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A Simple Model of Access and Capacity for Post-Secondary Schooling in Canada[1]

Ross Finnie
School of Policy Studies
Queen's University
Kingston, Ontario
K7L 3N6
Ph.: (613) 533-6000 ext. 74219
Fax: (613) 533-6606
e-mail: ref@post.queensu.ca

Abstract: *This paper develops a simple model of the post-secondary education system in Canada that provides a useful basis for thinking about issues of capacity and access. It uses a supply-demand framework, where demand comes on the part of individuals wanting places in the system, and supply is determined not only by various directives and agreements between educational ministries and institutions (and other factors), but also the money available to universities and colleges through tuition fees. The supply and demand curves are then put together with a stylised tuition-setting rule to describe the "market" of post-secondary schooling. This market determines the number of students in the system, and their characteristics, especially as they relate to "ability" and family background, the latter being especially relevant to access issues. The manner in which various changes in the system – including tuition fees, student financial aid, government support for institutions, and the returns to schooling – are then discussed in terms of how they affect the number of students and their characteristics, or capacity and access.*

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I. INTRODUCTION

The Canadian post-secondary education system has seen many important changes over the last decade or so. One set of these relates to the cost of schooling and student financial assistance. Tuition rates have increased substantially. There was a general substitution of loans for grants at the provincial level, while Canada Student Loan Program borrowing limits first rose, then remained stagnant after the middle of the decade. The basic structure of the student loan system in terms of who lends the money and who bears the risk of default changed twice. Programs providing interest relief, debt reduction in repayment, and other forms of debt remission were introduced and expanded. The Canada Millennium Scholarship Foundation came into existence, with most of its money going towards debt containment. The Canadian Education Savings Grants and Registered Education Savings Plan programs were brought on line. Education-related tax credits were increased and widened. Family incomes generally moved with the business cycle, but not equally across all ranges, as income inequality twisted in a number of different ways.

A second set of developments relates to the capacity of the system. The financial support provided by the provinces – who run the post-secondary education system – to colleges and universities was generally reduced in real (per capita) terms while institutions' costs rose, resulting in cut-backs, retrenchment, and what most would call an overloading of the system and a deterioration in the quality of education offered.

At the federal level, block transfers to the provinces for post-secondary education (along with health care and other social programs) were repackaged into the CHST (Canada Health and Social Transfer) and reduced as part of the battle to balance the budget. Support for research declined in the middle part of the decade, but then recovered strongly as funding was restored to the established research granting agencies (SSHRC, NSERC) and funds were injected into the newly created Canadian Fund for Innovation and Canadian Institute for Health Research. Support for universities' research overhead costs was included in the federal 2002 budget, and made permanent in 2003. The Canada Research Chairs program was introduced and expanded.

And all this time, as schooling costs rose and the means of paying for post-secondary schooling shifted in various ways and as post-secondary institutions were squeezed financially, the

returns to post-secondary education rose, as the "new knowledge economy" placed an ever increasing value on "highly qualified personnel".[2]

In the face of these developments, the twin issues of "access" and "capacity" (as they are termed here) naturally arises. More specifically, how have these changes affected the number and characteristics of students in the post-secondary education system? How should policy in support of access be directed in the context of such a complex web of underlying factors and outcomes? What can and should be done to adjust the capacity of the system?

These issues are driven, first, by basic questions of fairness – by concerns that the opportunity of participating in post-secondary education has become increasingly related to family background rather than an individual's ability to do the work and desire to succeed. But they are also propelled by concerns regarding the nation's economic performance, as it is questioned whether we are keeping up with our competitors in terms of overall rates of college and, especially, university attendance, and whether it is the most skilled, rather than the privileged, who are getting these higher levels of education.[3] Hence the use of the terms "capacity", or the *number* (and type) of places available in our colleges and universities, and "access", or who fills those places.

The contribution of this paper is to develop a conceptual framework that helps frame these twin issues of access and capacity. It then uses this framework to discuss the likely effects of various changes, including some of the most salient policy measures – tuition pricing, student financial aid, programs aimed at encouraging families to save for post-secondary education, support in aid of post-secondary institutions – on the number of students in the post-secondary system and their characteristics.

The framework employed is based on a relatively simple supply-demand model. The development begins with an outline of the basic features of the demand for post-secondary education – that is, the factors that determine who would *like* to participate in the system and who is *able* to do so in terms of having the required financial resources. The supply side, which represents the number of places available in the system, is then developed. With these pieces in place, the characteristics of

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[2] See AUCC [2002], Finnie, Schwartz and Lascelles [2003], Human Resources Development Canada [2002], AUCC [2002], Junor and Usher [2002], and Statistics Canada [2001] regarding these developments.

[3] See, for example, AUCC [2002], p. 6, Human Resources Development Canada [2002], and Industry Canada [2002].

the resulting "equilibrium" of the system in terms of the number of students and their characteristics are discussed. Various changes in some of the principal underlying factors which affect demand or supply, including the policy measures mentioned just above, are then addressed in terms of their likely effects on the two principal outcomes: the number of students in the system and their characteristics – again, capacity and access.

This framework makes clear how the demand and supply sides of the post-secondary education system interact to determine the number of students and their characteristics, especially as the latter relate to family background, a key access issue. It also helps separate, at least conceptually, the different influences various particular demand-side factors – including tuition fees, student financial aid, and the returns to post-secondary education – can have on these outcomes, some of which are surprising. The model also helps show how important the capacity of the system – determined largely by the parameters set by governments which provide the context in which individual institutions make their enrolment decisions – is to these outcomes.

The paper then discusses how the evolution of the post-secondary system over the last decade or so can be usefully using the model framework.

In summary, the goal is of the paper is to provide a conceptual framework that is useful for thinking about the demand and supply of post-secondary education in Canada and related capacity and access issues, especially in terms of various related policy issues.

II. THE MODEL

II.1 The Demand for Post-Secondary Education

The demand for post-secondary education may be defined as representing the number of individuals i) who would *like* to go to school, and ii) who have the resources to do so and are otherwise able to overcome any barriers to entry. This approach corresponds to the standard notion of demand as employed by economists, and proves useful to our purpose of developing a model of post-secondary education.

One basic determinant of the demand for post-secondary education is price, which in this case may be thought of as the level of tuition fees (and other school costs): at higher tuition levels,

fewer individuals i) find it worthwhile to pursue higher studies and/or ii) have the means to do so, and vice versa at lower tuition levels.

This price-demand relationship leads into the classic "demand curve" concept used by economists which reflects the relationship between demand and price – in this case between the number of places sought at colleges and universities and tuition levels. The demand curve for post-secondary education – like virtually all demand curves – would be expected to be negatively sloped for the reasons just described.

Given this general down-ward sloping shape of the price-demand relationship, however, the particular position and form of the demand curve will be determined by the various underlying factors that determine the demand for post-secondary schooling. Some of the most important of these are not discussed.

i) Labour Market Opportunities and the Demand for Post-Secondary Education

Economists often focus on education as an investment activity, and the degree to which post-secondary education improves an individual's lifetime earnings or otherwise leads to desirable job opportunities is an important determinant of the demand for post-secondary education.[4] More specifically, an increase in the returns to schooling will shift the demand curve out, representing – *ceteris paribus* – a greater demand for places at colleges and universities at any given price.

One important implication of the fact that labour market outcomes comprise an important component of the demand for post-secondary education is that any increase in the returns to schooling is likely to increase the demand for it. Understanding this dynamic can, for example, help explain the general increase in enrolment rates that appears to have occurred over the last decade and a half among those from virtually all family backgrounds (discussed below) – despite the sharp increases in tuition fees. Even though it costs more, it is also worth more, especially when viewed in the long term, and individuals have generally responded by enrolling at higher rates.

