

Access and Persistence of Students from Low-Income Backgrounds in Canadian Post-Secondary Education: A Review of the Literature

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Abstract

Whether to attend a post-secondary education (PSE) institution, which one to attend, and how to complete its degree or diploma requirements are extraordinary complex decisions faced by millions of young Canadians. Factors such as financial considerations, family background, information constraints and inherent ability all interact to determine whether or not young Canadians will attend, and ultimately graduate from, any one of the variety of PSE institutions across the country. Until recently, the study of these decisions in Canada has been hindered by a general lack of policy interest as well as the lack of appropriate data to adequately tackle these complex questions. This paper attempts to review the state of knowledge regarding access to and persistence in PSE in Canada, with emphasis on the experiences of students from low-income families, a group which has historically not benefited from publicly financed PSE as much as those from middle- and high-income families, yet whose participation is seen as fundamental to Canada's competitiveness in the global knowledge-based economy. The focus is on the empirical work done in this area in Canada, as well as the United States, since there are many similarities in the educational systems between the two countries and studies in these areas have generally advanced further south of the border. The purpose is to assist researchers in accessing the state of knowledge and seeking new avenues of policy-relevant research for Canada.

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I. Introduction

The Canadian system of higher education has historically been viewed as functioning reasonably well as assessed by its ability to attract eligible students from diverse backgrounds. This perception was undoubtedly due to the fact that post-secondary education was conducted at public institutions where tuition and other fees were considered to be affordable. And for those students who came from more modest family backgrounds, there were government-subsidized student loans available to bridge the short-term financing gap. There may have been some problems with access to post-secondary education, but the system was reasonably fair and that those high school students who desired a post-secondary education could attain it.

This perception began to change in the 1990s. Public institutions were forced to do their part when provincial governments cut spending and the pressure of competition from abroad and private institutions within Canada started to be felt. Provincial governments across Canada started scrutinizing what occurred in their ivory towers and the governments' business agendas dictated that these institutions provide performance indicators to justify continued funding increases. Universities responded by discussing public accountability and quality (although often unable to define either), and increasing tuition fees to partially offset declines in provincial government grants. Student loans programs often failed to keep pace with the increasing costs of attending post-secondary institutions.

As a result, the concern of policy makers and academics recently has been how accessible is post-secondary education (PSE) in Canada to students from low-income backgrounds given the increasing costs of attendance? Have these cost increases had a more profound negative effect on students from families with more modest or lower incomes? Furthermore, accountability as well as revenue considerations have led these same institutions to concern themselves with retention and graduation rates: it is one thing to admit students (i.e., access); it is another to ensure that they make reasonable progress towards graduation (i.e., persistence).

The popular perception in Canada is that post-secondary education has become less accessible as tuition increases have continued to outpace the rate of inflation, and student indebtedness continues to rise. If true, in essence these changes have the potential to put PSE out of the reach of many Canadians, especially those from low-income families. Indeed, data show that over the past 40 years, students have become increasingly reliant on part-time work during the school years and student assistance (both grants and loans, but especially the latter) to finance their education. At the same time, parental contributions have declined sharply (Cervenak and Usher, 2004), and student borrowing has increased, as has the debt-to-earnings ratio, resulting in some students struggling to pay back their loans (Finnie, 2002). Still, demand for PSE has increased over this period of time due, at least in part, to the increased rates of return versus only a high school diploma (Boothby and Drewes, 2006).

The purpose of this paper is to summarize the state of knowledge in regard to access and persistence of students in PSE, especially amongst students from low-income families. In particular what factors have been shown to influence a student's ability to attend PSE and also to remain in PSE over the longer term (presumably to graduation). The volume of literature available for this study is large; to keep the review more manageable and more focused, it is necessary to work within certain parameters. Thus, the studies reviewed will be limited to those that address the factors behind post-secondary education access and persistence in Canada and the US. This is because of the similarities between the US and Canadian systems of PSE and also because the literature on the US is, in general, further advanced than in Canada. This is likely due to the availability of data in the US, the sheer number of researchers in the area being larger than in Canada, and (arguably more recently), concerns about the widening distribution of income in the US and its impact on the attainability of PSE for low-income groups. Furthermore, what follows will focus more on studies that use more sophisticated empirical techniques; the attendance and

persistence decisions of young people are complex and studies that use only simple correlations, do not add much light to this complex issue, although these types of studies are sometimes useful for providing stylized facts that can be used in empirical modeling.

In what follows, emphasis will be placed on the recent literature that employs empirical modeling; Junor and Usher (2004), Looker and Lowe (2001) and Looker (2001) provided excellent and more comprehensive reviews of the literature. De Broucker (2005) also provides a good review of the factors that limit the access and persistence of low-income students.¹ Finally, this paper will not discuss the current Canadian data available. Readers interested in this topic should see Junor and Usher (2004) and Statistics Canada and CMEC (2003) for comprehensive reviews of the Canadian microdata available which might be useful to researchers.

The paper is divided as follows: the next section will address the current state of knowledge about access to PSE in both Canada and the United States. Section III addresses what we currently know about persistence in PSE. Section IV discusses some of the policy implications, and the final section concludes and offers some advice for how researchers might proceed in studying PSE in Canada.

II. Access to Post-Secondary Education

In its simplest form, human capital theory says that individuals will pursue an education up to the point where the increase in the expected present value of the education (in terms of lifetime salary) net of the direct and indirect costs of the education is positive. In the presence of perfect information and efficient credit markets, the implication of this is that even students from low-income families would find pursuing higher education as worthwhile as those from higher-income families, all else equal. Further, this theory would suggest that the form of financing of PSE does not matter so that, say, a grant for an entering student would have the same effect as the equivalent decrease in tuition or an equal credit on income taxes. In other words, basic human capital theory suggests that there do not exist barriers to entering PSE.

Despite the theory, it is well known that high school students from lower-income families are much less likely to attend postsecondary education than those from more affluent backgrounds. There may be a number of reasons for this: the cost of higher education may be perceived as too high, and this maybe exacerbated if the information given to low-income students -- whether by their parents, high school counsellors, or others -- is incorrect. These students may not understand the value of PSE in terms of future earnings, or they may apply a discount rate that is too high (thus underestimating the present value of future earnings), or they may be risk averse and so not want to borrow to finance an education. Furthermore, students are human, are assumed to maximize utility, and will therefore take other factors other than the rate of return into account when deciding whether to pursue a post-secondary education. Furthermore, although there seems to be an emerging consensus on the variables that are important in the decision to access PSE, there is less agreement on the pathways taken, and this provides methodological and empirical challenges for researchers. For example, students may access PSE right out of high school, or they may delay entering for a year or more. They may choose between various types of PSE – university, college, or trade-vocational schools – or they may elect not to attend at all.²

The existing evidence on each of these factors will be considered in turn.

¹ The accompanying tables to this paper (de Broucker and Mortimer, 2005) provide a deeper look at many of the studies in this current work. Ehrenberg (2004) provides a brief, but very comprehensive review of (mainly) recent econometric studies of higher education with emphasis on the US. Long (2005) also has an excellent review of the US literature.

² To give but a few examples of the diversity in the recent Canadian literature, Christophides, et al. (2001) model access as a decision between attending and not attending PSE. Butlin (1999) divides the PSE attendance decision into university, community college and trade-vocational schools. Adding a time dimension to the modeling exercise, Tomkiewicz and Bushnik (2003) divide high school graduates into those who access PSE right away, those who delay, and those who do not attend at all.

A. Financial Considerations

Researchers have spent a considerable amount of time and effort addressing the impact of finances on access to PSE. Most of the recent research in Canada has focused on the impact of the tuition increases that occurred in the 1990s as some provincial governments cut funding to colleges and universities and, as transfers to post-secondary institutions declined, tuition increased to fill the funding gap (Finnie and Usher, 2005). Current research debates the full impact of tuition increases and if these have resulted in decreased student enrolments, particularly those from low-income families since it is this group that may be more sensitive to tuition hikes compared to families with higher incomes.

Junor and Usher (2004), in their extensive review, look at simple trends in tuition and PSE participation and find little evidence to suggest that tuition has been a barrier to PSE access overall. By contrast, Johnson and Rahman (2005) find that including province-specific trend variables in the model results in higher tuition fees reducing participation. They also find that the opportunity costs of attendance, as well as the expected payoff of university education are also important in determining the probability of participation. Similarly, Neill (2005) includes both year and province fixed effects and treats tuition as endogenous in her model. She too finds a negative relationship between tuition and participation, even though there is little overall correlation between fees and enrolments.

Strictly in terms of the participation of students from lower-income families, Coelli (2005) finds these tuition increases in the late-1990s had a negative impact on the university attendance rates of individuals from low-income families, and a smaller effect on those from middle- and high-income backgrounds. The effect of tuition increases on attendance at non-university PSE institutions was essentially zero, with no discernable differences amongst parental income levels. De Broucker (2005) reviews the Canadian literature and finds that the university attendance gap between children from low-income and high-income families is consistent in the literature, and there is no evidence that the gap has widened over time, despite the fear amongst many that participation amongst low-income families would decline as tuition increased dramatically in the 1990s. He argues that financial considerations are but one of many determinants of PSE attendance. Similarly, Drolet (2005) finds that the relationship between participation in PSE and parental income remained rather stable over the 1990s, despite this being a period of rapid tuition increases in Canada.

Christophides, et al. (2001) use data from seven years of the Survey of Consumer Finance (SCF) between 1975 and 1993 and find that the PSE participation rates of 18 to 24 year-olds increased, but the increase was larger for children from families in the lowest income quantile. Higher incomes explain some of this increase in participation rates, but there is still a strong secular increase in participation from all income groups – especially lower income groups – so that participation convergence occurred. Tuition, however, is generally an insignificant predictor of PSE participation. This may have to do with the time period studied when there was little variation across provinces in real tuition fees and annual increases were small as compared to the large rises in the years after this study. Corak, et al. (2003) use more recent data -- three waves of the General Social Survey, 1986, 1994, and 2001 – but also find that tuition had little impact on the participation of PSE students, largely because increases in student loan availability kept pace with tuition increases in the 1990s.³ They found that parental income is important for university attendance, but not for PSE in general, since participation in college is not as sensitive to income as university participation.

Frenette (2005b) investigates this latter point further. He uses an ordinal probit model with three choices: university, college and no PSE. He finds that there are not significant differences in the probability of college attendance between income quartiles. He argues that these results are misleading, however, since he also finds that the probability of college attendance is lower amongst lower-income students when the sample is limited to those who did not attend university. Drolet (2005) looks at the attendance gap somewhat differently, but still finds a similar result. Conditioning her sample on those young people

³ In the United States, the situation was somewhat different since tuition also increased from the mid-1980s through mid-1990s but government financial assistance to universities decreased, causing net tuition to rise. This had the most profound impact on low-income students (McPherson and Schapiro, 1997).

who did not go to university, she finds that the college attendance rate between young people from high-income and low-income families is similar to that for university attendance. These studies imply that the PSE attendance gap is narrowed when we include colleges as well as universities, but young-people from low-income families are less likely to attend either type of institution.

The limitation of many of these studies is that they generally use a dummy variable for participation in PSE using cross-sectional data and define participation in a number of different ways, both of which could bias the estimates. For example, Rivard and Raymond (2004) argue that students who are already in the system (and thus nearer to graduation) are less likely to be affected by tuition increases. This biases estimates of the tuition effect on participation. They look at entry into PSE using the Youth in Transition Survey (YITS) and find that the transition into PSE from high school is not particularly sensitive to family income or tuition. More important factors were academic preparation and parental education. They too argue that government student loans were able to meet the growing tuition burden in the 1990s and/or the increased returns to education over this period made PSE completion worthwhile, even if tuition increased. More recently, Frenette (2007) arrives at a similar result. Also using the YITS, he finds that most of the gap in university attendance rates between students from low- and high-income families can be explained by high school marks, scores on standardized tests, etc., although these are likely correlated with family income.

