (2003). Research on retention and attrition. Millennium Research Series. Montreal, QC: Canada Millennium Scholarship Foundation.
- Heller, D. E. (1997). Student price response in higher education: An update to Leslie and Brinkman. *Journal of Higher Education*, 68 (6): 624-659.
- Heller, D. E. (1999). The effects of tuition and state financial aid on public college enrollment. *The Review of Higher Education*, 23(1), 65-89.
- Johnson, D. R. (2008). Interprovincial variation in university tuition and the decision to attend university immediately after high school graduation: Evidence from Youth in Transition Survey in Canada. (MESA Working Paper). Toronto, ON: Educational Policy Institute.
- Johnson, D.R., & Rahman, F. (2005). The role of economic factors, including the level of tuition, in individual university participation decisions in Canada. *Canadian Journal of Higher Education*, 35(3), 101-127.
- Junor, S., & Usher, A. (2002). *The Price of knowledge: Access and student finance in Canada*. Montreal, QC: Canada Millennium Scholarship Foundation.
- Junor, S., & Usher, A. (2004). *The Price of knowledge 2004: Access and student finance in Canada*. Montreal, QC: Canada Millennium Scholarship Foundation.
- Lambert, M., Zeman, K., Allen, M., & Bussiere, P. (2004). Who pursues postsecondary education, who leaves and why: Results from the Youth in Transition Survey. Research Paper prepared for the Culture, Tourism and Centre for Education Statistics Division. Statistics Canada Catalogue Number 81-595-MIE - No. 026. Ottawa, ON: Statistics Canada & Human Resources and Skills Development Canada.

- Leslie, L.L., & Brinkman, P.T. (1988). *The economic value of higher education*. New York, NY: American Council of Education.
- Looker, E.D., & Lowe, G.S. (2001). *Post-secondary access and student financial aid in Canada: Current knowledge and research gaps*. Ottawa, Ontario: Canadian Policy Research Network (<http://www.cprn.ca/cprn.html>).
- Marks, G. N. (2007). *Completing university: Characteristics and outcomes of completing and non-completing students*. Camberwell, VIC: The Australian Council for Educational Research Ltd.
- McElroy, L. (2005). *Student aid and university persistence: Does debt matter?* Montreal, QC: Canada Millennium Scholarship Foundation.
- Mueller, R. E. (2007). *Access and persistence of students from low-income backgrounds in Canadian post-secondary education: A review of the literature*. Paper prepared for the MESA Project. Toronto, ON: Educational Policy Institute.
- Neill, C. (2004). *Tuition fees and the demand for university places*. Waterloo, Ontario: Wilfrid Laurier University (http://www.wlu.ca/documents/17295/Enrol_Fee.pdf).
- Shaienks, D., Eisl-Culkin, J., & Bussiere, P. (2006). *Follow-up on education and labour market pathways of young Canadians aged 18-20 – Results from YITS Cycle 3*. Research Paper prepared for the Culture, Tourism and Centre for Education Statistics. Statistics Canada Catalogue Number 81-595-MIE2006045. Ottawa, ON: Statistics Canada & Human Resources and Social Development Canada.
- Stinebricker, T. R., & Stinebricker, R. (2007). *The effects of credit constraints on the college drop-out decision: A direct approach using a new panel study*. (Working Paper 13340). National Bureau of Economic Research.
- Usher, A. (2006). *Beyond the Sticker Price: A closer look at Canadian university tuition fees*. Toronto, ON: Educational Policy Institute.

Tables

Table 1. Persistence through university in the YITS-A and YITS-B sample

Pairs of Academic Years	Total Observations in Combined YITS-A and YITS-B samples rounded to nearest 100 observations	Percentages of persons aged 15, 18,19,20 on December 31, 1999		
		Leavers	Persisters	Year One
1996-97 to 1997-98	suppressed	1.0	99.0	69.4
1997-98 to 1998-99	1900	16.2	83.8	32.9
1998-99 to 1999-00	5000	11.8	88.2	33.3
1999-00 to 2000-01	7300	9.8	90.2	29.9
2000-01 to 2001-02	8200	8.8	91.2	25.3
2001-02 to 2002-03	6000	4.8	95.2	21.8
2002-03 to 2003-04	8000	5.2	94.8	22.3

Notes: A leaver is a person who is enrolled as a full time student in a bachelors program as a program of study in a province in the first of the pair of academic years listed and does not continue into a bachelor's program in the same province into the second of the pair of academic years listed and does not graduate from the program. A persister continues into the next academic year at a bachelor's program in the same province.