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[4] See, for example, Rathje and Emery [2002], Vaillancourt [1995|, and Vaillancourt and Bourdeau-Primeau [2002] for recent work on the estimation of the rate of return to post-secondary education by level, field of study, and sex.

ii) Student Financial Aid and the Demand for Post-Secondary Education

Student financial assistance is another important determinant of the demand for post-secondary education, and for basically the same basic reasons that demand is affected by price – student aid affects both the rate of return to post-secondary schooling and its affordability.

Starting with grants, scholarships, bursaries, and other sources of non-repayable student financial aid, these forms of support can, first of all, help students overcome any financial barriers that potentially stand in the way of enrolling in post-secondary schooling by providing the funds they need to pay tuition fees, living costs, and other related expenses. Second, by affecting the net costs of the schooling, they also affect its rate of return.[5] Increases in student financial aid of this type will, therefore, tend to increase the demand for education among those receiving the assistance.

Student loans have a somewhat different effect. Like grants and other nonrepayable sources of student aid, loans provide the money individuals need to pay their schooling-related expenses. But unlike those other sources, they do not generally change the rate of return to schooling. The reason is that loans do not generally reduce the effective cost of attending school – precisely because the money is only lent, not given. The effect of a loan on an individual's demand for post-secondary schooling is, therefore, potentially strong and direct, but will not be as great as an equal amount of money given in the form of a grant.[6] A given amount of government spending on student financial aid will, however, go much further on loans than grants, precisely because the money is paid back, so the overall effect of a dollar spent on loans versus grants on the demand for education and access is an empirical issue.[7]

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[5] The differentiation of the affordability and rate-of-return effects can be seen by considering one grant going to an individual who wanted to go to school in the absence of the grant because the net benefits of the schooling (benefits minus costs) made it worthwhile, but was unable to afford to do so in the absence of the assistance, and another grant going to an individual who would have been able to meet the costs in the absence of the grant but finds it worth doing so only in the presence of the price subsidy the grant represents. In the first case, the grant works through its effect on affordability, in the second, through its effect on the rate of return.

[6] That said, to the extent student loans are in fact subsidized, as is the case for all government student loan programs in Canada, they will also reduce the effective cost of schooling and therefore affect the rate of return to at least some degree. In particular, loans are interest free while the student is in school, which represents a major subsidy which effectively reduces the cost of the schooling in real discounted present value terms.

[7] See Finnie [2001, 2002] for further discussion of the relative efficacy of loans and grants in increasing access to post-secondary education.

iii) Family Background and the Demand for Post-Secondary Education

Participation in post-secondary education, especially university attendance (as opposed to college, trade-vocational schools, and other forms of tertiary education) has been empirically shown to be significantly related to family background.[8] This is obviously an important relationship in terms of social justice issues, but also has important implications for the nation's economic performance as well, since who goes on to post-secondary should be determined by talent, rather than privilege, if it is to be the most able and worthy individuals who rise through the skill hierarchy and lead the way in the "new knowledge economy".

A variety of factors generate this background-schooling relationship. One is the inheritability of IQ or "ability" of some other type, although it is typically difficult to isolate this effect from others.[9] Another effect of family background – and, importantly, the one upon which student financial aid programs are typically focussed – is the individual's (family's) ability to pay for the schooling. But family background can also affect the demand for post-secondary schooling through the formation of preferences, the preparation for post-secondary education in terms of scholastic background and in other ways, and even perceptions of the costs and benefits of post-secondary education.

It is very important from a policy standpoint to sort out how the relative importance of these different ways in which background affects the demand for post-secondary education. If it is believed that post-secondary participation rates are lower for those from lower income families because of the affordability issue, for example, and policies are consequently directed at this problem with, say, increases in student financial aid, but the greater problem is actually differences in the preparation for, perceptions of, and preferences towards post-secondary schooling by family type, the policy efforts will achieve limited results in terms of improving the enrolment rates of lower income families while the opportunity of striking at the more fundamental issues is lost.

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[8] Looker [2001] provides a recent overview of existing work on the relationship between family background and post-secondary participation. Other work includes Bouchard and Zhao [2000], Butlin [1999], Christofides, Cirello, and Hoy [2001], De Brouker & Lavallée [1998a, b], Finnie, Lascelles, and Sweetman [2003], Foley [2001], Frenette [2002], Knighton [2002], and Zhao and de Broucker [2002, 2003].

[9] See Carneiro and Heckman [2002] for a recent discussion, and empirical investigation, of these issues using U.S. data.

Yet whatever the underlying reason, the characteristics of individuals' families, and their backgrounds more generally, will be important determinants of the demand for post-secondary education. Similarly, shifts in any of these family (or social) background factors (e.g., higher incomes or increases in parental education levels) will cause commensurate shifts in the demand for post-secondary education.

iv) Other Influences on the Demand for Post-Secondary Education

Any other change in the net overall benefits of – or the preparation, perceptions, or preferences for – post-secondary education will shift the demand for it. If, for example, a government instituted a set of policies to help post-secondary graduates with their school-to-work transition, that would increase the value of a diploma and shift the demand for post-secondary schooling outward. If, conversely, the unemployment rate for *less* educated young people fell, the long-run net returns to schooling would tend to fall as it became more costly in terms of lost earnings (thereby increasing its opportunity cost), and shift the demand curve inward. If the university experience itself was made more interesting and effective, demand would shift out. If the general "tastes" for education changed, for reasons of snobbery, because of a truly greater appreciation of intellectual pursuits and higher learning, or for any other reason, again demand would shift. The framework developed here is suitable for considering any such changes.

v) Summing Up the Demand Side

In summary, an individual's demand for post-secondary education is related to the associated benefits of going to college or university and having the means of doing so. Key factors in this relationships include price (or tuition levels as well as other costs), the rate of return to post-secondary schooling (monetary and otherwise), the level of financial aid available to students, family background, and other factors. Precisely how these factors help determine the number of students and their characteristics becomes more apparent below. First we turn to the supply side of the system.

II.2 The Supply Side

It is difficult to characterise the supply of post-secondary education in Canada in any single manner or with too much precision due to the diversity of systems operating in the country. This diversity derives from the different kinds of post-secondary education offered (from short trade-vocational courses to graduate degrees that take many years to complete), the existence of a private sector that exists in some of these niches to varying degrees, differences in how the system operates along provincial lines, and other factors.

In general, though, the capacity of the system is largely determined by government funding formulas, other sources of revenue, education ministry directives, and institutions' own strategic decisions, as well as other factors. Taking all these elements into consideration, the post-secondary system in Canada may be generally considered, at least to start, as having a classic upwards-sloping supply curve, indicating that as the price rises, more places could be offered.

In short, higher tuition fees (the relevant price) make it feasible and worthwhile for the system to expand its capacity. This is the basic concept – as simple as it is – used in the following discussions, but it will be seen that the model and its implications still hold quite well when the supply side is thought of in somewhat different terms.

II.3 "Equilibrium": The Number of Students and the Make-Up of the Student Body

Demand and supply can now be put together to consider a typical "market equilibrium" situation. Figure 1 shows the sort of upward sloping supply curve and downward sloping demand curve just discussed. It also shows tuition levels being exogenously given to the "market", as represented by the horizontal line at P (for price), corresponding to the standard situation in Canada where fees are set by provincial education ministries based on considerations of affordability, revenue raising, and other factors, rather than by free market forces (i.e., charging the highest price possible given the demand faced and the underlying supply curve).[10]

[10] In some provinces there is room for institutions to set their own fees, but usually within relatively narrow ranges. More general exceptions have emerged in recent years, but tend to involve specialised programs, usually the professions (especially medicine, law, and business). Treating tuition levels as set by non-market forces remains, therefore, a useful way of thinking of the more general situation.