In the US the results are generally supportive of the hypothesis that tuition does have a negative effect on participation. In separate reviews of the US literature, Leslie and Brinkman (1997) and Heller (1997) find that the demand curve for higher education is downward sloping and that enrolment decisions of lower-income students are much more sensitive to tuition pricing and aid packages. In other words, students from low-income families are more sensitive to the net price of higher education. In the US, however, the variation in tuition prices is much higher than in Canada which could be driving the significance of these results.

In the United States, there has been a lively debate about the effects of student loans on post-secondary participation and whether there exists a credit constraint which effectively stops some students, especially those from low-income families from attending. If credit markets are functioning properly and students are not debt-averse and have perfect information, then credit markets should relax any financial constraints of PSE attendance, a factor especially relevant for students from low-income families. Keane and Wolpin (2001) use post-estimation simulations of their dynamic model of college education attainment and find that relaxing the borrowing constraint has little effect on school attainment. They do, however, find that it does increase net borrowing by students, but that these resources were used to reduce market work and increase consumption while in college. Similarly, Cameron and Heckman (2001) cast doubt on the lack of financial aid explanation for low attendance amongst students from low-income families. Carneiro and Heckman (2002) review the US literature and add new evidence supporting the paramount importance of long-term factors, such as family background, over short-term factors, such as credit constraints. Since many of these factors are correlated with family income in the short-term period when PSE decisions are made, it is often erroneously stated that this short-term credit constraint is what prohibits low-income individuals from attending PSE. The implication is that policy should be directed towards students earlier in life if the long-term goal is to increase PSE participation.

In Canada, Finnie (2000) used the National Graduates Survey for four graduating classes between 1982 and 1995, and finds that the use of student loans has been increasing and repayment problems have been increasing as well. Allen, Harris and Butlin (2003), using essentially the same data, have similar findings. Both studies show that the state of the economy (i.e., lower incomes, higher unemployment, etc.) affects the ability of graduates to pay back loans. Furthermore, college graduates are more likely to have these problems than those with a university degree. The limitation of both these studies is that they suffer from sample selection bias since only PSE graduates were surveyed in the data. As a result, the authors have no way of knowing how many students either did not pursue PSE or left before completing their education owing to concerns about high-debt burdens. In short, these results do not tell us if credit markets are functioning to assist students in accessing PSE, but that repayment problems are most common amongst college graduates who enter a poor labour market.

More recently, Finnie and Laporte (2007) use a sample of 17 to 24 year-olds from the 2002 Post-Secondary Education Participation Survey (PEPS) and show that about two-thirds of the sample had accessed PSE at the time of the interview. About one-third of these had taken out a student loan and about 70 per cent of this group said that they would not have been able to pursue PSE without these loans. Other loan holders pointed to the wider range of options available to them as a result of the loans. In any case, the rate of borrowing was higher among those students from lower socio-economic backgrounds (as measured by parental education or family income). They further argue that the loans system does appear to be working in aiding young Canadians to access PSE and that non-monetary factors (such as family background) should be looked at if the policy goal is to increase PSE participation rates. Using these same data, Finnie and Laporte (2006) argue that students with loans from private sources and who work during school may be evidence of unmet need in the government loan system.

Although the availability of student loans may assist some students to participate in PSE, there are still distributional implications involved. Kapsalis (2006) notes that use of the Canada Student Loans Program (CSLP) increases as parental income decreases. More encouraging is that this same report notes that the average loan amongst students from low-income families is only slightly more than that of students from high-income families; a factor likely due, at least in part, to higher attendance in colleges (which cost less) amongst low-income families. Given that those with college diplomas will be paid less on average than those with university degrees, the loan burden as a percentage of income could be greater for low-income students.

While student debt is the emphasis of Canadian studies, there is also evidence from the US that the debt load of parents has increased as well (Hemingway and McMullen, 2004), even though the US has government-sponsored PSE loan programs which do not exist in Canada. This means that some Canadian families too may be taking out private loans in order to finance their children's education. The implication of this is that low-income families would likely be paying higher interest rate to do so, if in fact they are successful at receiving private bank loans. Furthermore, students may reduce the number of classes they take in order to work, interrupt or drop out of their studies, or opt for shorter programs in colleges rather than attend university. All are potentially undesirable effects of paying for higher education.

While it is theoretically straightforward to determine the impact of financial aid (of any type) on access to PSE, empirically it is much more difficult. Part of the problem is that financial aid is correlated with many individual characteristics that also have an influence on education, so omitting these variables from standard regressions biases the estimated effect of any aid. To circumvent this problem of endogeneity, Dynarski (2003) uses changes in the US Social Security Benefit Program which paid students -- with a deceased, disabled or retired parent -- a monthly payment while enrolled full-time in PSE. This program was dropped in the early 1980s and thus provides a natural experiment with the amount of aid an exogenous variable. She finds that aid increases both the probability of attending college as well as educational attainment. In other words, both access and persistence are enhanced. In her words, "... aid has a 'threshold effect': a student who has crossed the hurdle of entry with the assistance of aid is more likely to continue schooling later in life than one who has never attempted college" (p. 4). Her quantitative results are consistent with previous estimates using cross-sectional data. She argues that biases in the cross-section are offsetting. Also, her results suggest that: "A relatively inexpensive way for government to increase the impact of the student aid programs would be to reverse these incentives, so that those considering college entry are offered the most generous subsidies" (p. 37).

In Dynarski (2002) she also uses a natural experiment, namely the introduction of the HOPE Scholarships in Georgia in 1993 which gave money to Georgia high-school students who graduated with an average of B or higher. She concludes that the introduction of these scholarships increased attendance, but mainly for upper-income and white students. She argues that this is because larger proportion of low-income black youths do not meet the academic standards of this scholarship and also due to the fact that the HOPE Scholarship is reduced dollar-for-dollar if a needs-based Pell Grant is received. In other words, the HOPE is taxed at a marginal rate of 100 per cent. In a related paper (Dynarski, 2004a) she finds that programs in other states are more beneficial to minorities since they have lower GPA requirements and do not claw back needs-based merit grants like the Georgia program. In an earlier paper (Dynarski, 2000)

and not surprisingly, she finds that merit-based HOPE Scholarships widened the attendance gap between blacks and whites, and between those from low- and high-income families.

Exacerbating the attendance gaps in the US has been the trend towards more merit-based aid and tax credits rather than increases in the needs-based aid. This is largely the result of political pressure from the middle class which has seen dramatic tuition increases at both private and public institutions (Ehrenberg, 2005).⁴ It is also the result of increasing competition amongst institutions to attract the best students. Since merit (based on standardized test scores) is correlated with family income, as institutions increase the number of merit aid recipients, proportion of Pell Grant recipients falls (Ehrenberg, Zhang and Levin, 2006). Furthermore, the Pell grant program has not kept pace with increasing tuition costs, resulting in the growth of student loans to finance higher education (Price, 2004). This is likely to result in students from lower-income families being disadvantaged. As Schwartz (1985) has shown, of the four different types of aid given to high school students upon entry into college, only public grants increase the probability of enrolment. While he does not test for this directly, he argues that students from lower-income families should be affected most since public grants are inversely related to parental income. Neither public nor private loans, nor private grants have any significant effect on enrolments. This may be due to the fact that they are not targeted and go to individuals who would have attended without these funds. More recently, Ehrenberg (2005) cites a number of studies which show that eliminating loans from the financial aid packages of a number of Ivy League institutions has increased the enrolment of students from lower-income families.

In Canada too, the amount of needs-based aid has recently decreased in real terms at the same time that non-needs-based aid has increased (Finnie and Usher, 2005). Gucciardi (2004) discusses the increase in the number of merit-based scholarships in Canada over the past 15 years. Although these merit scholarships have become increasingly diverse (for example, awarded for both merit and need), the majority of these scholarships are still awarded based on academic achievement; most are given to first year students on a non-renewable basis and represent a relatively small amount of the total costs of education (about \$1000). This modest value, coupled with the increase in the number of students being offered these scholarships, leads the author to argue that “. . . their purpose is less about outstanding merit and more about managing enrolment” (p. 9). This means that many low-income students could be shut out of this type of aid. She also notes that it is not clear that these merit scholarships improve students' probability of success at post-secondary education, and there is clearly a need for more Canadian research in this area. In terms of resource allocation, this result also suggests that government and private money might be better spent elsewhere. Similarly, Ouelette (2006) uses the PEPS and finds that while 29 per cent of PSE students in 2001-02 received some form of grant or scholarship, the dollar amounts were only large enough to cover the full education costs for five per cent of all students.

Even needs-based assistance itself in Canada is largely a misnomer, and it could be an inefficient means of helping low-income students. Much of this aid is actually targeted towards higher-income students, based on the ease at which students in Canada are able to claim independent status (generally deemed to have no parental support) and thus are eligible for higher amounts of aid, even if their families continue to provide support. Furthermore, the “need” of student is increased if she is attending an institution or program that is more expensive (e.g., university instead of college or medical school instead of general arts). The conclusion is that high need and low income are not necessarily positively correlated. Usher, 2004b: 21) notes that: “The real way to get grants is to study expensively, refrain from working, and move away from home. Is this the message Canadian governments want to send to students?” Thus, the author recommends that the Canadian system move toward that of most other countries, including the US, where income-based grants are more prevalent, despite being continuously eroded by merit-based aid.

While the costs of tuition and the availability of loans and grant aid have attracted the attention of researchers, these are not the most common forms of PSE financing in Canada, either in terms of usage

⁴ Ironically, it is taxpayers who called for state tax cuts following the Reagan tax cuts in the 1980s. This has left public many institutions not sufficiently funded. Furthermore, although tuition increases at public and private institutions have been roughly the same over the past 30 years, the private institutions started with a larger base, resulting in an increased dollar funding gap between the two types of institutions.

or amount of funds coming from these sources. Usalcas and Bowlby (2006) use the PEPS and find that, although money from personal savings was the most common source of funds for financing PSE, money from employment was the largest dollar amount of funds used. Of course, low-income students may not have the savings and thus would not be included in this figure. Another popular alternative is working while studying, and both the probability of working as well as the number of hours worked per week by Canadian post-secondary students during the academic year appears to be on the rise (Usalcas and Bowlby, 2006). Junor and Usher (2004) note that students work to pay for their education-related expenses, to sustain a certain lifestyle, or to gain work experience that will enhance their future prospects. They cite a couple of sources which indicate that amongst students who work, the first reason is the most important. However, amongst all students only about one-third cited the need to work to pay for education, which gives rise to the importance of the other two reasons for working. Unfortunately, it is not possible to disentangle wants from needs in these data, nor can students from different income strata be identified.

One of the main limitations of many of the above studies is that they use parental income as a factor that influences PSE attendance. According to Mazumder (2003), there are no studies in the literature which investigate the empirical importance of parental *wealth* (which is largely absent in surveys) as opposed to parental *income* (which is commonly included). This is important for two reasons: (1) it is a serious omission since paying for PSE is often done out of assets (i.e., wealth); and (2) programs that assist in accumulating wealth are likely to become increasingly important in Canada. Furthermore, even if wealth is not used directly to finance PSE, the lack of wealth may cause even high-income families to face a credit constraint and thus impact on their ability to send their children to PSE (Kane, 1994).

Although there are no Canadian studies on family wealth and access to PSE, what little evidence that does exist suggests that programs designed to enhance wealth for the purpose of financing PSE are more likely to benefit families with higher incomes. For example, Milligan (2005) uses the Survey of Financial Security and shows that the use of Registered Education Savings Plans (RESPs) and the related Canada Education Savings Grants (CESGs) is concentrated amongst both high-income families and families where the parents are highly educated, and is in direct conflict with the program's intent of increasing post-secondary education accessibility amongst children from lower-income families. This result is seconded by Shipley, et al. (2003) who use the Survey of Approaches to Educational Planning (SAEP) and show the positive correlation between income quintile and savings for post-secondary education. The CMSF (2005) analyzes two commissioned surveys and shows that family income is positively correlated with the probability of saving for PSE as well as RESP participation. Furthermore, the amount of time those parents have been saving for their children's post-secondary education is also positively correlated with family income. These results mean that children from higher income families will have a larger pool of assets to draw on to finance their college or university. The implication of these studies is that RESPs and similar programs represent a wealth transfer from low- to higher-income groups, as the latter group would be saving for PSE even without the government incentives.