The number of observations of persistence decisions between the pair of academic years obtained by combining YITS-A and YITS-B is presented in the second column rounded to the nearest 100. The next columns present the percentage of students aged 15, 18,19 or 20 on December 31, 1999 in Canada that are leavers, persisters and in Year One. Survey weights are used. The interpretation of the first row is that, for persons aged 15, 18, 19 and 20 in Canada as of December, 31 1999 and who were enrolled in a bachelors program in 1996-97 and were not in their graduating year in 1996-97, 99.0 percent persisted into the next year of the program. 69.4 percent of such persons were in the first academic year after high school (third year after Grade 11 graduation in Quebec) graduation.

Table 2. Variation in persistence rates across Canadian provinces

Province	Overall Persistence Rate	Year One Rate	All other years
British Columbia	87.6	82	90.1
Alberta	83.5	81.5	84.3
Saskatchewan	87.2	83.3	88.9
Manitoba	87.1	82.7	89.1
Ontario	91.2	86.4	93.6
Quebec	95.2	94.7	95.4
New Brunswick	86.7	84.5	88.0
Prince Edward Island	90.6	84.2	93.7
Novas Scotia	85.5	81.5	87.7
Newfoundland	82.8	76.4	85.4

Notes: These values are persistence rates as a percentage of all persistence decisions observed in these provinces between all the pairs of academic years presented in Table 1. They are weighted to represent the universe of persistence decisions made by

persons aged 15, 18, 19 and 20 December 31, 1999. The Year One rate is for decisions made in the first academic year after high school completion (the third year after Grade 11 completion in Quebec).

Table 3. Coefficients on social and economic variables in the persistence decision

Variable	LPM (Prob. Value)	Probit Coefficient Marginal Effect (Prob. Value)
Year One	-0.023 (0.11)	-0.010 (0.27)
Year Two	-0.001 (0.92)	0.004 (0.59)
Year Three	0.015 (0.11)	0.012 (0.03)
Female	0.017 (0.36)	0.008 (0.31)
Born in Canada	-0.011 (0.62)	-0.006 (0.66)
Visible Minority	0.026 (0.19)	0.014 (0.17)
Two Parent Family	0.029 (0.04)	0.013 (0.08)
Parent with University	.007 (0.66)	0.004 (0.46)
Positive Parental Attitude	-.004 (0.75)	0.002 (0.78)
High School Grade	0.064 (0.00)	0.035 (0.00)
High School Math Grade	0.005 (0.48)	0.003 (0.38)
Number of High Schools	0.003 (0.73)	0.002 (0.69)
Unemployment rate for youth	-.003 (0.82)	-0.001 (.46)
Year Effects	YES	YES
Province Effects	YES	YES
R ²	0.064	NA
Sample Size	13548	13548

Notes: Persistence is a 0-1 variable equal to one if the respondent persists. Year One, Two, or Three are indicator variables refers to the number of academic years after high school completion with the adjustment for Quebec. Female equals one if respondent is female. Born in Canada equals one if respondent is born in Canada. Two parent family equals one if respondent spent most of high school with two adults. If at least one parent had some university then Parent with University equals one. If the youth perceived that the value of education beyond high school was either “fairly important” or “very important” to either parent, the value of Positive Parental Attitude equals one. The variables High School Grade and High School Math Grade take on values of 9 through 5 where 9 is the highest grade (over 90%) and 5 is the lowest grade of less than 50%. Year Effects are Canada-wide dummy variables for the pairs of academic years. Province dummy variables represent effects in a province in each year.

Probit marginal effects were calculated at the mean of the high school grades and number of high schools as well as the mean unemployment rate. All other marginal effects represent effects of moving from a value of zero to a value of one in the indicator variable.