The number of places supplied by the system is represented by the point where the price intersects the supply curve, or N_S. The number of places demanded is represented by the point where the price intersects the demand curve, or N_D. As drawn, the figure shows the typical situation in Canada where, at given tuition levels, demand is greater than supply ($N_D > N_S$). That is, there are more individuals who would like to go to college or university (i.e., applicants and potential applicants) than for whom there are places. In standard economics jargon, there exists a situation of "excess demand".

There can, however, only be as many students in the system as the number for whom there are places, so overall participation is equal to the number of places available at the going price – N_S. It is important to note that in such a situation (i.e., where demand is greater than supply), the number of students is "supply-constrained" – that is, determined by the capacity of the system. The implications of this become clear below.

It might be questioned as to how well this model reflects the reality of the post-secondary sector in Canada, but there are a number of arguments that could be used to suggest it is in fact a useful characterisation of the general situation. The logic of the demand curve is clear, the supply curve has been discussed above, and prices (tuition fees) are set more-or-less as described. As for the nature of the equilibrium that results, there are in fact typically more applicants than spots, while most institutions could generally be described as operating more-or-less at capacity – thus pointing to the excess demand/supply-constrained situation shown.[11]

Having said that, this characterisation best represents universities and more specialised college programs where the number of places is in fact limited and entry requirements serve to ration the number of places among an excess of applicants. Many vocational schools and a good number of college programs have, in contrast, much easier entry requirements and can adjust the number of places they offer by hiring additional instructors and otherwise obtaining additional resources, meaning there is little in the way of excess demand and those who want to get in are able to do so. In short, the supply curve is much more elastic and the system tends to be more demand-determined

[11] Institutions could, of course, always increase enrolment with their given level of resources at prevailing tuition levels, but in most cases only by reducing the quality of education they offered (e.g., bigger classes, less-qualified teachers, etc.). This is merely another way of thinking of the capacity situation as described.

rather than supply-constrained. In other cases, such as certain specific university departments facing declining demand and a fixed number of professors, situations of excess supply (more places than students) might obtain. These exceptions are incorporated into the discussions which follow, but do not detract from the usefulness of the more general characterisation that has been proposed, especially when thinking about policy issues.

Thus, apart from these particular cases, the system may be characterised in the following way: i) demand is greater than supply at prevailing tuition levels, and ii) the capacity of the system – and the number of students in it – will grow (only) if additional resources are injected into it through an increase in tuition fees or in some other manner. This would seem to represent a reasonable description of the current situation in Canada.

In such a system, the available places are generally rationed by entry requirements, or "ability". It is, however, not necessarily the best or otherwise most deserving students who get places, but rather the (perhaps) best and most deserving *of those who apply* – that is, who wish to go to school *and* have the means to do so at tuition levels P.

There might, in particular, be some very good students from lower income families who would like to go, and for whom post-secondary education would be a very good investment (both personally and at the social level), but who do not have the money to do so. And there might be others who possess the requisite raw talent but have not had the sort of high school (and earlier) educational opportunities that might have opened post-secondary opportunities for them a little later on when such choices were presented. Still others may simply not be aware of the benefits of a post-secondary education.

This model, simple as it is, proves useful for thinking about access and capacity issues: about *how many* students go on to post-secondary education, and *who* goes. It is also, as we will see below, perhaps useful for understanding what has been happening to access and capacity in the Canadian system in recent years and for thinking about what is likely to happen in the future and how various policy levers could affect those outcomes.

III. HOW DEMAND AND SUPPLY FACTORS AFFECT CAPACITY AND ACCESS

III.1 An Increase in Tuition Fees

The analytical framework can now be used to consider the effects of an increase in tuition fees – which in the Canadian context might (as discussed above) be assumed to be determined by provincial education ministries. The associated dynamics are illustrated in Figure 2, where the higher tuition fees are shown as the change in price from P_1 to P_2. As represented, it is assumed that there is no associated increase in supply, such as would result were the additional fees transferred to institutions, in order to focus on the demand side effects. The case shown would, therefore, correspond to a situation where the additional fees went straight into government coffers without being re-invested in the post-secondary system, which is approximately what happened in many jurisdictions in the 1990's. The effects of a price increase which leads to an increase in supply is considered below.

As a result of the price increase, there is a movement along the demand curve, and demand falls to N_{D2}, as some individuals are no longer able ("I can't afford to go"), or are no longer willing ("It isn't worth it") to pay for post-secondary schooling at the higher price.[12] Given the assumption that there is nothing to change the supply of places in the system, the number of places at colleges and universities remains at N_S (shown by the broken vertical line at that point), and the number of places in the system remains supply-constrained. Otherwise put, there has been nothing to affect capacity.

Excess demand in the system falls to N_{D2}-N_S, entrance criteria adjust downward as institutions effectively dig deeper into the smaller pool of applicants they face to fill their places, and average student "quality" declines.

The nature of the student body also changes with respect to family background. In particular, there is likely to be fewer applicants (i.e., reduced demand) from lower income families, as such individuals will tend to be priced out of the market at the higher fee levels – in short, opportunities for post-secondary education for this group are reduced.

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[12] The demand curve does not shift, since the underlying price-demand relationship has not changed; instead there is only a movement along the given demand curve in response to the price change. The demand curve shifts only when one of the factors underlying it changes, as will be seen below. This differentiation between *a movement along*, and *shift of* a demand curve is one of the basic elements of economic analysis.

The ultimate effect on the mix of the student body is, however, more ambiguous. It will certainly depend, first of all, on how many individuals are no longer *able* to attend because they cannot afford the higher costs and how many *choose* not to attend because post-secondary education is no longer a worthwhile investment at the higher fee levels – that is, the "affordability" and "rate-of-return" effects on the demand for education discussed earlier.

But the final change in the composition of the student body will also depend on the resulting changes in admission criteria, and who now gains acceptance that did not when tuition was lower and entrance criteria were more strict. It can, however, probably be assumed that the overall effect of these two sets of influences will be not only fewer applicants, but also fewer (accepted) students from lower income families, and a greater decline for these than for those from higher income families. But this is an empirical question that can only be resolved by an appeal to data.[13]

As noted, the student body will also change in another significant way – its "quality", at least as measured in terms of entrance criteria. Student ability, thus measured, will tend to decline, as entrance criteria fall in response to the decreased number of applications and the need for institutions to fill their (unchanged) places from that smaller pool of applicants. This change would, furthermore, have implications for the overall rate of return to education, since a lower quality student body would typically generate a lower (social) rate of return to post-secondary schooling. This decreased rate of return would, in turn, tend to make expanding the system a relatively less attractive social investment. In short, if higher tuition fees force qualified individuals out of the system, the economic arguments for expanding the system at the margin are likely to fall as well.

III.2 The Effects of Increasing Student Financial Aid

This set-up can also be used to consider the effects of increasing need-based student financial aid (the implications of a decrease in aid are the reverse of those shown here – as is true for the other changes considered in this section). The traditional policy instruments are grants,

[13] If, for example, there is a clustering of lower income applicants at the margin of the acceptance criteria, a relaxing of those could actually result in an increase in the number – and share – of such students in the system. If, on the other hand, students' credentials (and the benefits of post-secondary education) are more evenly distributed by income class, the lower entry criteria will increase the acceptance of applicants in a relatively neutral manner, and the representation of lower income students will fall since there are fewer applicants at the higher tuition fee levels.

scholarships, bursaries, and loans, although since the mid-1990's there has been an expansion in debt remission programs, tax credits, and programs aimed at helping families save for their children's education.[14]

First and foremost, an increase in student aid targeted on individuals from lower-income families will shift the demand curve for post-secondary education out – from D_0 to D_1 as shown in Figure 3. More individuals will now have the means of participating in the post-secondary education system (they have more money to meet their schooling costs) and the incentive to do so (as the decrease in the effective cost of their schooling results in an increase in the associated rate of return), so the number of places sought at the prevailing tuition levels (assuming no change in fees or any other factors at this point) increases to N_{D1}. Note that the increase in demand comes entirely from low income families – those who qualify for the increased aid.