In the US, the results are similar, although the program details are somewhat different. Dynarski (2004b) shows that tax-deductible education savings accounts (ESAs) disproportionately benefit higher-income families. This is because these families are at higher tax brackets (thus saving more immediately by contributing), have children who are more likely to attend PSE (thus lowering the risk of taxes on withdrawals for non-education purposes), and needs-based aid is generally based on assets, including ESAs which does not impact high-income families (but lowers the value of these awards for low-income families). Ma (2004) finds that contributions to ESAs are not made from other savings but rather represent a rise in savings. Her data set, however, is not representative of the population but includes only individuals who are much more educated, have higher incomes, and are wealthier than the average person, and who returned the survey. The result is that the effects of these programs in encouraging individuals with lower-incomes to save cannot be determined from this. Still, she does note that saving for higher education may also encourage families to better plan for it as well.

Dynarski (2004a) shows that the merit-based aid programs in the US have had only a small effect on attendance, suggesting that a large number of those who receive such aid also would have attended without it. College choice, however, is affected by these aid programs with more students selecting four-

year than two-year colleges. As with other commentators, she notes that merit-based aid is likely here to stay because of the political support for such programs. Rather than trying to have this type of aid, which disproportionately benefits middle- and higher-income families, redistributed to lower-income families, she argues that a refundable tax credit for education, similar to the Earned Income Tax Credit in the United States, would be an effective way of delivering aid to needy students through the tax system.

Changing the source of financing may also have an important impact on the decision to attend PSE. Using CPS data from the US, along with a logistic regression model and a difference-in-difference analysis, Long (2004b) finds that tax credits primarily benefited the middle class, as higher-income families were not eligible, and low-income families often had insufficient tax liabilities to take advantage of the credits. The net result on postsecondary enrolments, however, was nil, although some evidence suggests that these students attended more expensive institutions. Exacerbating this outcome was the fact the take-up rates amongst eligible families was low, perhaps because many were unaware of the credits. The effects of these credits may also have been attenuated by the fact that some states reduced appropriations to two-year colleges and some institutions appeared to increase their tuition in response to these credits.

In Canada too, the details of the tax system seem to have important ramifications for PSE access. For example, Junor and Usher (2004) note that the largest financial program in Canada for post-secondary education is tax-based assistance; the benefit of this program is larger than the size of all student loans and grant programs combined, and students can earn almost twice as much as non-students before their income becomes taxable. Despite its size, there has been no research on the effects of this tax-based assistance on accessibility. Collins and Davies (2005) also address the importance of the tax system in Canada, but argue that income taxes following graduation can impact the decisions of young people. They reason that it is not expected income, but net expected income, that drives attendance in PSE. Furthermore, they state that it is usually the direct costs of higher education that are considered by the Canadian public (i.e., tuition, transfers to institutions, etc.), but that tax reforms have lowered taxes on returns to higher education, and this has represented a substantial benefit and hence an encouragement for students to pursue higher education.

B. Information Constraints

While the costs of PSE and how to fund it are paramount in the minds of most policymakers, there is plenty of evidence to suggest that it is a paucity of correct information, rather than a lack of funding, which may drive the PSE participation decisions of many Canadian youth. Junor and Usher (2004), for example, review the available Canadian evidence and quantify three barriers to post-secondary education: academic barriers account for about 10 per cent of the total, followed by financial barriers (20 to 33 per cent) and motivational and information barriers (about 50 per cent). This latter figure is the most worrisome since these young people appear to come from predominantly lower-income backgrounds. While motivational barriers may be difficult to address, information barriers could easily be changed. In fact, one could argue that these two barriers are positively correlated.

One of the major information obstacles is that individuals tend to misestimate the true costs and benefits of postsecondary education. On this topic the survey data paint a rather disturbing portrait. Ipsos-Reid (2004) finds that Canadians overestimate the cost of a university education, while underestimating the benefits in terms of earnings.⁵ Usher (2005) also uses these data and argues that this error is especially large amongst low-income Canadians. Furthermore, erroneous information may prevent young people and their parents from planning appropriately for PSE. CMSF (2005) shows that both high school students and their parents tend to over estimate the probability of obtaining funding from scholarships and government assistance (loans or grants) during the first year of post-secondary education. These results together imply that most families have inadequate savings to finance PSE, especially low-income families. However, like Usher (2005) the report goes on to note that both high-school students and their parents tend to overestimate the actual costs of PSE. It goes on to say that poor grades as well as

⁵ A survey of Alberta high school graduates commissioned by Alberta Learning (Ipsos-Reid, 2001) also found that the costs of PSE as well as debt burdens tended to be overestimated.

financial considerations are the most frequently cited barriers to PSE. The impact of these factors on actual PSE enrolment is unknown, although it is likely that students from low-income families will be affected most since they have both fewer family resources as well as misinformation about tuition levels and the probability of receiving scholarships, grants, or loans. Together these results point to a general lack of information about the costs of PSE, and this could distort the educational options that young people and their families pursue. For example, Shin and Milton (2006) found that enrolments increase at US colleges as the college wage premium increases, but the opportunity to attend PSE could be lost if this premium is underestimated. It may be that youth from lower-income families are more debt averse than other Canadians and thus an equitable access PSE policy might target grants to this group (Finnie 2001).

Leslie and Brinkman (1987) and Kane (1994, 1995, 1999) find that Pell Grants in the United States had little or no impact on access to college, something which could be due to lack of information about this program amongst eligible students. More generally, it also casts doubt on the efficacy of tuition subsidy programs in general which may be used to subsidize the education of those students who would have attended without such aid. In more recent work (Kane, 2003, 2004) finds that programs in California and the District of Columbia have been successful in increasing enrolments of students from low-income families. In the latter case, the program was combined with intensive counselling to high school students in DC, and this likely had a large impact on proportion of students entering college. In other words, relaxing the information constraint may have been an important factor in increasing accessibility. Similarly, Avery and Kane (2004) survey students from low- and high-income areas of Boston. They find that these two groups of students possessed similar information regarding the tuition costs and salary gains of attending college. They discover that mentoring inner-city students interested in attending college increased the probability that these high school students would in fact enrol in college. Mentoring included help with completing applications and scheduling entrance exams. Still, a substantial minority of these students failed to take the appropriate steps necessary to get into college while still expressing a belief that they actually would attend.

In Canada, Brunson, et al. (2001) use a focus group of 62 non-attendees, most of whom felt that increased information about programs and financial aid early in high school would improve participation amongst this group. An analysis of this study, plus the one by Foley (2001), leads Looker (2001) to stress the importance of information in enhancing PSE participation rates. This is especially true of information before high school which would allow students to design the appropriate curriculum to prepare for PSE. Looker and Lowe (2001) also note that information regarding how financial information shapes students' decisions regarding PSE in Canada is sorely lacking, and it is often the students with better information about financial aid who are better able to make appropriate decisions about education. Ironically, it is normally those students with better-educated parents -- and thus less likely to need the aid -- that possess the better information.

For the US, Perna (2004) reviews the literature on the topic and offers similar advice about the lack of appropriate information. This factor is also implied by Kitmitto (2004) who shows that the take-up rates of Pell grants are higher for those continuing their post-secondary studies than for those entering following high school. In a recent paper, Dynarski and Scott-Clayton (2006) argue that the complexity of the federal student aid application process in the US deters students from applying for aid, a factor which disproportionately impacts those with the least ability to pay for higher education.

Barr (2003:11-12) perhaps sums up this quagmire the best:

There are two causes of exclusion: financial poverty and information poverty. Thus any strategy for access needs both to provide resources and to increase information and raise aspirations. The latter is inadequately understood . . . The saddest impediment to access is someone who has never even thought of going to university.

C. Family Background

The above research has shown that financial and information constraints have been important determinants in limiting the access to PSE for many students, especially students from low-income families. These constraints, however, tend to be highly correlated with other aspects of family background which also impact the probability of PSE participation. Knighton and Mirza (2002), for example, use the Survey of Labour and Income Dynamics (SLID) and find that parental education is a stronger predictor of PSE participation than parental income, and this is above all true of participation in university. Similarly, Rahman, et al. (2005) show that youths whose parents had a post-secondary education were much more likely to attend PSE, especially university. Youth from low-income families were much less likely to participate in either college or university compared to those from higher-income families. Cameron and Heckman (2001) use longitudinal US data and argue that the emphasis of credit constraints on the ability of lower-income families to send their children to college is overstated, rather it is the long-term impact of family background that is important. Family income too is important, but not as a short-term means of paying for college, rather because of its long-term ability to better prepare children for college. Similarly, Carneiro and Heckman (2002) review the US literature and add new evidence supporting the paramount importance of long-term factors, such as family background, over short-term factors, such as credit constraints. Since many of these factors are correlated with family income in the short-term period when PSE decisions are made, it is often erroneously stated that this short-term credit constraint is what prohibits low-income individuals from attending PSE. The implication is that PSE participation is determined long before the period immediately preceding enrolment (or not) in higher education institutions and that relaxing short-term credit constraints would only have a minimal effect on participation. This evidence suggests that short-term policies (such as net tuition reduction) are not the most effective at increasing college attendance rates of the targeted populations and this money would be more efficiently utilized at earlier stages in a student's education. Shea (2000), by contrast, uses exogenous changes in parental income to determine its effects on children's' human capital accumulation. He concludes that it has a small impact, but money does matter for families where the father has low education.

For Canada, Drolet (2005) shows the positive relationship between parental and child attendance of PSE and that this affects the probability of attending university more than parental income. Over this same period, Finnie, Laporte and Lascelles (2004) argue that the importance of parental education on the participation of children increased throughout the 1990s for children with highly educated parents, but increased less or even declined for those individuals from families with lower parental education. De Broucker and Underwood (1998) find that this correlation holds across the 11 countries they studied. These results, coupled with the general increase in admissions criteria to Canadian institutions, suggest that parental education, and not parental income, is the more important factor in children accessing PSE.

Finnie, Lascelles and Sweetman (2005) go a step further and find that family background has both indirect and direct effects. Usually regression analysis only captures the total effect, whereas these authors use a block recursive technique which permits the separation of each. They find that parental background is important in determining PSE participation (especially university participation) directly, but also indirectly through its influence on pre-PSE attendance schooling. In other words, parental influence is an important determinant of PSE participation long before the period immediately preceding PSE attendance. In an earlier study, de Broucker and Lavallée (1998) show that importance of parental education on the educational attainment of their children, but they also argue that low parental education can be mitigated with high socio-economic status (as defined by parental occupation). The current family situation, and not just the family background, of potential PSE attendees is also a factor in determining participation. While Butlin (1999) finds that lone-parent versus two-parent families has no significantly different effects on attending any of three levels of PSE (loosely university, college and trades), he does find that having dependent children reduces participation significantly.

After being relatively stable over the 1990s, university (but not college) participation rates have begun to increase in the new millennium. But while demand has increased, capacity or supply may not have increased to the same extent as provinces cut back on provincial funding to universities. Finnie and Usher (2005) use the average entering grades of students compiled in the *Maclean's* magazine annual ranking of Canadian universities. Consistent with excess demand, the average entering high school mark has been increasing over the past decade, although how much of this is due to grade inflation is unclear. Still,

students from low-income backgrounds do tend to be less prepared than their colleagues from higher income backgrounds, so this phenomenon could also hurt access. Similarly, Fortin (2005) uses a simple demand and supply explanation to compare the market for university education in Canada and the United States. She argues that reduced government contributions to universities limit the supply of spaces available, and this becomes a binding constraint which limits access to these institutions. Her econometric estimates confirm this hypothesis. She argues that reduction in provincial grants to Canadian universities fell in the 1990s whereas in the US state grants increased and this explains the flat enrolment growth rates in Canada.