Prob. Values are calculated with robust standard errors clustered at the individual level. There are about 7500 individuals (clusters) in the data. Parameters from estimates represent parameter values for Canadian youth aged 15, 18, 19 and 20 on December 31, 1999 who ever entered university.

Table 4. Coefficients on tuition variables in the persistence decision when models are estimated without indicator variables for year or province effects

Tuition Measure	LPM (Prob. Value)	Probit Sign, (Prob. Value)
Level of Nominal Tuition	-0.000 (0.92)	0.0016 (0.73)
Level of Real Tuition and Fees	-0.0037 (0.53)	-0.0023 (0.66)
Level of Net Real Tuition	-0.0078 (0.24)	-0.0066. (0.32)
Change in Level of Real Tuition and Fees	0.028 (0.13)	0.025 (0.13)
Change in Level of Net Real Tuition and Fees	0.026 (0.12)	0.023 (0.14)
Level and Change in Real Tuition	Level	-0.0050 (0.39)
	Change	0.0325 (0.08)
Year Effects	NO	NO
Province Effects	NO	NO

Notes: The variables added to the list of social and economic variable in Table 3 are the tuition measures in the left-hand column. The level or change in tuition is measured in both current or 1992 dollars where the units are thousands of dollars. These are added separately to the models estimated and presented in Table 3. Standard errors are estimated robustly with clusters and survey weights at the individual level.

Table 5. Coefficients on tuition variables in the persistence decision when models are estimated with indicator variables for years and without indicator variables for province effects

Tuition Measure	LPM (Prob. Value)	Probit Sign, (Prob. Value)
Level of Nominal Tuition	-0.0064 (0.18)	-0.0049(0.21)
Level of Real Tuition and Fees	-0.0050 (0.38)	-0.0034 (0.44)
Level of Net Real Tuition	-0.0040 (0.55)	-0.0026 (0.62)
Change in Level of Real Tuition and Fees	0.0062 (0.74)	-0.00041 (0.97)
Change in Level of Net Real Tuition and Fees	0.025 (0.27)	0.011 (0.51)
Level and Change in Real Tuition	Level	-0.0022 (0.27)
	Change	-0.0054 (0.35)
Year Effects	YES	YES
Province Effects	NO	NO

Notes: The variables added to the list of social and economic variable in Table 3 are the tuition measures in the left-hand column. The level or change in tuition is measured in both current or 1992 dollars where the units are thousands of dollars. These are added separately to the models estimated and presented in Table 3. Standard errors are estimated robustly with clusters and survey weights at the individual level.

Table 6. Coefficients on tuition variables in the persistence decision when models are estimated without indicator variables for year and with indicator variables for province effects

Tuition Measure	LPM (Prob. Value)	Probit Sign, (Prob. Value)
Level of Nominal Tuition	0.063 (0.12)	0.071 (0.00)
Level of Real Tuition and Fees	0.024 (0.21)	0.018 (0.15)
Level of Net Real Tuition	-.032 (0.12)	-0.025 (0.06)
Change in Level of Real Tuition and Fees	0.045 (0.07)	0.027 (0.06)
Change in Level of Net Real Tuition and Fees	0.031 (0.16)	0.018 (0.18)
Level and Change in Real Tuition	Level	-0.014 (0.57)
	Change	0.058 (0.09)
Year Effects	NO	NO
Province Effects	YES	YES

Notes: The variables added to the list of social and economic variable in Table 3 are the tuition measures in the left-hand column. The level or change in tuition is measured in both current or 1992 dollars where the units are thousands of dollars. These are added separately to the models estimated and presented in Table 3. Standard errors are estimated robustly with clusters and survey weights at the individual level.

Table 7. Coefficients on tuition variables in the persistence decision with a Canada-wide trend effect and indicator variables representing province effects

Tuition Measure	LPM (Prob. Value)	Probit Marginal Effect (Prob. Value)
Level of Nominal Tuition	0.0013 (0.94)	-0.0063 (0.72)
Level of Real Tuition and Fees	-0.0023 (0.90)	-0.0042 (0.81)
Level of Net Real Tuition	-0.0015 (0.94)	-0.0013 (0.94)
Change in Level of Real Tuition and Fees	0.019 (0.46)	0.018 (0.43)
Change in Level of Net Real Tuition and Fees	0.008 (0.72)	0.0056 (0.80)
Level and Change in Real Tuition	Level	-0.033 (0.20)
	Change	0.047 (.18)
Year Effects	Replaced by trend variable	
Province Effects	YES	YES

Notes: The variables added to the list of social and economic variable in Table 3 are the tuition measures in the left-hand column. The level or change in tuition is measured in both current or 1992 dollars where the units are thousands of dollars. These are added separately to the models estimated and presented in Table 3. Standard errors are estimated robustly with clusters and survey weights at the individual level.