There will, however, again be no change in supply, which remains at N_S, precisely because tuition fees have not changed, meaning that – in the absence of any other policy changes, including (especially) those related to the supply side, universities and colleges will not have the additional resources required to pay for such an expansion and therefore will not do so. Since the number of places in the system remains unchanged, the number of students remains similarly invariant at N_S.

This is a simple, but highly significant result. That is, increasing student aid, and thus boosting the demand for post-secondary education, will not necessarily change the total number of students in the system. This is an especially important observation to make in the context of policies aimed at doing precisely this – increasing the number of "HQP", or highly qualified personnel.[15]

And the reason is simple. If colleges and universities are already operating at capacity in terms of what is financially feasible at prevailing tuition fees (and other elements of the funding schedules they face), they will generally not create additional places in the face of an increase in demand. That would require either an increase in tuition fees or a change in some other element of

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[14] The changing face of student financial aid is discussed in detail in Finnie, Schwartz and Lascelles [2003].

[15] For example, HRDC [2002] and Industry Canada [2002] both talk about increasing the number of students by boosting student financial aid, and the most recent federal budget does precisely this for graduate students, without any clear strategy regarding the capacity of the system.

the relevant funding formulas, such as being provided the money required for expansion directly from provincial ministries.[16]

An increase in student financial assistance will, however, have other effects – and potentially important ones. First, an increase in need-based aid will increase the demand for post-secondary schooling precisely among those who benefit from the aid program, those from low income families. This will also unambiguously increase their actual participation rates – in both relative and absolute terms – as more individuals from low income families (inevitably not less) also pass the entrance criteria which determine admission.

The final composition of the student will thus depend not only on the change in applications (the demand effect), but also on who gets in as entry criteria rise as institutions allocate their unchanged number of places among a greater number of applicants. Depending on the distribution of "ability" (as thought of in terms of entrance criteria), the actual composition of the student body with respect to family background may change more or less than proportionately to the change in demand. But the participation of lower income families will necessarily rise to the degree that the additional demand pressures come from their ranks, as should be the case with need-based aid.[17]

There would, therefore, be no measured change in overall participation rates as a result of an increase in student financial aid, but the characteristics of the underlying demand for post-secondary education, and of those who are ultimately accepted into the system, will change. And to the degree the aid is in fact need-based, the measured relationship between post-secondary participation and family income should generally become weaker as more individuals from lower income families enter the system.

These effects would presumably be greater for the types of schooling where financial barriers were more binding and the costs of post-secondary schooling were more important

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[16] Of course to the degree the system is not in fact supply-constrained, more students may in fact be admitted – as discussed above. But it has been argued that such cases are more the exception than the rule, especially at the university level.

[17] If those individuals brought into the demand side in response to the increased aid tended to be marginal candidates in terms of academic standards, a relatively reduced proportion of them might actually be accepted, as they were choked off by the stricter entry criteria. To the reverse this were true, the opposite would occur. But the number of students from low income families will rise in both absolute and relative terms to at least some degree, since the increased demand comes entirely from their ranks.

determinants of its underlying demand, such as for university education relative to college, for rural students relative to those living near a post-secondary institution, and so on. The framework applies equally, it is only a matter of how great these effects might be, which is an empirical issue.[18]

Improved access for capable young people from lower income families is, of course, exactly the primary goal of student financial aid programs. The fact that, in the case of an increase in student financial aid accompanied by no action on the supply side (i.e., no change in capacity), these individuals will tend to effectively take the places of others who might have gone in the absence of such aid is not necessarily a bad thing, but needs to be recognised.

The second way in which the student body would change is implicit in the preceding, and again relates to its "quality", and is the opposite of that discussed for the tuition increase just above. Entrance criteria will tend to rise in response to the increased number of applications, increasing the average "quality" of student in the system. And this change could again have implications for the overall rate of return to education, with the associated increases (as better students come into the system) leading to an increase in the (social) value of post-secondary education and, therefore, generating incentives to expand the system.

Of course the dynamics suggested by this model would not apply in all cases, and to the degree places are not supply-constrained and there is actually excess capacity in the system – the exceptions discussed above – the number of students could in fact rise as student financial aid increased. And there may be a related dynamic whereby demand spilled over from certain demand-constrained institutions (e.g., the better universities and colleges) to others where there was room for more students. This sort of increased use of previously un-used capacity has potentially important implications for the final changes in terms of the number of students in the system, the characteristics of the student body, the distribution of these students across different levels of the post-secondary system and particular institutions, and the effects of the changes on the social rate of return to post-secondary education.

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[18] The effects of student financial assistance have been represented as a change over time, but the same logic would apply to comparing two different provinces. For example, we would not necessarily expect to see a greater number of students or higher overall participation rates in a province that offered more generous student financial aid than another (*ceteris paribus*), but the composition of the student body would be different, with more students from lower income families in the system that offered more assistance.

Still, the basic elements of what has just described should still hold in that there will be increased demand on the part of those benefitting from the increased aid; the greater demand will, in the presence of capacity constraints, not change the number of students in the system but will tend to lead to tighter admission standards as a relatively fixed – or in the limit perfectly fixed – number of places are allocated among a larger pool of applicants; and the characteristics of the student body will change to include more individuals from lower income families and fewer of those from higher income families.

III.3 Changes in Other Demand-Side Factors

Changes in other demand-side factors will have at least qualitatively comparable effects to a change in student financial aid – that is, a change in demand will result in (strictly speaking) no change in the number of students in the system to the extent it is supply-constrained, but a shift in the composition of applicants and the characteristics of the student body as new students enter the system and entry standards are adjusted in response to the changed demand for the (relatively) fixed number of places available. The exact magnitude and nature of these effects will depend on the underlying source of the change in demand, the extent of that change, and precisely how the effects work through the system.

Furthermore, to the degree the system is in fact not perfectly supply-constrained, there may (as discussed earlier) also be adjustments in the number of students as the system expands or contracts in response to the changed demand, or spill-over from the supply-constrained areas of the system to other areas, with the changed demand leading students to enrol in institutions or programs that have room for them even though these might not be their first choices.

The effects of a shift in demand stemming from an increase in the returns to post-secondary education are perhaps particularly interesting from a broader post-secondary education policy perspective. Whereas other markets, including those for certain specific kinds of human capital, can generally be relied upon to generate more of the sought-after kinds of goods, services, or workers through the normal workings of demand, prices, and supply, this is not generally likely to be the case for post-secondary graduates as a whole.

If there were, for example, an increase in the demand for more "highly qualified personnel" – as is generally thought to have occurred in the last decade or so – the model presented here suggests that governments would have to take active supply-side measures to allow the system to respond to that shift in demand. If they did not, there would not necessarily be any increase in the number of graduates – to the degree the system is supply-constrained. And again, to the degree the system is at capacity in some areas but not others (e.g., the better universities versus those located away from cities or of lower overall quality, and the college system in general), there will be spill-over effects of the excess demand that could veil the capacity constraints that might perhaps bear attending to.

Indications of an increase in the demand for graduates would presumably include, on the one hand, increased employment opportunities and salaries for graduates, and on the other, greater numbers of applicants for the number of post-secondary spots available, increased entry standards, and increased attendance at institutions that were previously characterised by excess capacity – but little or no change where the system is at capacity. The challenge to governments would presumably be to respond to such signals with the appropriate adjustments on the supply side.