Using a multinomial logit model and the 1995 School Leavers Follow-Up Survey, Butlin (1999) finds that many factors affect the type of post-secondary education pursued (university, college or CEGEP, and trade or vocational), but the only socio-demographic factor that influences PSE attendance is parental level of education (although the study did not simultaneously control for parental income). He also finds that school-related variables such as average high school grades (especially in math and English or French), student participation in class and extra-curricular activities affect attendance in PSE. Butlin concludes by counselling against lumping all PSE together since the determinants of the participation in each differ. The studies by Frenette (2005b) and Drolet (2005) support this conclusion. Junor and Usher (2004:113) perhaps sum it up best:

Youth with higher secondary school marks are more likely to come from higher income strata while those with lower marks are more likely to come from lower income strata. The former tend to desire a university education, and the latter tend to desire a college education. These two groups do not compete against each other for access to post-secondary spaces. They are, in effect, two separate 'markets.'

D. Other Factors

Family background tends to be correlated with other factors which are important in determining participation in PSE. For example, Frenette (2005b) uses the National Longitudinal Survey of Youth (NLSY) from the US and found that including standardized test scores in probit estimates of university attendance reduced the importance of income. Of course, since those from higher income families are more likely to perform well in high school than those from a more disadvantaged background, this could still be a problem, especially in the United States where funding of local school boards tends to be positively correlated with an area's tax base.

Foley (2001) uses the 1991 School Leavers Survey and its 1995 follow-up, and focuses on those who had completed high school and thus eligible to attend PSE, but did not, or else attended and then dropped out. Although the decision not to attend PSE is complex, the main reason drop-outs gave was that they did not have enough money to continue (23 per cent and this number increased to 26 per cent for those who never attended PSE). While this was the most popular response, the remaining 77 per cent of the respondents cited non-financial reasons for not attending. This does not mean that financial factors were not important, only that respondents did not consider them the most important factor in non-attendance. Finnie and Laporte (2007) use the 2002 PEPS and again find that financial barriers were no more important a deterrent to PSE attendance than they were a decade earlier, and this is despite the fact that tuition increased while needs-based aid fell in real terms over this period.

Using data from the YITS Bowlby and McMullen (2002) discover that less than half of those 18-20 year olds surveyed cited barriers to post-secondary education. Of these, the most common barrier was financial, with about two-thirds citing this obstacle. Other barriers were inability to get into programs and lack of motivation. Tomkowicz and Bushnik (2003) also used the YITS and discovered that not receiving a grant or scholarship predicted delayed enrolment in PSE compared to those who entered right after high school. But other factors such as province of residence and high school grades tended to be better predictors of delayed entry. The same study showed that parents with lower levels of education were a good predictor of not going on to PSE from high school. Their study, however, covers a relatively short period of time (approximately three years) after high school graduation. Using the same survey Tomkowicz, Shipley and Ouellette (2003) discover that those with higher debt loads, all else equal, are

more likely to perceive financial barriers to PSE, but the authors do not distinguish between respondents on the basis of amounts received from scholarships, grants, bursaries, etc. This lack of significance, however, could be due to the relatively small amounts of money in this category.

Mueller and Rockerbie (2005b) build a disequilibrium model of university spaces where changes in the tuition prices do not function clear the market since these are generally set exogenously by provincial governments. When demand for spaces increases, the entering GPA of high-school students is what appears to increase in order to ration these limited spaces. Coupled with other evidence, this suggests that low-income students are put at a disadvantage compared to their colleagues from higher-income families. Related to this is the paper by Mueller and Rockerbie (2005a) which uses Ontario application data which give a more accurate representation of demand for university spaces than enrolment data, which more correctly represent the supply of spots in a post-secondary education market. They find distinct demographic differences in demand: males tend to be more price sensitive than females, and students applying from Ontario high schools exhibit less sensitivity to tuition and median incomes in their applications behaviour compared to “other” students which include college transfers, those not applying while in high school, etc. In other words, as discussed above, applicants are not a homogenous group: some students are destined for university and are not sensitive to tuition or income changes, while others have less attachment to the idea of attending university and are sensitive to these variables.

The bulk of the work to date has focused on access into PSE at universities, or colleges (including CEGEPs in Quebec) and technical schools, but as graduate and professional education has become increasingly important, there would also seem to be a need to study access, especially as the importance of graduate education grows along with the rise in the knowledge economy (Finnie and Usher, 2007). Currently there is a dearth of information in Canada on this topic. An exception is Frenette (2005a) who uses the deregulation of tuition for professional programs in Ontario as a natural experiment to estimate the impact of tuition on enrolment in these programs by socio-economic status (as measured by parental education). He finds that enrolments of students whose parents held post-secondary credentials below the post-graduate level fell. By contrast, enrolments increased for students with parents with either no PSE credentials or post-graduate credentials. In Quebec and British Columbia, where such tuition was not deregulated, there were no shifts in enrolments by socioeconomic status. The bad news in all of this is that a professional education in Ontario may be out of reach for middle-income Ontarians. The good news is that grant programs have likely increased the accessibility of those from lower-income backgrounds despite increasing tuition costs. For the US, Ehrenberg and Mavros (1995) find that the type of aid given to graduate students – grants versus teaching assistantships, for example – has an impact on completion rates and time-to-degree.

E. Program Choice

While plenty of research has been conducted on the factors that affect access to PSE, these same factors may also have an impact on program choice, although very little research has been done in this area. The research regarding PSE access in general is rather passé, at least in the United States, according to Hoxby (2004:3) since “opportunities to attend college have sufficiently expanded so that almost every young person who is eligible and likely to benefit from college does try it at some point, in some form.” She argues that attendance has both an *extensive* and *intensive* margin, and research on the former appears to have been exhausted while research on the latter remains very active. Questions such as which institution to attend, when to attend, and how to attend (e.g., full or part-time) remain important since most young Americans are accessing PSE, and policy remains important for determining what they do once inside.

While studies generally address the quantitative effect of various variables on access, Long (2004a) discusses the qualitative effects of tuition on low-income families. While tuition is not a significant deterrent to attending higher education in general, it does have an effect on the quality of college attended. This study, along with Van der Klaauw (2002) shows that aid packages affect the choice of institution, but only for those who have already applied. They say nothing about access, since the decision to attend (or access) college has already been made. Thus, insofar as tuition and quality are

positively correlated, the lack of financial resources does constrain the academic potential of low-income applicants.

Other work from the United States suggests that financial considerations too are important in determining the program choice of students. Choy (1999) shows that high school students from low-income backgrounds are less likely to attend four-year institutions and attributes part of this to the fact that they are less prepared academically than their counterparts from higher-income backgrounds. Among college-qualified high school graduates in 1992, income is positively related to the following: expecting to complete a bachelor's degree; planning to enrol at four-year institution; taking steps towards admission (e.g., applying to institutions and taking entrance exams); and gaining admission. However, when low-income students with the academic qualifications took the necessary steps for admission, low-income students were just as likely as middle-income students to be accepted to and enrol at a four-year institution, although both of these income classes still lagged somewhat behind students from upper-income families.

In preliminary work, Lang (2005) finds that financial aid has an impact on the choice of college major, and that this may result in the misallocation of resources with labour-market surpluses in some fields and shortages in others. In a similar vein, Field (2002) finds that the earlier the timing of education debt (up-front tuition wavers versus an equivalent amount of loan repayment assistance) increases the probability that the student will practice public interest law. She argues that this is not due to students more committed to public interest work, but more likely due to time-inconsistent debt aversion. This relates to the current public student loans programs in Canada. Junor and Usher (2004) write that Canada is the only country that uses debt reduction (a.k.a. remissions) as a major means of providing aid. Although details vary by province, a portion of the principle of student loans is forgiven following the successful completion of part or all of an eligible program. These are also being supplemented with specific loan forgiveness programs for jobs that have labour shortages. Still, there has not been any study of either of these programs.

Analyzing the effects of the District of Columbia's Tuition Assistance Grant Program (DCTAG), which is neither merit- nor needs-based, Abraham and Clark (2003) find that enrolments amongst freshman increased at eligible institutions, but total enrolment increases were more modest, implying that these grants had more of an impact on *which* college was chosen, rather than *if* college was chosen. Dynarski (2000) also finds that the Georgia HOPE Scholarships redistribute students from neighbouring states back to Georgia (where the awards are tenable).

Canadian evidence also suggests that cost considerations may be influencing the choice between college and university. Statistics Canada and CMEC (2003) shows that about 25 per cent of college students in Canada are enrolled in university transfer programs, and this number increased slightly in the 1990s. Whether this increase is in response to higher university tuition, limited availability of university spots, or other factors, is unclear. Evidence from the United States (Ehrenberg and Smith, 2004), however, suggests that the success of these students (measured as the number completed four-year degrees within three years of transferring) varies considerably across institutions. The authors suggest that this may have something to do with the nature of transfer agreements between two- and four-year institutions.

F. Other Considerations

Looker and Lowe (2001) provide a good look at many of the factors determining post-secondary educational access and note that data to analyze many of issues regarding the participation of lower-income students is lacking. To be useful, they argue, data must allow researchers to be able to interact socio-economic status with other characteristics that are normally associated with lower educational attainment such as gender, ethnicity, Aboriginal status, etc. They also point to the fact that Canada lacks time-series data on the total direct costs of post-secondary education which include housing, food, books, transportation, relocation costs, and other education-related expenses. More recently, Usher and Steele (2006) provide information on many of these variables by province and state in their comparison of PSE affordability in Canada and the United States.

These other costs of attending PSE are of particular importance for low-income families. Distance between home and the postsecondary educational institution, for example, has been shown to be more of a deterrent for Canadian students from low-income families, especially for those wishing to attend university (Frenette, 2002, 2004). This effect, however, is mitigated for low-income students living close to a college. Whether these students graduate and ultimately attend university, however, is not known. Since the probability of living further from a university is greater for those in rural areas, there may be other factors correlated with distance. McMullen (2004) synthesizes this line of research and discusses the importance of losing social capital in deciding to move away to attend university, which is almost always necessary for rural students. In addition, the fact that individuals in rural areas tend to have a lower probability of having a university education means that young people may not be fully aware of the benefits of attending university. Students who attended high school in a rural area were less likely to attend university than those schooled in an urban area. Rural status, however, did not decrease the odds of attending other types of PSE (Butlin, 1999). Rahman, et al. (2005) also find no difference in the participation probabilities of rural versus urban youth in attending PSE and also find no difference in choosing university over college. They do find, however, that both college and university attendance is higher amongst youth from high-income families, which suggests that low-income rather than residency in a rural area is driving this result, although the two are positively correlated.

An interesting addition to the access debate, albeit a sensitive one, is the nature versus nurture effect of parental education on educational attainment. Plug and Vijverberg (2003) use four waves of the Wisconsin Longitudinal Study between 1957 and 1992 and compare the educational attainment of natural and adopted children. They conclude that the direct and indirect effects of parental intelligence (measured by the IQ of only one parent) accounts for the majority of ability necessary for school achievement of children. Thus, nature trumps nurture. Rothstein (2004) finds that the Scholastic Aptitude Test (SAT), which is taken into consideration by admissions committees at US institutions, is positively correlated with the socio-economic status of both the student and her high school, thus biasing the estimated importance of SAT scores in determining preparedness for college. The implication of this is that low-income students are put at a distinct disadvantage when standardized test scores – but not economic background – are reviewed by admissions committees.

Working may also have an impact on the decision to attend PSE. Indeed, working more than twenty hours per week in the final year of high school significantly reduces participation in university compared to not working at all, but working does not appear to effect those high school students intending to pursue a college or trades education (Butlin, 1999).

The amount of competition amongst an entering class also seems to play an important role in access. Coelli (2005) found that large cohorts also had a negative effect on university attendance, even after controlling for other variables, especially for youth from low-income cohorts (although this may be correlated with lower measured achievement or low-income students during high school thus reducing their probability of acceptance at university).

Using a unique longitudinal survey of young people and their parents from three Canadian cities, Looker (1997) discusses the importance of student attitude towards schooling and knowledge of postsecondary programs as other variables which are important in determining both access and educational attainment. She says that the main differences arise between those who went to university and those who attended other postsecondary educational institutions (which are often considered inferior to universities), not between those who pursued PSE and those who did not. She too argues that knowledge is important, especially information about the non-university options available. A survey of Alberta high school graduates (Ipsos-Reid, 2001) found that the earlier the decision to pursue PSE, the more likely a student was to attend a postsecondary institution. In the US, Ehrenberg (2005) reviews some of the recent literature and writes that the programs which are the most successful at preparing students from low-income families for PSE start early and continue to provide services throughout middle school and high school. This factor is especially important in the United States since low-income students tend to live in districts where schools are underfunded.