Table 8. Coefficients on tuition variables in the persistence decision with indicator variables for year and province fixed effects

Tuition Measure	LPM (Prob. Value)	Probit Marginal Effect (Prob. Value)
Level of Nominal Tuition	0.0033 (.85)	-0.0034 (0.67)
Level of Real Tuition and Fees	-0.0014 (.94)	-0.0027 (.74)
Level of Net Real Tuition	0.0086 (.70)	0.0026 (.79)
Change in Level of Real Tuition and Fees	0.016 (.54)	0.0013 (.91)
Change in Level of Net Real Tuition and Fees	0.028 (.37)	0.0031 (.82)
Level and Change in Real Tuition	Level	-0.029 (0.27)
	Change	0.0433 (0.26)
Year Effects	YES	YES
Province Effects	YES	YES

Notes: The variables added to the list of social and economic variable in Table 3 are the tuition measures in the left-hand column. The level or change in tuition is measured in both current or 1992 dollars where the units are thousands of dollars. These are added separately to the models estimated and presented in Table 3. Standard errors are estimated robustly with clusters and survey weights at the individual level.

Table 9. Coefficients on tuition variables and tuition variables interacted with parental education variable in the persistence decision with indicator variables for year and province fixed effects

Tuition Measure	Model	LPM (Prob. Value)	Probit (Prob. Value)
Level of Nominal Tuition	Base	0.007 (0.69)	-0.0010 (0.91)
	Ed. Int.	-0.0058 (0.69)	-0.0046 (0.52)
Level of Real Tuition and Fees	Base	0.0002 (0.99)	-0.0018 (0.84)
	Ed. Int.	-0.0029 (0.80)	-0.0016 (0.82)
Level of Net Real Tuition	Base	0.0092 (0.70)	0.0021 (0.82)
	Ed. Int.	-0.0009 (0.94)	0.00036 (0.96)
Change in Level of Real Tuition and Fees	Base	0.0034 (0.92)	-0.0066 (0.68)
	Ed. Int.	0.0237 (0.51)	0.0145 (0.43)
Change in Level of Net Real Tuition and Fees	Base	0.021 (0.57)	-0.0031 (0.47)
	Ed. Int.	0.012 (0.69)	0.0113 (0.53)
Year Effects		YES	YES
Province Fixed Effects		YES	YES

Notes: The variables added to the list of social and economic variable in Table 3 are the tuition measures in the left-hand column. The level or change in tuition is measured in both current or 1992 dollars where the units are thousands of dollars. These are added separately to the models estimated and presented in Table 3. Standard errors are estimated robustly with clusters and survey weights at the individual level.

Appendix A: Supplementary Tables and Figures**Table A-1.** The structure of the “normal” path through Four Years of University in the YITS Surveys

INITIAL YEAR	NEXT YEAR	AGE	GRADE		AGE	GRADE		AGE	GRADE		AGE	GRADE	
		YITS A	(non ON, ON(QC) QC)	YITS B	(non ON, ON(QC) QC)	YITS B	(non ON, ON(QC) QC)	YITS B	(non ON, ON(QC) QC)	YITS B	(non ON, ON(QC) QC)		
1996-97	1997-98	12			15	10	10	16	11	11	17	12	12 (CEGEP 1)
1997-98	1998-99	13			16	11	11	17	12	12 (CEGEP 1)	18	YEAR 1	13 (CEGEP 2)
1998-99	1999-00	14			17	12	12 (CEGEP 1)	18	YEAR 1	13 (CEGEP 2)	19	YEAR 2	year 1
1999-00	2000-01	15	10	10	18	YEAR 1	13 (CEGEP 2)	19	YEAR 2	year 1	20	YEAR 3	year 2
2000-01	2001-02	16	11	11	19	YEAR 2	year 1	20	YEAR 3	year 2	21	YEAR 4	year 3
2001-02	2002-03	17	12	12 (CEGEP 1)	20	YEAR 3	year 2	21	YEAR 4	year 3	22		year 4
2002-03	2003-04	18	YEAR 1	13 (CEGEP 2)	21	YEAR 4	year 3	22		year 4	23		
2003-04		19	YEAR 2	year 1	22		year 4	23			24		