III.4 Expanding Capacity

Another case to consider is expansion of the capacity of the post-secondary system while tuition fees and other policies are left unchanged. This is perhaps an especially relevant policy consideration at a time when governments have been making commitments to increase the number of post-secondary graduates, but are at the same time perhaps reticent to increase tuition levels for political reasons. In Figure 4, this scenario is represented by an outward shift of the supply curve from S_0 to S_1. Such an expansion could come in the form of increased block grants to institutions or any other policy change which essentially made it possible (and worthwhile) for institutions to admit a greater number of students at any given level of tuition fees.

With such a shift in the supply curve, the quantity supplied at prevailing tuition fee levels (P) increases from N_{S0} to N_{S1}. Since tuition levels have not changed, demand remains at the same level as before (N_D), but there is an increase in the number of students in the system, as institutions admit more students to fill the greater number of places now available, and there is a corresponding

decrease in excess demand (as shown). This result – more students – would obviously be consistent with what would presumably be the underlying policy goal of such a capacity initiative. The exact degree to which the number of students increases of course depends on the particular extent and nature of the initiative, on the ultimate effects on institutions' capacity, and other relevant factors.

In addition to increasing the overall number of students, the characteristics of the student body will – as with the demand side changes – also adjust. Most importantly, admission standards will tend to fall as institutions attempt to fill their increased number of places from the same pool of applicants as before. That is, more "lower quality" students will make it into the system. If the policy goal is, however, to increase the number of post-secondary students, this is not necessarily a problem, as long as the system does not dig so deeply into the pool of applicants that it begins to include individuals for whom investing in post-secondary education is not a good social investment.

Since there is no change in tuition levels, the model suggests that neither will there will be any change in the number of applications for spots in the system.[19] Thus, while there will be no decrease in the number of applicants from lower income families, neither will there be any increase. There could be a change in the relative shares of the student body coming from lower versus higher income families, but only to the degree the new "marginal" acceptances included relatively more – or fewer – individuals from lower or higher income families. These are the same sort of "acceptance effects" as discussed above. There is, though, no obvious reason to think the effect should run one way or another.[20]

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[19] Over time, the number of applicants might change as more students are admitted to the system, since some students who previously perceived they had little chance of being accepted might now see that it is worth applying. This is true in the other changes discussed above as well. That is, the demand for places and the number of applicants have been considered to be equal, whereas it might be more correct to speak of demand being the same as the "potential" number of applicants, where some individuals who would like to go might not even apply because they perceive their chances of being accepted as being very low. This differentiation has, however, no real effect on the workings of the model.

[20] That is, there is no strong reason to think that student ability, as represented by high school records and other factors that enter institutions' acceptance decision, is correlated with family income at the acceptance margin. This is, however, an empirical issue that can only be resolved with data.

III.5 Recent Policy Initiatives: Helping the Middle Class or Crowding Out the Poor?

A particularly interesting set of recent policy changes to consider are the introduction and expansion of programs aimed at increasing parents' savings for their children's future education (Canadian Education Savings Grants and Registered Education Savings Programs) and the expansion of education-related tax credits available to students and their families.

The effects of these programs would likely be similar to the other increases in demand factors just discussed in terms of the overall numbers of students in the system – either no change, or spill-over from the capacity constrained sectors and institutions to those with excess capacity. But there will be different impacts with respect to who gains access to post-secondary education. The model developed here suggests that these programs will result in a greater number, and share, of individuals from the types of families that benefit from the measures in question, and fewer students of other types, as some of these are squeezed out of the system as entry criteria rise in order to allocate the available places among the larger pool of candidates.

To the degree such policies increase the demand for post-secondary education on the part of middle and higher income families, and less so among those with lower incomes who are not in a position to take advantage of the opportunities available (not having room for such savings or sufficient income to benefit from the tax credits), it is the children of those higher income families that will benefit from these programs, as they will be even more likely to go on to post-secondary education than before – and, by the implication of the model presented here, those from lower income families who would tend to be crowded out to at least some degree.

Who, then, are the beneficiaries of recent government programs of this type, and who does not benefit? Or, in the context of this analysis, who is likely to crowd out whom as a result of these initiatives? Answering that question is beyond the scope of this paper, but it is important to consider such implications in terms of predicting the present and future effects of these sorts of government policies on access to the post-secondary system.

The same logic applies to other like changes, including parents simply becoming more aware of the costs of post-secondary education and saving more for their children's education even beyond that which any government policy provides, encouraging their children to work harder or otherwise

be more prepared for post-secondary schooling, and any other behaviour which affects the demand for post-secondary education.

It is generally laudable to see increased preparedness on the part of parents for their children's education and to encourage their children to think about going to college or university, and perhaps good for governments to contribute to this dynamic. But the full effects of these activities need to be thought through. And the model provided here points to the risk of any resulting increased demand not leading to rises in the overall number of students, while changing the characteristics of who goes, with greater representation among those who benefit from the programs and fewer from those who do not.

Complementary policies could be adopted to match these newly gained advantages for the middle and upper classes to provide some sort of similar set of benefits – presumably of a different kind such as increased direct need-based student financial aid in the form of grants, loans, and so forth – to lower income families, but the importance of doing this to avoid the crowding out just described needs to be recognised. Failure to do so could, to repeat, result in the current policies that are intended to increase participation in the post-secondary education system simply creating (further) advantages for the middle and higher income families who benefit disproportionately from these programs, and leave lower income families behind, in relative and absolute terms.

An alternative remedy to this thorny dynamic is, of course, an expansion of the capacity of the system in order to create the extra spaces likely to result from the increased demand that is likely to derive from these pro-education government initiatives. The model presented here helps illustrate all these issues, even if it also points to the need to learn more about the actual magnitudes of the relevant effects – how the demand for post-secondary education has shifted in the past and is likely to shift further in the future as a result of each of the underlying changes being discussed, what the precise response of universities and colleges has been and is likely to be in the future in the face of these shifts in demand, and so on. The framework developed here should be useful for identifying the qualitative nature these relationships in principle, but needs to be fleshed out with hard data for it to be more fully useful for policy formation.

III.6 Summarising the Analytical Framework

This relatively simple framework has been developed as a means of identifying the different factors that can affect the post-secondary education system in terms of the number and characteristics of students in the system – that is, capacity and access. This paradigm is useful for framing many relevant policy discussions, especially with respect to categorising policies in terms of whether they operate through the demand side or through the supply side, and the different effects various policies might have on the number and characteristics of students in different circumstances.

In this way, the framework should help us better understand what has happened in recent years in terms of the number and characteristics of student in the post-secondary education system, what might happen in the future under various different scenarios, and the role policy can play in these future dynamics. It is, however – as has been repeated throughout this section – essential to appeal to data to flesh out the different dynamics this model points to. What can be done in this regard?

IV. WHAT HAS BEEN HAPPENING TO SUPPLY AND DEMAND?

Although developments have varied across provinces, the Canadian post-secondary education system in the 1990's can be broadly characterised by the following developments:

- Tuition rates increased substantially.[21]
- The overall number of post-secondary students rose moderately in the first part of the decade, then much more slowly in the latter part, with effectively no change in the numbers at the university level for the benchmark undergraduate programs after 1993, while college enrolment continued to grow, although more moderately than in the earlier part of the period.[22]
- On the supply side, the resources available at the university level were unchanged or declined through most of the decade, whether measured in dollar terms, in faculty numbers, or in other ways. Informed commentators speak of spending constraints, cut-

[21] Junor and Usher [2002], p. 75, with reference to Statistics Canada's *Annual Tuition and Additional Fee Survey*.