III. Persistence in Post-Secondary Education

The issue of persistence in higher education is much less studied in the economics literature than the issue of access; undoubtedly due, at least in part, to the lack of longitudinal information about student outcomes (Long, 2005). The distinction between attending PSE and persisting is important. Long provides data which show that attendance rates in the US have increased significantly, but completion rates amongst 23-year olds have risen little since 1970. Further she shows that those who do complete today are more likely to follow a “non-traditional route”: taking courses infrequently and transferring between institutions. The causes of this are many and include the lower aptitudes of marginal attendees and the concentration of federal aid on marginal enrollees. This lack of interest on what happens following the initial entrance into PSE may be largely policy driven. Turner (2004) says that policymakers have tended to focus exclusively on access while neglecting the persistence and completion question. In her words (pp.14-15): “It is important to ask why many education analysts (including economists) focus on the enrollment measure, which is an indicator of potential investment, rather than on degrees or credits, which measure additions to human capital stock.” Indeed, these “sheepskin effects” have been shown to be important in recent Canadian studies (Ferrer and Riddell, 2001, 2002), although completion of education credentials may be correlated with other unobservable characteristics such as perseverance and work effort, both of which are also rewarded in the labour market.

Grayson and Grayson (2003), in their review of the literature, say that different institutional settings and other factors explain attrition so that it is misleading to make general statements about the conditions that lead to withdrawal. There appears to be only a weak relationship between leaving PSE and finances. Still, students often cite both academic and financial reasons for withdrawing. Some 50 per cent of Canadian students captured in the PEPS cited lack of interest in their programs or PSE in general as the main reason for dropping out, whether or not they returned is now known from these data. Financial considerations rated a distant second at 29 per cent (Barr-Telford, et al., 2003). Lambert et al. (2004) using the Youth in Transition Survey come to a similar conclusion but note that 40 per cent of leavers from PSE returned within two years. This underlines the importance of understanding the full diversity of students in terms of their personal, academic and economic realities (American Council on Education, 2003).

Cervenán and Usher (2004) also find that very few of the students surveyed claimed that they were ever forced to withdraw from PSE for financial reasons and this number (3 per cent) was the same in 2002 as it was in 1965 (when the real costs of education were significantly less). On the surface it would seem that financial reasons have very little impact on persistence. Still, the Canadian Undergraduate Survey Consortium survey used by these authors only captures those students who returned to school and not those who left for financial reasons and did not return. Foley (2001) cites the most popular reason for not attending (which includes leaving) PSE as not having enough money to continue (23 per cent). Amongst those who dropped out, however, only 9 per cent cited this reason. All things considered, she finds that non-financial reasons are more important determinants of persistence than financial reasons.

Students are most likely to leave PSE during their first year, and the probability of leaving thereafter decreases, although large numbers of students return to PSE later in life. Bowlby and McMullen (2002) use the YITS and find that those students who continued their post-secondary studies were more likely to receive money from parents as well as scholarships and grants compared to those who dropped out of their studies, although these differences do not appear to be large. Those who left also seemed to have more trouble adjusting to their studies compared to those who continued.

Although financial factors may have little effect on persistence, the type and amount of financial aid are likely important in determining a student's decision to remain in PSE. McElroy (2005) uses data on student aid and enrolments for over 13,000 domestic students entering three- to five-year degree programs in 1997 or 1998 provided by six universities in three provinces (Ontario, Quebec and British Columbia). She defines aid as government student loans, grants, or both, and annualizes the amount of aid received based on the amount that would have been received to complete one year of the program on a full-time basis. She finds that persistence (defined as completion of the degree requirements or progress toward completion) was highest for those who received both grants and loans, especially when the annualized

amount was less than \$3,000. By contrast, persistence was lowest for those who received only loans, especially those with annualized loans over \$3,000, and persistence decreased (by both measures) as this amount increased. The effect of family income and academic preparedness are not significant factors. She argues that debt aversion may be responsible for the negative relationship between loans and persistence, perhaps since students with both grants and aid had accumulated less debt for the same total amount of money received (loans plus grants).

There is also evidence that the sources of financial assistance are related to age. The CMSF (2001) commissioned a survey of some 1,500 post-secondary students across Canada. They find that parental financing of PSE decreases with age, while debt increases. Furthermore, debt from private sources is increasing as education costs increase at the same time that earnings from summer employment remain modest. Finnie and Laporte (2007) show that older students are more likely to have student loans. They argue this is because older students are no longer constrained by the income of their parents and thus this type of financing may not be targeted as it could be. Prairie Research Associates (2005) find a similar pattern amongst college students. Another interpretation might be that older students are more likely to be in the final years of their programs and the resources used for earlier years of education might be diminished or at least diminishing. This could impact the persistence of older students.

Evidence from the US suggests that aid can be an important factor in persisting. DesJardins, et al. (2002a) provide evidence that financial aid increases the probability of degree attainment by reducing stop-out behaviour, and that aid given early in a student's career may be more effective at reducing this behaviour. Similarly, Bettinger (2004) finds that exogenous changes to a student's Pell Grant between the first and second year of college have the predicted effect: increases tend to increase persistence (conditional on enrolment) while decreases result in higher stop out rates. He argues that other studies have shown that Pell Grants have the perverse effect of reducing persistence (since low-income students might enrol frivolously) do not control for the fact that these students have a higher probability of non-completion *ex ante*. Linsenmeier, et al. (2002) estimate the effects on a change in a university's financial aid package from loans to grants on low-income students. They find that this increased the probability of graduation, but only for low-income minority students, and only at the 10 per cent level. DesJardins, et al. (2002b) discover that financial aid packages do lead to a positive impact on retention. They also find differing effects by type of aid, even if the same dollar amount is awarded. The authors hypothesize that there is more "meaning" attached to different types of aid over and above the amount of the award. Stratton, et al. (2005) point to the importance of distinguishing between dropout and stop-out. They find that those receiving work-study aid have the lowest probability of dropping out and those receiving grants have the highest probability of enrolling continuously. Angrist, et al. (2006) provide experimental evidence suggesting that a combination of services and financial incentives to increase retention are more successful than either program alone.

Aid (grants and loans) does not help attainment at four-years colleges, but does for shorter programs such as two-year and certificate programs in the US (US Department of Education, 1997). Still, these are simply summary statistics and low-income students are more likely to rely on aid to persist and complete programs, so this may be somewhat misleading. What we really need to know is how persistence and completion rates would change for underprivileged students in the absence of such aid. Singell (2004) does just this. He shows that both needs- and merit-based aid increases retention, although the former has a larger impact. This is likely that result of merit-based students having more options available to them, both in terms of other opportunities and other sources of financial support. Increased use of merit-based aid, however, has reduced the graduation rates of students from low-income families.

Dynarksi (2005) too shows that reducing education costs (through scholarships) increases the percentage of students who complete their degree programs. Still, her results demonstrate that even when the direct costs of PSE are reduced to zero, there are still drop outs, suggesting that a zero-tuition policy would by itself not eliminate drop outs and that other factors may be responsible for failing to graduate. Similarly, Stinebrickner and Stinebrickner (2003) examine a unique data set from Berea College, an institution where all admitted students receive free tuition and heavily subsidized room and board, thus making the direct costs of attending college practically zero. This allows them to test the hypothesis that low-income students are financially constrained from pursuing higher education. They still

find that students from lower-income families are less likely to graduate. Although their data are not detailed enough to further analyze this point, they do note the importance of family background on persistence.

There is some literature in the US which concludes that students with higher admission test scores and high school grades are more likely to persist in college than those with lower test scores or grades (Gansemer-Topf and Schuh, 2005). These authors find a strong correlation between institutional grants and retention and graduation rates, but only for low-selectivity private institutions. They failed to find any significant correlation between grants and retention and graduation rates at highly selective institutions, even those that earmarked a large share of their overall expenditures for institutional grants. This is likely because students at these institutions come from high-income families.

Choy (1999) shows for students in the United States, persistence (defined as completion of a degree or still enrolled) was positively related to 1 to 14 hours of work per week compared to no outside work, but declined thereafter. For all weekly hours of work, with the exception of 1- 14 hours, students who borrowed were more likely to persist than those who did not. These data, however, do not tell us if course loads were reduced and/or if length of time to completion increased as a result of working during school. Citing other studies, she notes that students may substitute working for borrowing. An alternative explanation is that debt-averse students may find the burden of loans too high and thus prefer to work rather than increase the principle of these loans. Cornwell et al. (2003) study the Georgia HOPE scholarship program and find that students, especially inframarginal students, will do such things as take less than a full-course load, withdraw from courses, and take summer classes, presumably in order to preserve their GPAs to continue to qualify for the aid. These behaviours increase time to degree completion and fly in the face of the logic often used to justify these types of programs: that they offer incentives to work hard and invest in human capital. The implication is that this type of merit-based program may lead to inefficiencies, rather than the desired increases in human capital.

In Canada, Junor and Usher (2004) note that working students spend less time in class, and provide mixed evidence about the relationship between number of hours working and number of hours studying (although any negative correlation could be related to the fact they may be taking fewer classes per semester). In fact, the authors note that students working more than 30 hours per week tend to maintain their grades, but this is the result of cutting back on the number of courses taken in order to devote the same amount of time studying per course. The cost is that the time-to-completion is increased, although whether persistence is affected is likely, but not certain.

Other factors are also important with regard to persistence. Wetzel, et al. (1999) point to academic and social integration factors as being more significant than financial factors in affecting persistence. Bettinger and Long (2005) find that enrolled students who took part in English and math remediation classes at the post-secondary level were more likely to persist in college, transfer to a higher-level college, and complete a bachelor's degree, compared to observationally equivalent students who did not take these classes. Choy (2002) shows that high school programs matter when it comes to completion at college: students who take more rigorous programs are more likely to both enter college as well as complete their studies. Murtaugh, et al. (1999) also note that factors such as taking a freshman orientation course, being from the same state, and higher high school and first semester GPA, are positively associated with persistence. Unfortunately, their analysis does not include measures of socio-economic status nor financial details.

A match between student ability and school quality are also important in determining completion of college in the US (Light and Strayer, 2000). High calibre students are more likely to complete if they attend a high quality institution, while those of lesser ability have a higher probability of graduating from a lower quality college. This has important implications for programs that might encourage students of one ability level to attend a college of a different quality. Winston and Zimmerman (2004) also address the importance of peer effects. They conduct a natural experiment where first year roommates are randomly assigned a peer. They find that being paired with a high-achieving peer is better for a student's achievement. Since their sample consists of elite institutions, however, the variance in observed ability (as measured by SAT scores) is not large.

The US Department of Education (1997) argues that attending a two-year institution may make financial sense, but students who do so with the intention of attaining a four-year degree are less likely to have completed this course of study within five years compared to those who go directly to a four-year institution. For students who do transfer, persistence is not affected, although time to degree is lengthened. Still many students fail to transfer to four-year institutions. Hilmer (1997) has shown that students, especially those from poorer families, are more likely to choose higher quality universities upon transferring (as are students of low ability and those who performed poorly in high school) compared to those who entered university directly from high school.

IV. Summary, Conclusions, and Policy Implications

To attend, and complete in a timely manner, a post-secondary education involves a series of extraordinarily complex decisions. The state of research in this area in Canada, while not in its infancy, is in the toddler years. The factors that influence the decision to attend and complete PSE and the variety of pathways taken by individuals (and perhaps abandoned) are the subject of active research in this area. This paper has reviewed this literature on access and persistence of students from low-income families. There are a few conclusions and policy implications that can be drawn, although many questions remain to be answered.