Notes: Ages refers to the normal age of the respondent in the first academic year of the pair of academic years. 8 provinces, excluding Ontario and Quebec (ON and QC) normally graduate students from high school at the end of Grade 12. Students are normally 15 years of age in Grade 10. In Ontario, during the period studied, students normally graduated high school at the end of Grade 13. In Quebec, students who are university bound normally graduate high school at the end of Grade 11 (Year 5 in Quebec terminology since high school starts in Grade 7) and then complete two years at CEGEP. University programs are normally either three or four years to degree completion.

Table A-2. Reports of the coefficients on year-effect and province effect indicator variables in the linear probability models in Table 2 as well as the trend variable used in place of year effects

Coefficient on indicator variable for year fixed effect in Table 3. Estimate (Prob. Value)	
These are estimated with province fixed effects	
1996-97 to 1997-98	0.067 (0.01)
1997-98 to 1998-99	-0.11 (0.00)
1998-99 to 1999-00	-0.09 (0.00)
1999-00 to 2000-01	-0.07 (0.00)
2000-01 to 2001-02	-0.066 (0.00)
2001-02 to 2002-03	-0.010 (0.15)
2002-03 to 2003-04	Omitted dummy
Coefficient on Trend without year fixed effects but with province fixed effects	
Trend	0.027 (0.00)
Coefficients on indicator variable for province fixed effects in Table 3.	
These are estimated with year fixed effects.	
B.C.	-0.027 (0.21)
Alberta	-0.060 (0.02)
Sask.	-0.035 (0.17)
Manitoba	-0.033 (0.24)
Ontario	Omitted dummy
Quebec	0.020 (0.14)
N.B.	-0.015 (0.51)
N.S	-0.038 (0.17)
P.E.I.	0.032 (0.38)
Nfld	-0.028 (0.56)