[22] Statistics Canada [2001], Table 4, p. 35, and Table 12, pp. 52-59.

backs, budget shortfalls, and the like – as opposed to a willing tailoring of the resources available to do the required job for a given number of students. In the terms used here, the supply curve shifted backward. The college system, in contrast, suffered less or even expanded.[23]

- The various factors that underlie the demand curve for post-secondary education moved in a mixed fashion, but probably in ways that would be expected to increase the overall demand for post-secondary education. To wit, the labour market returns to post-secondary education continued to increase, family characteristics generally changed in ways that would be expected to increase enrolment rates (e.g., the number of parents with post-secondary diplomas rose), the post-secondary-aged population began to grow again, while student financial aid changed in a variety of ways with more ambiguous overall effects.[24]
- While the data are sketchier, the number of applications for college and university appears to have climbed, especially in the latter part of the decade, and entry criteria rose.[25]
- The information on the demand for post-secondary education and actual enrolment by family income level is even sketchier, but appears to indicate increases in post-secondary participation rates across all family income levels, but larger increases for certain income groups than others, generally favouring those at middle or higher income/education levels, with smaller increases or even decreases among those from lower income/education families.[26]

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[23] Statistics Canada [2001], Table 52, p. 167, AUCC [2002], Figure 2.7, p. 25 and Figure 4.11, p. 65,Junor and Usher [2002], pp. 172-180. It should be kept in mind that some of this financial pressure came from the ageing of the nation's collective faculty, since salaries rise with age.

[24] AUCC [2002], Chapter 1, pp. 1-20, and Junor and Usher [2002], various sections.

[25] Acumen [2001], Junor and Usher [2002], and various issues of MacLean's special issue on universities.

[26] Bouchard and Zhao [2000], Corak , Lipps and Zhao [2003], Finnie, Laporte and Lascelles [2003], and Zhao and de Broucker [2001, 2002]. See, however, Acumen [2001] for evidence suggesting that lower income students have not fallen behind, at least not in Ontario.

Using the analytical framework developed above, it may be hypothesized that the university system in particular – where it has been suggested the supply-constrained model is more likely to obtain – has evolved in the manner shown in Figure 5. The tuition increases are represented in the change from P_0 to P_1, and are irrefutable. The rise in the returns to post-secondary education and other underlying demand side factors may be thought to have resulted in an outward shift in the demand curve from D_0 to D_1, resulting in the above-mentioned increase in the overall number of places demanded (applications), from N_{D0} to N_{D1}, despite the higher tuition fee levels, which themselves would have caused a decrease in the number of places demanded. The supply of places has remained more-or-less unchanged[27], resulting in an increase in excess demand (since N_{D1} is greater than N_{D0} and S has not changed), leading to the observed increased entrance criteria, and spillover to certain more "marginal" institutions and the college system in general (where enrolment continued to rise right through the decade).

IV.1 How the Model Helps

This interpretation of what has occurred may not be completely accurate, but it is coherent both in terms of how it corresponds to the observed developments in the system and the workings of the theoretical model developed above. It is, in short, a reasonable working hypothesis.

Placing the observed developments in the context of the model that has been developed here should thus allow each piece of information, whether direct or indirect, to help us form and test hypotheses regarding what has been changing in the system in terms of demand, supply, and the overall numbers (and characteristics) of students, and also assess the generally validity of the underlying model.

But what would a counterfactual be? Are the model and the hypothesized changes actually being tested? Put in a different way, what sort of information, or outcomes, would lead us to refute the basic model and/or the recent developments hypothesized above? Suppose the system is not

[27] This has been shown as the net result of a shift back of the supply curve and an accompanying movement outward along a given supply curve at the higher tuition levels, but could have been shown in other ways, depending on how much of the tuition increases institutions received, how these provided incentives to increase capacity even as core funding cuts and related measures led them to decrease the number of places, and related institutional details. The key element is that – either way – the overall number of places did not, for the most part, change a great deal.

supply-constrained as has been hypothesized and/or suppose there have not been increases in demand that have outstripped the capacity of the system? More concretely, suppose the system does in fact generally expand with increases in demand, which is to say that the government (and institutions) match the number of places to the demand for them – allowing always for some level of "excess demand" representing those who are simply not highly qualified enough to be accepted into the system? In such a case, we might again observe or otherwise surmise an increase in demand (as here), but we would also expect to find a resulting increase in the supply and, ultimately, the number of students in the system, and no increase in excess demand or any of its manifestations as suggested above. That is, we would expect to observe a different set of developments.

Thus, the particular confluence of empirical developments noted above is not only consistent with a particular "model" of the post-secondary system world and how it is hypothesized to have changed of in recent years, but also represents a test of that model and the hypothesized developments in the sense that if either did not hold, we would not likely have observed the empirical developments that have been noted. In short, we have something of a falsifiable set of outcomes against which we can test our model and hypotheses; we have something of a scientific method.

The contribution of the theoretical model developed in the preceding sections is, therefore, that it not only makes provides a framework for thinking about what we might look for in the data available to confirm or refute this model and how the post-secondary system behaves and has evolved over time. We can, for example, predict the likely effects of the changes in the underlying factors that affect demand that have been observed in terms of shifting the curve, and the more unambiguous effects of the change in tuition rates on movements along the curve. If the net effect is to increase demand, we can look for such an increase either directly in terms of applications, or indirectly in the various other ways proposed above. And if we do not find the anticipated changes, either the model does not hold, or the developments have not been the hypothesized ones. The theoretical model thus provides guidance to where we should look in terms of data, and how we should interpret what we find.

V. CONCLUSION

This paper has addressed various issues pertaining to participation in the Canadian higher education system, broken down principally into two parts: the "capacity" issue, or the total number of students in the system, and the "access" issue, or *who* goes.

The paper starts by developing a conceptual model of the post-secondary system using a relatively simple supply-demand framework. This begins with the development of a more-or-less standard demand curve, where the demand for higher education is postulated to be inversely related to price (i.e., tuition levels and other associated schooling costs) plus other factors which affect its affordability and net benefits, such as the labour market returns to schooling and the financial aid available to students. A stylised supply curve is then proposed, whereby the number of places in the system is determined not only by various institutional arrangements between educational ministries and the institutions, but also the money available to universities and colleges through tuition fees. The supply and demand curves are then put together with a stylised tuition-setting rule to describe the "market" – or system – of post-secondary schooling.

The key aspects of that system may be summarised as follows:

- The number of places in the system is largely – especially at the university level – supply-constrained, meaning that at any point in time it is determined by the capacity of the system.
- Demand is generally greater than supply at the prevailing tuition fee levels, and excess demand is rationed by entrance criteria.
- Any factor that shifts the demand curve will change the demand for places in the system, but not the number of places (overall participation) to the degree the system is in fact supply constrained. Thus, changes in the returns to post-secondary education, the student financial aid system, or other demand-side factors will affect how many *want* to go, *who* goes, and the amount and nature of excess demand, but not the total number of students in the system.
- While this is the main paradigm, other elements of the system, especially at the college level, are more likely to be able to adjust capacity and absorb different

numbers of students, including any overflow stemming from shifts in the capacity-constrained (university) sector.

After developing this general set-up, the model is used to speculate upon the likely effects of a number of underlying changes in the system. The effects of changes in tuition levels, student financial aid, the returns to post-secondary education, and the underlying funding of the system are thus examined with respect to their likely effects on the total number of students in the system and the characteristics of the student body in terms of ability and family background.

A set of hypotheses regarding the changes in the post-secondary system that have occurred over the last decade or so is then proposed, discussed in terms of what the existing evidence shows in the context of the model that has been developed. The model is thus seen to help guide us as to where we should look for changes, and how to interpret what is found.

Putting these parts together, it is hoped that this paper adds to our understanding of the post-secondary education system in terms of how many go, who goes, and why and for thinking about related policy issues.