In terms of financing higher education, governments can pursue two broad options: first, increasing the availability of aid such as loans, grants and scholarships or, second, decreasing tuition costs. Aside from certain advocacy groups, almost no one suggests that increasing subsidies to post-secondary education is an efficient way to increase access and persistence, since this would simply represent a windfall to middle- and upper-income families who are able to pay for (or at least borrow for) higher education. Rather, the call has been for such subsidies (be it grants or interest subsidies of student loans) to be directed to individual students (Laidler, 2002). Scholarships or merit-based aid tends to benefit those most qualified academically, but academic preparedness is positively correlated with family income and so again provides a subsidy to higher-income families. This leaves grants and loans as options. Finnie (2005) discusses these two options. He argues that there are two avenues in which financing PSE can increase enrolment. The first is that it decreases the direct cost of education. The second way is that the rate of return to higher education is increased. In the case of student loans and perfect capital markets, only loans with a below-market rate of interest (such as the CSLP) will have any positive effect on enrolment by increasing the rate of return to education. Targeted grants, by contrast, affect both the rate of return and affordability. That said, grants have a stronger effect than loans, but loans can be spread over a larger number of students. A number of studies (e.g., Vossensteyn 2004) have noted that loans are more cost-effective than outright grants or scholarships. This is owing to the fact that the former have to be repaid by those benefiting, whereas the latter do not. Furthermore, subsidized loans are less expensive than grants or scholarships of the same amount so that limited government resources can be spread over a larger number of beneficiaries.

One lesson we can take from existing research is that not all aid is created equal. The empirical evidence suggests that loans are less effective at attracting lower-income students to PSE than grants. This, coupled with the fact that governments have been making more merit-based awards at the expense of needs-based aid, does not bode well for the access and persistence of students from low-income families. Indeed, this realization appears to be making its way into educational policy, at least in Ontario. The report by former Ontario Premier Bob Rae recommends, among other measures, increasing grants to students from low-income families as a way of improving accessibility.⁶

Although merit-based aid is not the most effective way to finance PSE for students from low-income families, Dynarski (2003) warns that is likely here to stay, at least in the United States given the political support for such programs. Rather than trying to have this type of aid, which disproportionately benefits middle- and higher-income families, redistributed to lower-income families, she argues that a refundable tax credit for education, similar to the Earned Income Tax Credit in the United States, would be an

⁶ See Beach, et al. (2005) and the papers therein for an assessment of the Rae Report.

effective way of delivering aid to needy students through the tax system. The same would apply to Canada.

Evidence presented by Heller (1997) shows that students from low-income backgrounds are more sensitive to changes in tuition and aid packages than their colleagues from higher-income families, as are students attending community colleges compared to universities. This, coupled with the evidence from Hilmer (1997) regarding the higher quality universities transferred to following a two-year community college program, suggests that the expanded use of the Canadian college system may be an option worth pursuing. This may be easier said than done. Andres and Krahn (1999) study the post-secondary education systems in Alberta and British Columbia. Both systems are “articulated” and intended to provide access to a wide group of students by offering the relatively easy transfer of credits between institutions. Still, they are a loss to explain why so few non-academic high school students take advantage of the less onerous entry requirements at non-university institutions, especially amongst students in Alberta. Junor and Usher (2004) too argue that colleges in Alberta and British Columbia have become increasingly integrated into the university system, and they are also becoming more selective in their admissions choices, compared to the other eight provinces which effectively have open access policies. Thus, while integration of community college and university curricula may be beneficial to students from low-income families, the benefits are lost as colleges start to behave more like universities in their admission procedures.

Although the financial aspects of higher education are important, especially for students from low-income families, an increasing body of literature suggests that other factors are at least as important. De Broucker (2005) recommends programs such as early intervention in school to level the playing field between children from different family backgrounds, and information and counselling to help students make the right PSE decisions. On the financial front, he recommends universities reduce tuition risk by fixing tuition levels for the length of a student’s program, as well as government aid which focuses more on low-income students. This last measure includes rethinking the use of tax credits (which are regressive), reassessing the criteria used in needs assessment, and ensuring that low-income students do not graduate with huge debt loads (in order to prevent inequality after graduation).

We know little about what influences the access and persistence of non-traditional students, even though these are becoming an increasing share of students at both universities and colleges in Canada. Similarly, evidence from the US shows that drop-outs and stop-outs, or permanent and temporary leavers from PSE are different, and that students who follow the traditional route of completion (i.e., four years in university) are no longer necessarily the norm. This suggests that researchers must expand their time horizons to capture students who may interrupt, but ultimately complete their programs, as well as the factors responsible for this behaviour.

We have focused here financing PSE through loans, scholarships, or grants, or some combination of these three. Students may also finance their higher education through working more hours, both during the school year and during the summer and holidays. But we still know little about the effects of working on access and persistence in PSE, aside from the fact that students who work the most tend to either do poorer in school or increase their time to graduation, but does working during PSE help or hinder the employment prospects of graduates? The only detailed empirical evidence that exists for Canada is at the high school level and shows that working is an important determinant of drop-out behaviour, although it is correlated with a number of other factors (Bushnik, 2003). Involvement in co-operative education programs may enhance the employment prospects of graduates, but what about those who take McJobs in order to pay PSE-related expenses? Does this increase the time to graduation or decrease the probability of graduating? What about low-income students who tend to be risk averse and may choose to work over taking out student loans?

Related to this, student loan burdens have been increasing at the same time that the CSLP has become more generous. How much of this increase is used for education and how much might be used for current (perhaps unnecessary) consumption? Finnie and Laporte (2007) show that almost 60 per cent of students who held loans in 2002 would have liked to borrow more, but they could not determine if it was due to

need (i.e., expenditures related to PSE), to maintain a certain lifestyle, or for savings (i.e., interest-free money).

Little Canadian evidence exists about the choice of institution once the decision to attend PSE has been made. Are students directed towards different institutions and/or fields of study as the result of financial considerations? If so, this could result in a mismatch between a student's skills and interests and his program of study? If so it could be an inefficient outcome for both the student and society as a whole.

We have assumed throughout this paper that more education is a good thing for both the individuals who receive private benefits from it, and for all Canadians because of the positive externalities that are created. Much literature in the US discusses the movement of the university model from, in essence, cultural finishing schools for the elite, to the mass-access model where product branding is important to differentiate competitors. While most studies implicitly assume that increased access and persistence are good for society, this may not be the case. PSE may not be a worthwhile for every student and there may in fact be a number of students for whom PSE credentials do not improve earnings. Thus, enticing marginal students to remain in PSE may not be a socially optimal policy. As de Broucker (2005:36) argues: "We need more vocational options that would offer a real alternative to post-secondary education and provide a smooth and rewarding school-to-work transition for high-school students who do not want to pursue post-secondary studies."

We have also implicitly assumed throughout the supply of PSE spots would passively increase as the result of increase participation of students from low-income families. This assumption should be put to rigorous investigation. Even if the benefits to educating more students are positive, the net benefit to society may be low or negative if the costs of providing additional education are increasing.

We know practically nothing about the influences of various factors on post-graduate education. The ability for Canada to be competitive in the knowledge or post-industrial economy has been on the radar screen of policy makers for some time (to wit, the Canada Research Chair program), yet most research is focused on access to colleges and universities (with a smaller amount on persistence). As graduate education increases in importance, it is vital to understand if the models used for college and undergraduate university education, also apply to graduate students.

A reason for this lack of research in Canada is due to the paucity of appropriate data to study the questions of interest to researchers. The lack of longitudinal microdata, in particular, has hampered our understanding of persistence patterns among students. Often surveys are cross-sectional, and include only those who are already in PSE, limiting the usefulness of the data for studying the experiences of students who do not participate. Furthermore, researchers must often utilize complex statistical techniques to control for biases inherent in cross-sectional data. Other datasets contain only graduates, again limiting their usefulness, while still others contain a limited number of variables, and even though they allow us to follow students over time, the small sample sizes often prevent meaningful inference. Perhaps the most promising widely available study is the YITS, which includes only young Canadians in its universe and follows them as they transition between high school, work and PSE. Especially useful will be the third cycle which follows the cohort aged 18-20 years from 2000 through 2004 (when they were 22-24 years of age). These data will allow researchers to follow and estimate the impact of many of the factors listed above on the access and retention (and also completion) probabilities of Canadian youth.

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Table 1 - Selected Studies on Access to PSE

Author, Title and Date	Methodology	Country	Data Sets	Findings
Abraham & Clark, Financial Aid and Students' College Decisions: Evidence from The District of Columbia's Tuition Assistance Grant Program (2003)	Uses difference-in-differences estimation to look at changes in enrolment associated with tuition grant programs	United States	Data from the College Board on SAT writers, and Integrated Postsecondary Educational Data System	Exogenous drop in tuition had a upward effect on enrolments at these institutions, especially for high incomes, whites & students with highly educated parents. Effect on total enrolments less which suggests that grants had more of an impact on <u>where</u> to attend than <u>if</u> to attend.
Allen, Harris & Butlin, Finding Their Way: A Profile of Young Canadian Graduates (2003)	Descriptive statistics	Canada	National Graduates Survey	University grads were less sensitive to labour market conditions than college grads; majority of grads didn't have repayment problems.
Andres & Krahn, Youth Pathways in Articulated Postsecondary Systems: Enrolment and Completion Patterns of Urban Young Women and Men (1999)	Descriptive statistics	Canada	A unique panel survey of Vancouver and Edmonton high school students	In PSE systems that focus on access by having integrated trade schools, colleges, and universities, family background remains an important factor.
Avery & Kane, Student Perceptions of College Opportunities: The Boston COACH Program (2004)	Summary statistics and crosstabs	United States	COACH program survey results	Mentoring inner-city students increases their probability of enrolling in college.
Barr-Telford, et al., Access, Persistence and Financing: First Results from the Postsecondary Education Participation Survey (PEPS) (2003)	Descriptive statistics	Canada	Postsecondary Education Participation Survey	Likelihood of PSE attendance is positively linked to HS grades, parental educational level, parental income and personal savings.
Bowlby & McMullen, At a Crossroads: First Results for the 18 to 20-Year-old Cohort of the Youth in Transition Survey (2002)	Crosstabs and charts	Canada	Youth in Transition Survey (1999)	Barriers to PSE cited by about half of respondents. Most common barrier to access reported was financial (about two-third of those who cited barriers), inability to get into a program and interest/ motivation followed.
Butlin, Determinates of Postsecondary Education Participation (1999)	Multinomial logit model	Canada	School Leavers Survey (1991) & Follow-up (1995)	The predictor variables that determine participation vary greatly based on type of PSE (i.e., university, community college, trade). High school graduates with at least one parent who is university-educated were much more likely to attend university.
Cameron and Heckman, The Dynamics of Education Attainment for Black, Hispanic, and White Males (2001)	Multinomial logit model	United States	National Longitudinal Survey of Youth (1979-91)	Parental income positively correlated with schooling attainment, but not because of credit constraints, but due to long-run correlation with family and environmental factors. Implies tackling these may be more important than short-term net tuition reduction.
Choy, College Access and Affordability (1999)	Summary statistics and charts	United States	Various National Center for Education Statistics datasets	Low-income HS students tend to be less prepared, with lower HS grades; aspirations and expectations possibly more important than income.
Choy, Access and Persistence: Findings from 10 Years of Longitudinal Research on Students (2002)	Literature review	United States	National Education Longitudinal Study, Beginning PS Longitudinal Study, Baccalaureate and Beyond	Rigorous HS program contributes to improved access, as does parent education.

Table 1 cont.