27 University Tuition and Persistence: An Inter-Provincial Comparison

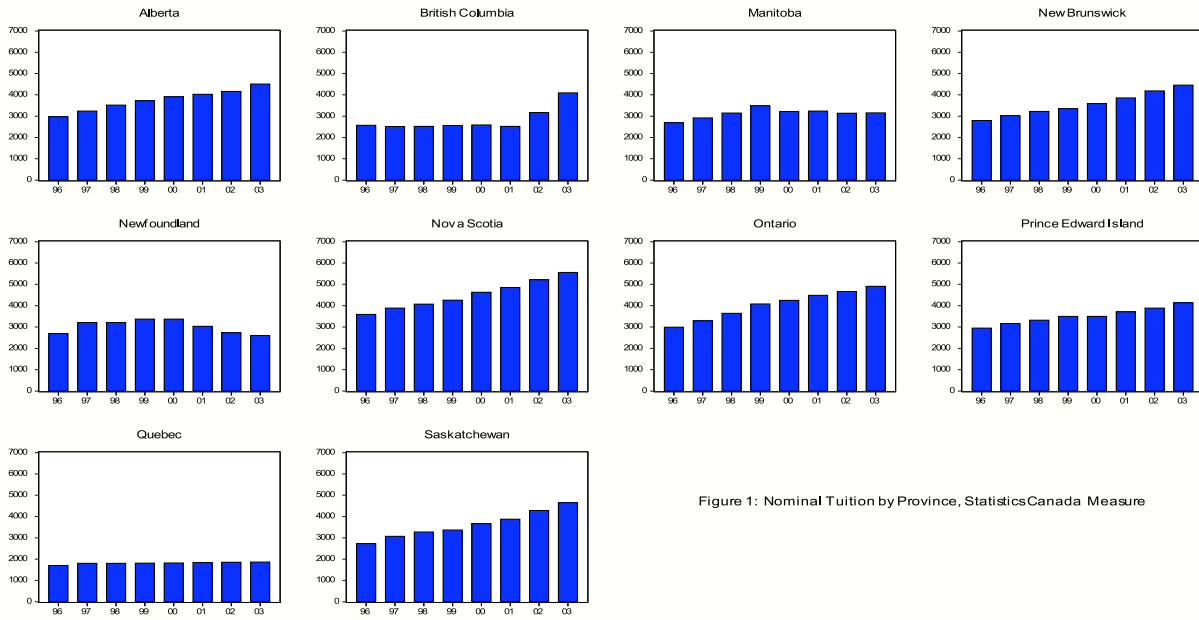


Figure 1: Nominal Tuition by Province, StatisticsCanada Measure

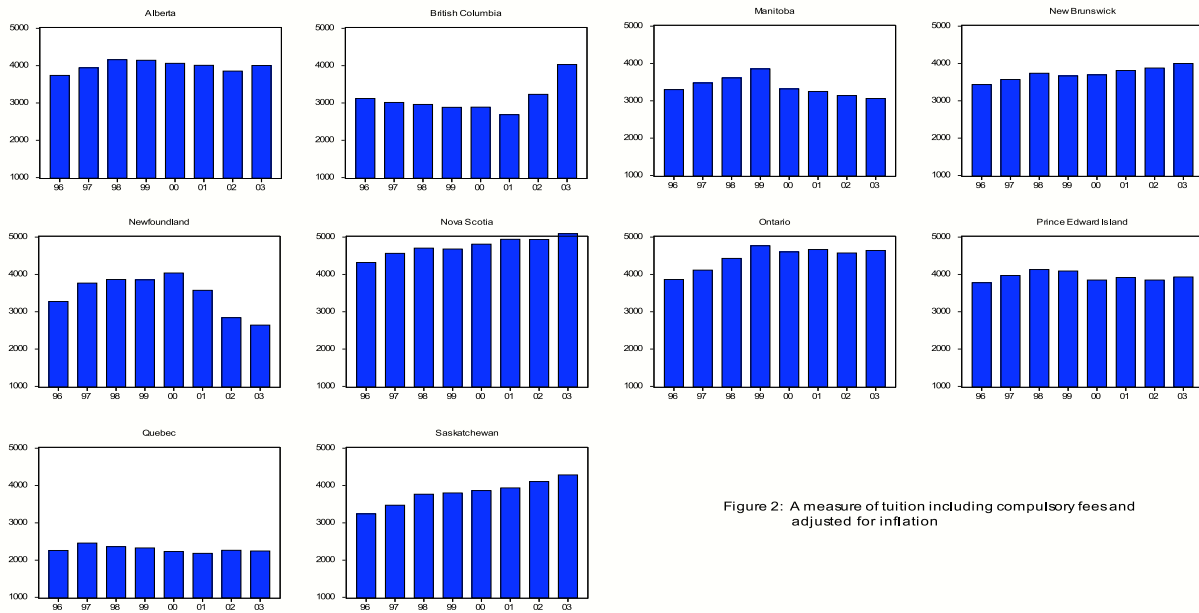


Figure 2: A measure of tuition including compulsory fees and adjusted for inflation