Figure 1: Supply and Demand for Post-Secondary Education

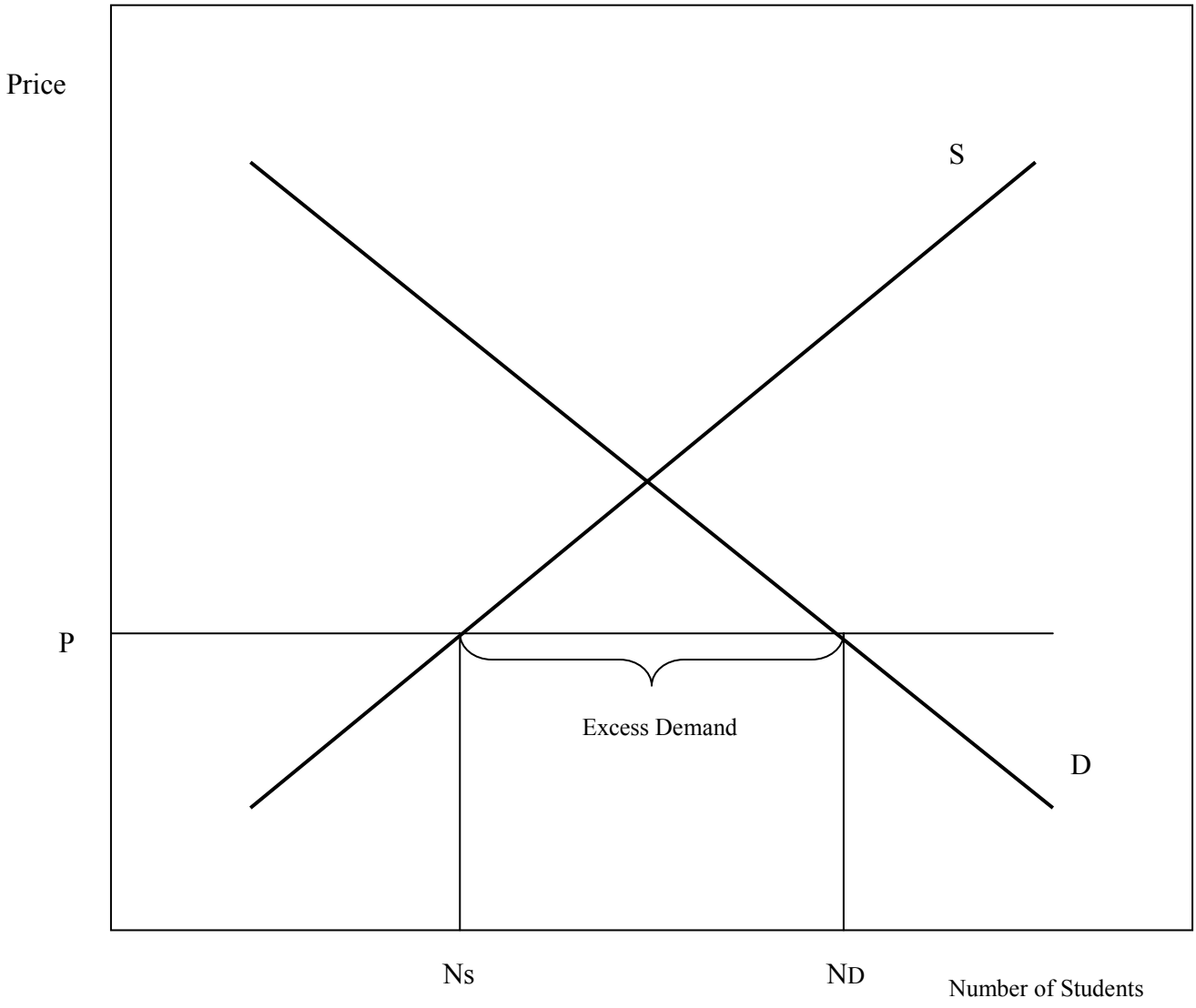


Figure 2: Effect of an Increase in Tuition

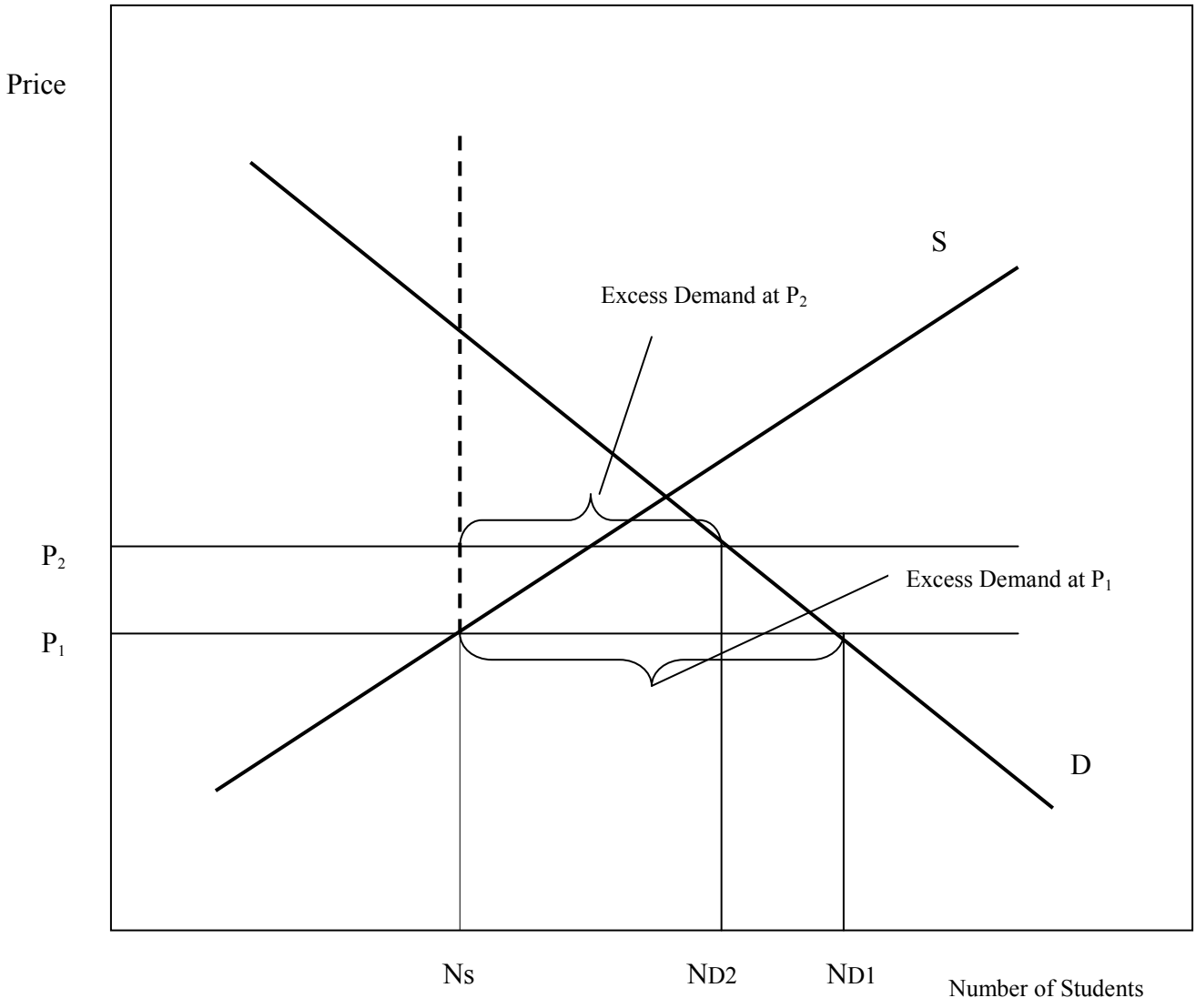