Author, Title and Date	Methodology	Country	Data Sets	Findings
Christofides, Cirello & Hoy, Family Income and Post-Secondary Education in Canada (2001)	OLS, Poisson regression and probit models	Canada	Survey of Consumer Finances (1975-1993, excluding 1983)	Parental education and income are significant to PSE participation, tuition is not; income gap converged between 1975 and 1993.
Coelli, Tuition, Rationing and Inequality in Post-Secondary Education Attendance (2005)	Multinomial logit model	Canada	Survey of Income and Labour Dynamics (1993-2001)	Large negative tuition effects on university attendance for students from low-income families, and lower (even zero) effect on the probability of attendance of students from middle- and upper-income families. No tuition effect at colleges.
Collins & Davies, Carrots and Sticks: The Effect of Recent Spending and Tax Changes on the Incentive to Attend University (2005)	Literature review	Canada	1998 Survey of Consumer Finances	Suggests that government support of PSE has shifted to students in the form of tax benefits (e.g., tax credits, reduced income tax progressivity)
Corak, Lipps, & Zhao, Family Income and Participation in Post-Secondary Education (2003)	OLS and 2SLS	Canada	General Social Surveys (1986, 1994 and 2001) and Survey of Consumer Finances	Gap in participation rates between students from low- and high-income families narrowed in the 1990s, the result of steady increases in the former. Young males more likely to attend community colleges because of tuition increases at universities.
de Broucker, Getting There and Staying There: Low Income Students and Post-Secondary Education: A Synthesis of Research Findings (2005)	Charts and crosstabs	Canada	OECD Indicators	Thorough summary of other literature. Shows non-financial reasons such as parent education, geography, and expectations are at least as important as costs.
de Broucker & Lavallée, Intergenerational Aspects of Education and Literacy Skills Acquisition (1998)	OLS	Canada	International Adult Literacy Survey (1994)	Parental education and child outcomes are positively correlated, but high socio-economic status (as defined by occupation) can overcome low parental education.
Drolet, Participation in Post-secondary Education in Canada: Has the Role of Parental Income and Education Changed over the 1990s? (2005)	Linear probability model	Canada	Survey of Labour and Income Dynamics	Finds no evidence of change in the relationship between access and parental income and education has changed over the 1993-2001 period. Parental education more important predictor than income.
Dynarski, Hope for Whom? Financial Aid for the Middle Class and its Impact on College Attendance (2000)	Uses difference-in-difference estimation to look for discontinuities at the time of HOPE program introduction	United States	Current Population Survey and Integrated Postsecondary Education Data System	The merit based aid HOPE program had a large positive impact on attendance of middle and high income youth in Georgia, especially whites. Attendance gap increased between blacks and whites and high- and low-income families. Enrolment dropped in neighbouring states.
Dynarski, The Behavioral and Distributional Implications of Aid for College (2002)	OLS used to estimate different effects of the HOPE program in Georgia.	United States	Current Population Survey	Attendance increased in Georgia. Effects concentrated amongst white and upper-income youth because the HOPE award amount was reduced dollar-for-dollar for recipients of Pell Grants, and lower-income black youths less likely to meet academic requirements.

Table 1 cont.

Author, Title and Date	Methodology	Country	Data Sets	Findings
Dynarski, Does Aid Matter? Measuring the Effect of Student Aid on College Attendance and Completion (2003)	Difference-in-difference to analyze the effect of a shift of aid policy on college attendance	United States	Social Security Student Benefits program	Aid availability has a positive effect on attendance and increases educational attainment, and its effect continues after subsidy stops.
Dynarski, The New Merit Aid (2004a)	OLS used to estimate the different effects of the HOPE program in Georgia and similar programs in other southern states	United States	Mainly October Current Population Survey, various other surveys	Merit aid programs increase college attendance and shifts enrolment to 4-year programs; increases attendance in home state. Other states have better record of minority attendance since academic requirements are not as restrictive and program design different.
Ehrenberg, Zhang, & Levin, Crafting a Class: The Trade Off Between Merit Scholarships and Enrolling Lower-Income Students (2006)	OLS	United States	National Merit Scholarship and Pell Grant Program administrative panel data	An increase in the share of institutionally funded National Merit Scholarship winners in the entering class reduced the numbers of Pell Grant recipients.
EKOS Research Associates, Student Financial Survey: Baseline Results (2001)	Summary statistics	Canada	Students' Financial Survey (for CMSF done by EKOS research associates)	Parental assistance decreases and debt increase with age; 9 in 10 students work over summer, students have growing private debt.
Field, Educational Debt Burden and Career Choice: Evidence from a Financial Aid Experiment at NYU Law School (2002)	Propensity score methods and OLS	United States	NYU Law School's Innovative Financial Aid Survey	Tuition waivers instead of an equivalent amount of loan repayment assistance leads to take up rates in public interest law that are 1/3 higher.
Finnie, Student Loans: The Empirical Record (2000)	Summary statistics	Canada	National Graduate Survey	Over time borrowing rose, payback rates fell, repayment problems rose. Highlights recent changes to student financing.
Finnie, Measuring the Load, Easing the Burden (2001)	Descriptive statistics	Canada	National Graduates Survey (four waves)	Suggests policy options like increasing eligibility and limits for student loans; increased grants for students from lower-income families due to debt aversion.
Finnie, Student Loans, Student Financial Aid and PSE in Canada (2002)	Descriptive statistics and charts	Canada	National Graduates Survey	Student borrowing rose over the past 2 decades, as have debt-to earning ratios. Some individuals are struggling with debt loads.
Finnie, A Simple Model of Access and Capacity for Post-Secondary Schooling in Canada (2005)	Theoretical model	Canada	None	The number of spots in PSE is supply constrained; Demand is largely greater than supply; changes in demand reflected in who goes (access) whereas other factors determine supply (capacity).
Finnie & Laporte, The Demand for Student Loans and Access to Post-Secondary Education (2006)	Linear probability model	Canada	2002 Post-Secondary Education Participation Survey	Some students appear to have needs unmet by the government student loans based on their take-up rate of private loans and working while attending PSE.
Finnie & Laporte, Lending Opportunity: Student Loans and Access to Post-Secondary Education (2007)	Summary statistics	Canada	2002 Post-Secondary Education Participation Survey	Debt aversion is a small problem; lack of interest leads reasons for non-attendance; more students are turning to private loans.
Finnie, Laporte, & Lascelles, Family Background and Access to Post-Secondary Education: What Happened in the 1990s? (2004)	Linear probability model	Canada	1991 School Leavers Survey and 2000 YITS (18-20 cohort)	PSE participation is strongly related to parental education, family type (1 vs. 2 parent); no strong differences exist across provinces

Table 1 cont.

Author, Title and Date	Methodology	Country	Data Sets	Findings
Finnie, Lascelles, & Sweetman, Who Goes? The Direct and Indirect Effects of Family Background on Access to Postsecondary Education (2005)	OLS regression using a block recursive technique	Canada	School Leavers Survey (1991) & Follow-up (1995)	Family background is positively related both directly and indirectly (through high school grades, attitudes towards education, etc.) and are stronger for university attendance than the all post-secondary attendance.
Foley, Why Stop After High School? A Descriptive Analysis of the Most Important Reasons that High School Graduates do not Continue to PSE (2001)	Logistic regression	Canada	School Leavers Survey (1991) & Follow-up (1995)	As a whole non-financial barriers are more important than financial; stated barriers vary by parental education, but not by sex.
Frenette, Access to College and University: Does Distance Matter? (2004)	Multinomial logit model	Canada	Survey of Labour and Income Dynamics	Students are less likely to attend college or university if not within commuting distance, especially low-income students
Frenette, The Impact of Tuition Fees on University Access: Evidence from a Large-scale Price Deregulation in Professional Programs (2005a)	Linear probability model	Canada	National Graduates Survey	Enrolment patterns professional programs changed in Ontario were tuition increases were greatest, especially by socioeconomic status.
Frenette, Is Post-secondary Access more Equitable in Canada or the United States? (2005b)	Ordered and binary probit models	Canada, United States	Survey of Income and Labour Dynamics (Canada) National Longitudinal Survey of Youth (US)	Young people from the lowest income quartile are more likely to attend university in Canada compared to the United States. College attendance rates are similar based on income quartile.
Frenette, Why are Youth From Lower Income Families Less Likely to Attend University? (2007)	Linear probability model and Oaxaca decomposition	Canada	Youth in Transition Survey	Most (84%) of the gap in university attendance between students from top and bottom income quartiles can be explained with observable characteristics. Most important are standardized test schools, high school marks and parental influences. Financial constraints explain only 12% of the gap.
Ipsos-Reid, Post Secondary Accessibility Study (2001)	Summary statistics	Canada	1999/2000 Alberta high school graduate telephone survey	Perceived barriers (in descending order) were costs, not knowing interests, low high school grades, debt aversion and lacking motivation. Students from lower-income households more likely to see cost as a barrier. Students tended to overestimate costs and debt loads of PSE.
Ipsos-Reid, Canadians Attitudes Towards Financing Post-Secondary Education: Who Should Pay and How (2004)	Summary statistics	Canada	Commissioned Survey	Canadians overestimate the costs and underestimate the earnings advantage of university, especially low-income Canadians
Johnson & Rahman, The Role of Economic Factors, Including the Level of Tuition, in Individual University Participation Decisions in Canada (2005)	Linear probability model	Canada	Labour Force Survey (1976-2003)	Tuition increases reduce the probability of university participation relative to the provincial trend. The opportunity costs of university attendance, the reduction in the probability of unemployment at graduation, and a higher payoff are also important determinants of participation.

Table 1 cont.

Author, Title and Date	Methodology	Country	Data Sets	Findings
Junor & Usher, The Price of Knowledge: Access and Student Finance in Canada (2004)	Literature Review	Canada	17 Canadian data sources with descriptions of each	Broad findings indicate access in Canada is generally improving though problems like debt loads, tuition increases and aboriginals still exist.
Kane, College Entry by Blacks Since 1970: The Role of College Costs, Family Background, and the Returns to Education (1994)	Probit estimates	United States	Current Population Survey	Increases in costs in the early 80s reduced enrolment of blacks, while increases in parental education increased enrolment. Enrolment decision based on tuition and level of Pell Grants (equal but opposite effects) implying that the net tuition price is the relevant variable.
Kane, Rising Public College Tuition and College Entry: How Well do Public Subsidies Promote Access to College? (1995)	Two-stage random effects model	United States	National Longitudinal Survey of Youth, High School and Beyond, October Current Population Survey	Tuition increases act to decrease enrolment and widen income gaps. Increases in minimum wage decrease enrolment, particularly for minorities and those attending two-year colleges.
Kane, A Quasi-Experimental Estimate of the Impact of Financial Aid on College-Going (2003)	Regression discontinuity approach	United States	California Student Aid Commission	Cal Grant program significantly increases enrolment rates for students from low-income families.
Kane, Evaluating The Impact Of The D.C. Tuition Assistance Grant Program (2004)	OLS regressions with institutional and year fixed effects	United States	Integrated Postsecondary Education Data System (IPEDS), US Department of Education data, and DCTAG data	DCTAG increased college enrolments among low-income students owing largely to the large proportion of low-income students in DC.
Kitmitto, The Effects of Pell Grants on Enrolment in Higher Education (2004)	Probit regression using a natural experiment from changes in Pell Grant eligibility requirements	United States	Survey of Income and Program Participation	Grants have little effect on enrolments of high school students. Larger effect on persistence. Take up rates higher for those enrolled in the previous year, compared to those who were not implies information is a problem.
Knighton & Mirza, Postsecondary Participation: The Effects of Parents' Education and Household Income (2002)	Crosstabs and some logistic regressions	Canada	Survey of Labour and Income Dynamics	Parental education is a stronger influence than family income in attendance and decision of college or university, although both are significant.
Lambert, et al., Who Pursues Postsecondary Education, Who Leaves and Why: Results from the Youth in Transition Survey (2004)	Summary statistics	Canada	Youth in Transition Survey (2000 & 2002)	Parental educational and high parental value on PSE are related to access.
Lang, Financial Aid, Income, and Choice of College Curriculum (2005)	Multinomial logit model	United States	1993-1994 Baccalaureate and Beyond Longitudinal Study	There is a strong relationship between financial aid, income and college major choice.
Linsenmeier, Rosen & Rouse, Financial Aid Packages and College Enrolment Decisions: An Econometric Case Study (2002)	Probit model	United States	Administrative archives of a major northeastern university	Replacing loans with grant aid increases the probability of graduation by low-income students, but the effect is not statistically significant.

Table 1 cont.