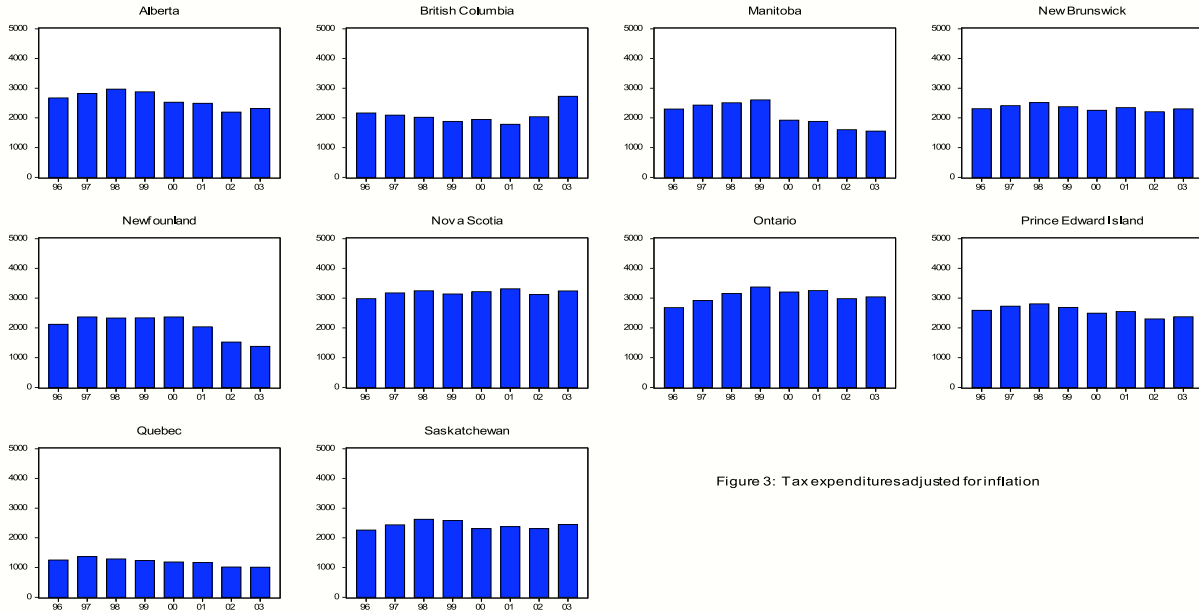


Figure 3: Tax expenditures adjusted for inflation

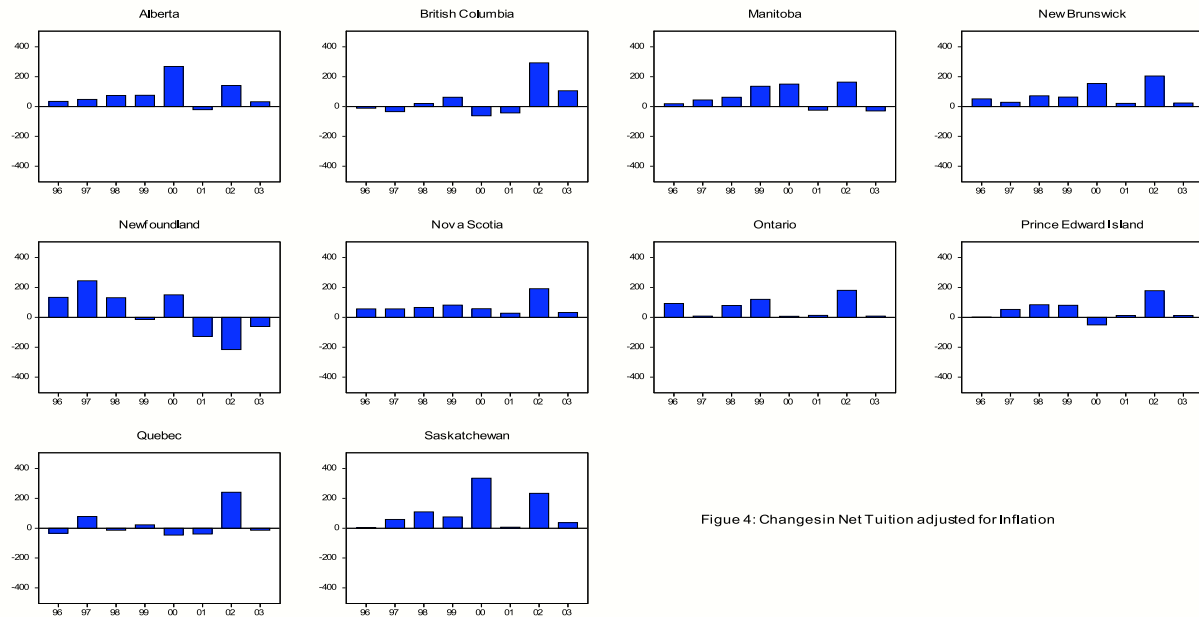


Figure 4: Changes in Net Tuition adjusted for Inflation