Author, Title and Date	Methodology	Country	Data Sets	Findings
Long, The Impact of Federal Tax Credits for Higher Education Expenses (2004b)	Logistic regression	United States	October CPS (1990-2000), various other data	Tax credits did not increase enrolments, nor did students switch to four-year versus two-year institutions. Could be because the credit was not targeted at families at the margin and take-up rates were low possibly because of lack of knowledge about the credits.
Looker, In Search of Credentials Factors Affecting Young Adults' Participation in Postsecondary Education (1997)	OLS	Canada	A longitudinal survey of youth and parents in 89, 92 & 94 (Hamilton, Halifax and rural Nova Scotia)	Finds, in addition to the usual factors, attitudes and knowledge of programs are important to PSE access.
Looker, Why Don't They Go On? Factors Affecting the Decisions of Canadian Youth Not to Pursue Post-Secondary Education (2001)	Review of Foley (2001) and COGEM (2001)	Canada	None	Summarizes findings of other reports. In addition to costs and fear of debt, attitudes and perceptions are important to access of PSE.
Looker & Lowe, Post-Secondary Access and Student Financial Aid in Canada: Current Knowledge and Research Gaps (2001)	Literature review	Canada	None	Research gaps exists in how gender, ethnicity, access to info on PSE, high school and university traits, and information technology affect access.
Ma, Education Savings Incentives and Household Saving: Evidence from the 2000 TIAA-CREF Survey of Participant Finances (2004)	Propensity score methods	United States	Survey of TIAA-CREF participants	Tax-advantaged college savings accounts tend to increase savings rather than diverting it from other savings vehicles.
Mazumder, Family Resources and College Enrolment (2003)	OLS	United States	Survey of Income and Program Participation	Family wealth is an important factor in college attendance because it reduces borrowing constraints, income also has a positive effect.
McPherson & Schapiro, Financing Undergraduate Education: Designing National Policies (1997)	Summary statistics	United States	American Freshman Survey, NPSAS Database	Argues real increases in tuition have impaired access and choice.
Milligan, Who Uses RESPs and Why (2005)	Probit and Tobit regressions	Canada	Survey of Financial Security (1999)	Use of RESPs and CESGs is highly concentrated in high-income families and households where parents are highly educated.
Neill, Tuition Fees and the Demand for University Places (2005)	Probit model	Canada	Labour Force Survey (1979-2002)	Overall there is little correlation between university fees and enrolment, but using an instrumental variable approach results in fee increases that are negatively related to enrolment.
Plug & Vijverberg, Schooling, Family Background and Adoption: Is it Nature or is it Nurture? (2003)	OLS	United States	Wisconsin Longitudinal Survey (1957, 64, 75, 92)	About 55-60% of all ability relevant for schooling is genetically passed on while environment effects are quite small. Estimate is higher if the indirect effects of genetics that work through income is included.
Prairie Research Associates, Canadian College Student Finances, Third Ed. (2005)	Summary statistics	Canada	Canadian College Student Survey Consortium	Student finances and concerns vary by program type. Older students less (more) likely to rely on parents (loans) for financing.

Table 1 cont.

Author, Title and Date	Methodology	Country	Data Sets	Findings
Rahman, Situ & Jimmo, Participation in Post-secondary Education: Evidence for the Survey of Labour and Income Dynamics (2005)	Logit model	Canada	Survey of Labour and Income Dynamics	Youth from higher-income families are more likely to attend both college and university than their lower-income counterparts. Those with parents who have PSE are more likely to attend university than college. Income has no effect on the choice between college and university.
Rivard & Raymond, The Effect of Tuition Fees on Post-secondary Education in Canada in the late-1990s (2004)	Linear probability models	Canada	Youth in Transition Survey (18-20 cohort)	College and university tuition levels did not have a negative impact on direct transitions to PSE, or caused substituting of college for university. Parental education and academic preparation important.
Schwartz, Student Financial Aid and the College Enrolment Decision: The Effects of Public and Private Grants and Interest Subsidies (1985)	Logit regression	United States	High School and Beyond Survey of 1980 senior class	Public grants significantly related to enrolment while public or private interest subsidies and scholarships are not. Implication is that lower-income students benefit.
Shea, Does Parents' Money Matter? (2000)	OLS and 2SLS	United States	Panel Study of Income Dynamics	Results suggest that parents' money generally doesn't matter, but that it becomes important for those with low education levels.
Tomkowicz & Bushnik, Who Goes to Post-secondary Education and When: Pathways Chosen by 20 Year-olds (2003)	Logistic regression	Canada	Youth in Transition Survey (18-20 cohort)	Youth who were either male, had children, or had uneducated parents were less likely to attend. Minorities were more likely to attend.
Tomkowicz, Shipley & Ouellette, Perception of Barriers to Education in a Group of 18 to 20-Year-Olds: For Whom Does Money Matter? (2003)	Descriptive statistics and binary logistic regression	Canada	Youth in Transition Survey (18-20 cohort)	Total student income, as well as awards and grants, did not significantly affect perceived financial barriers to education.
Van der Klaauw, Estimating the Effect of Financial Aid Offers on College Enrolment: A Regression-Discontinuity Approach (2002)	Regression-discontinuity approach	United States	Application and financial aid records from an east coast college	Financial aid is an effective instrument in competing with other colleges for students.

Table 2 - Selected Studies on Persistence in PSE

Author, Title and Date	Methodology	Country	Data Sets	Findings
American Council on Education, Student Success Understanding Graduation and Persistence Rates (2003)	Descriptive statistics	United States	National Centre for Educational Statistics	Graduation and persistence rates are often underestimated because they don't look at the entire student lifecycle.
Barr-Telford, et al., Access, Persistence and Financing: First Results from the Postsecondary Education Participation Survey (2003)	Summary statistics	Canada	Postsecondary Education Participation Survey	Drop-outs cited lack of fit with program or PSE in general as main reason (50%), finances were second (29%).
Bettinger, How Financial Aid Affects Persistence (2004)	OLS, Wald, and IV estimation	United States	Data on students at all Ohio colleges	Uses exogenous changes in Pell Grant amounts and finds positive (negative) changes act to reduce (increase) dropout rates amongst needs-based students, conditional on initial enrolment.
Choy, Access and Persistence: Findings from 10 Years of Longitudinal Research on Students (2002)	Literature review	United States	National Education Longitudinal Study, Beginning Postsecondary Longitudinal Study, Baccalaureate and Beyond	Non-traditional students as well as these with lower parental education have lower likelihoods of completion. Rigorous high school programs bolster the probability of university completion.
Cornwell, Lee & Mustard, The Effects of Merit-Based Financial Aid on Course Enrolment, Withdrawal, and Completion in College (2003)	Difference-in-difference method	United States	Data on all undergrads at the University of Georgia	Consequences of HOPE include students are less likely to have a full course load, more likely to withdraw from courses and take summer courses.
de Broucker, Getting There and Staying There: Low Income Students and Post-Secondary Education: A Synthesis of Research Findings (2005)	Literature review	Canada	OECD Indicators	Summarizes Canadian literature pertaining to persistence and finances. Concludes that completion has little to do with finances.
DesJardins, et al., A Temporal Investigation of Factors Related to Timely Degree Completion (2002a)	Hazard model	United States	University of Minnesota administrative data and student profile questionnaire	Financial aid may increase the probability of graduation but promotes degree attainment by reducing stopout behaviour. Aid targeted early in a student's career may be more effective.
DesJardins, et al., Simulating the Longitudinal Effects of Changes in Financial Aid on Student Departure from College (2002b)	Hazard model	United States	University of Minnesota administrative data	Financial aid packages reduce stopout probabilities relative to the case of no aid, but the probabilities differ depending on the type of aid given (grants, loans, scholarships, work-study, etc.).
Dynarski, Does Aid Matter? Measuring the Effect of Student Aid on College Attendance and Completion (2003)	Difference-in-difference	United States	Data from the Social Security Student Benefit program	Aid availability appeared to have a positive effect of completion rates but this was not statistically significant.
Dynarski, Building the Stock of College-Educated Labor (2005)	OLS	United States	2000 US Census	Tuition subsidies increase the number of young people with a college degree by 3-4 percentage points (from a base of 27 per cent of the population). Effects strongest for women, especially non-whites. Probability of completing degree increases by 5-11 per cent.

Table 2 cont.

Author, Title and Date	Methodology	Country	Data Sets	Findings
Ehrenberg & Mavros, Do Doctoral Student's Financial Support Patterns Affect Their Time-to Degree and Completion Probabilities? (1995)	Duration models	United States	Unique data collected at Cornell University	The impact of financial support patterns on the level of completion and dropout is greater than the impact it has on time-to-degree.
Ehrenberg & Smith, Analyzing the Success of Student Transitions from 2- to 4-years Institutions Within a State (2004)	Linear probability model	United States	Grouped data from the Office of Institutional Research and Analysis of the State University of New York	Considerable variance across four-year institutions in the completion rates of transfer students from two-year institutions.
Hilmer, Does Community College Attendance Provide a Strategic Path to a Higher Quality Education? (1997)	Two-stage estimation	United States	High School and Beyond	Students choose higher quality universities if they first attend community colleges, and the largest quality increases are observed for students from poor families, who are of low ability, or who perform poorly in high school.
Lambert, et al., Who Pursues Postsecondary Education, Who Leaves and Why: Results from the Youth in Transition Survey (2004)	Summary statistics	Canada	Youth in Transition Survey (18-20 cohort)	The major reason cited for dropping out of PSE was lack of interest, while 40 per cent of leavers returned to PSE within two years.
Light & Strayer, Determinants of College Completion: School Quality or Student Ability (2000)	Probit model	United States	National Longitudinal Survey of Youth	Students have the highest probability of completion if they match their school choices with their academic ability.
McElroy, Student Aid and University Persistence: Does Debt Matter? (2005)	OLS	Canada	Data from six universities in Ontario, Quebec and BC	Persistence highest for those who received most amounts of both loans and grants and lowest for those who received only large loans.
Murtaugh, et al., Predicting the Retention of University Students (1999)	Proportional hazards model	United States	Oregon State University student data	Attrition was found to increase with age and decrease with HS and first semester GPA. Non-residents had greater attrition than residents.
Singell, Come and Stay a While: Does Financial Aid Effect Retention Conditioned on Enrollment at a Large Public University (2004)	Bivariate selection model	United States	University of Oregon applicant data	Subsidized, need-based financial aid increases first-year retention, while merit-based aid has small impact on retention. Not controlling for selectivity bias overstates the effect of aid (both needs- and merit-based) on enrolment and retention.
Stinebrickner and Stinebrickner, Understanding Education Outcomes of Students from Low Income Families (2003)	Proportional hazard and Kaplan-Meier survivor function models	United States	Administrative data from Berea College and the National Educational Longitudinal Study	Non-traditional students as well as these with lower parental education has lower likelihoods of completion.
Stratton, O'Toole, & Wetzal, A Multinomial Logit Model of College Stopout and Dropout Behavior (2005)	Multinomial logit model	United States	Beginning Postsecondary Survey (1990/1994)	Finds difference in factors affecting stopout and dropout, including first-year financial aid type, marital and parental status.

Table 2 cont.

Author, Title and Date	Methodology	Country	Data Sets	Findings
Turner, Going to College and Finishing College: Explaining Different Educational Outcomes (2004)	Summary statistics	United States	Mainly the March and October Current Population Surveys (1968-2000), various others	Attendance rates in the US have increased dramatically but completion rates have risen little. No strong conclusion but potential causes of this include lower aptitude of marginal students, the concentration of federal aid on marginal attendees, and states putting more resources towards two-year institutions.
US Department of Education. Postsecondary Persistence and Attainment: The Condition of Education (1997)	Summary statistics	United States	Various data from the National Center for Educational Statistics	Suggests students who attend part-time and work full-time, delay entry, or break the continuity of studies, are less likely to both persist and complete programs. Aid (grants and loans) does not help attainment at four-years colleges, but does for shorter programs. Students who start at 2-year institutions are less likely to attain a bachelor's degree within five years.
Wetzel, O'Toole & Peterson, Factors Affecting Student Retention Probabilities: A Case Study (1999)	Binomial logistic regression	United States	Freshman and sophomore student records from a Virginia college	Academic indicators like GPA and credit hours per attempted hours drive the retention choice; financial variables were less significant.
Winston and Zimmerman, Peer Effects in Higher Education (2004)	OLS	United States	College and Beyond database	Find that lower-achievers (as measured by SAT scores) are more likely to succeed if they have higher-achieving roommates. Students in the middle are most likely to be influenced by roommates in either direction.