Figure 3: The Effects of Increasing Student Aid

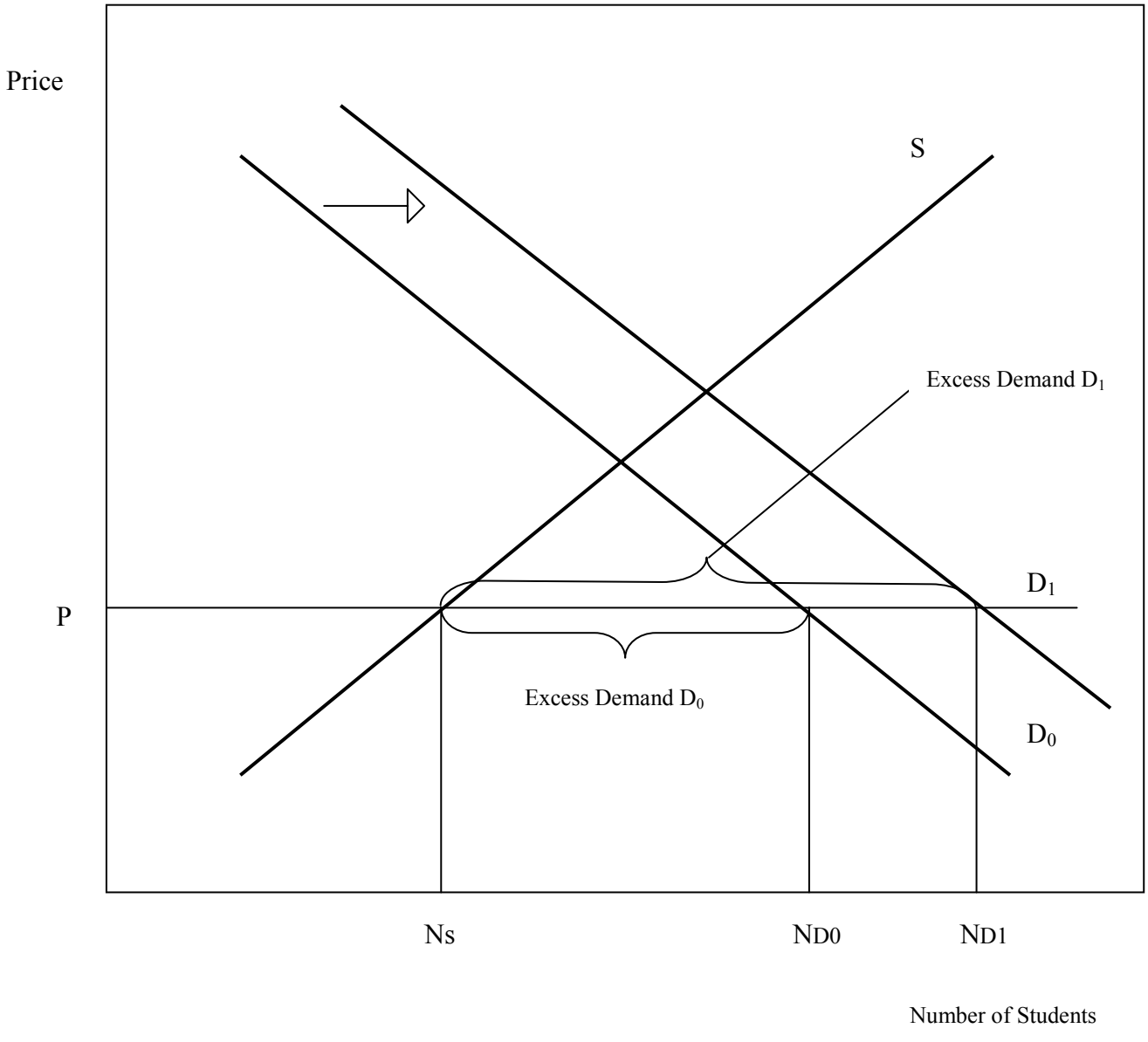


Figure 4: Expanding Capacity

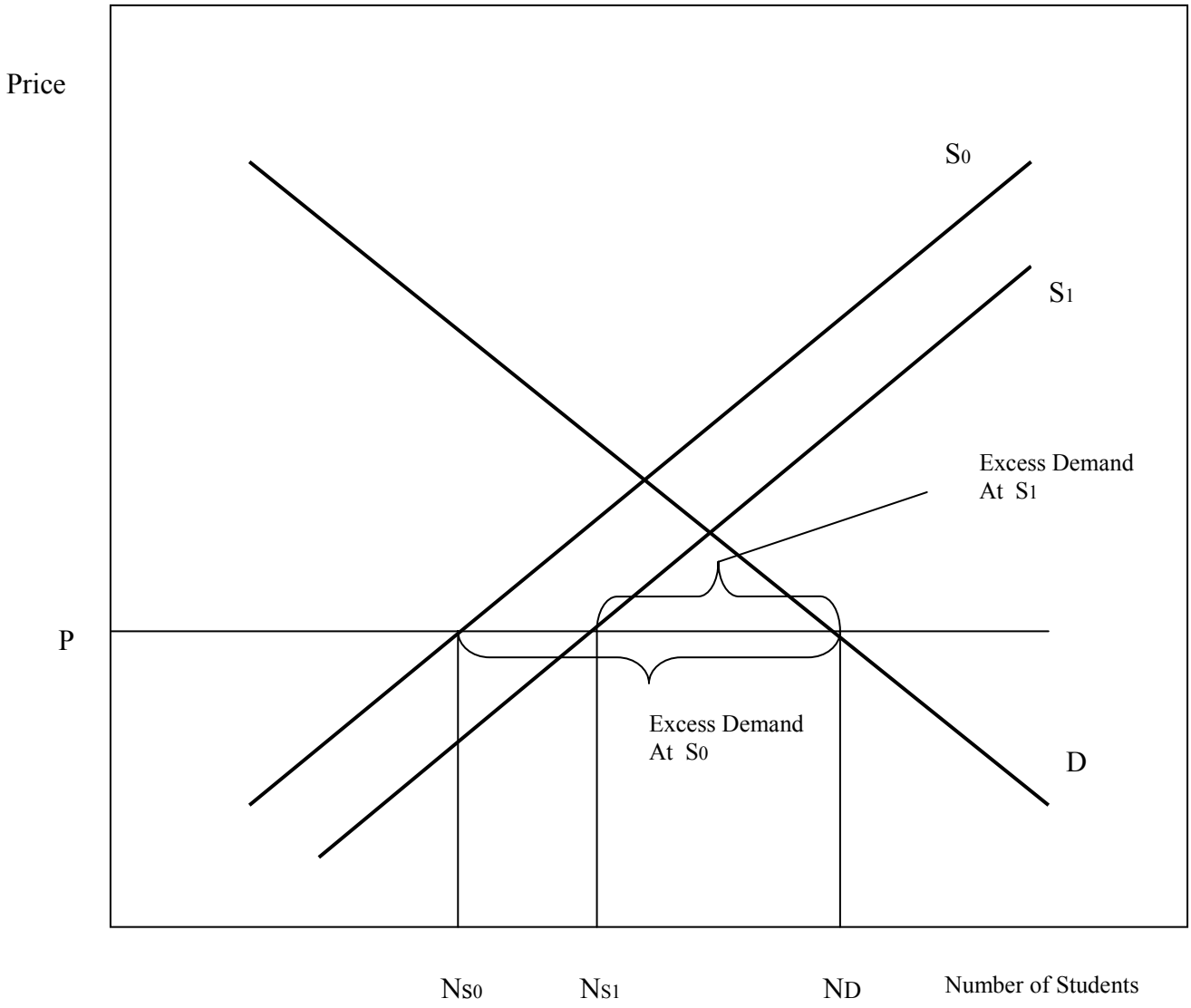
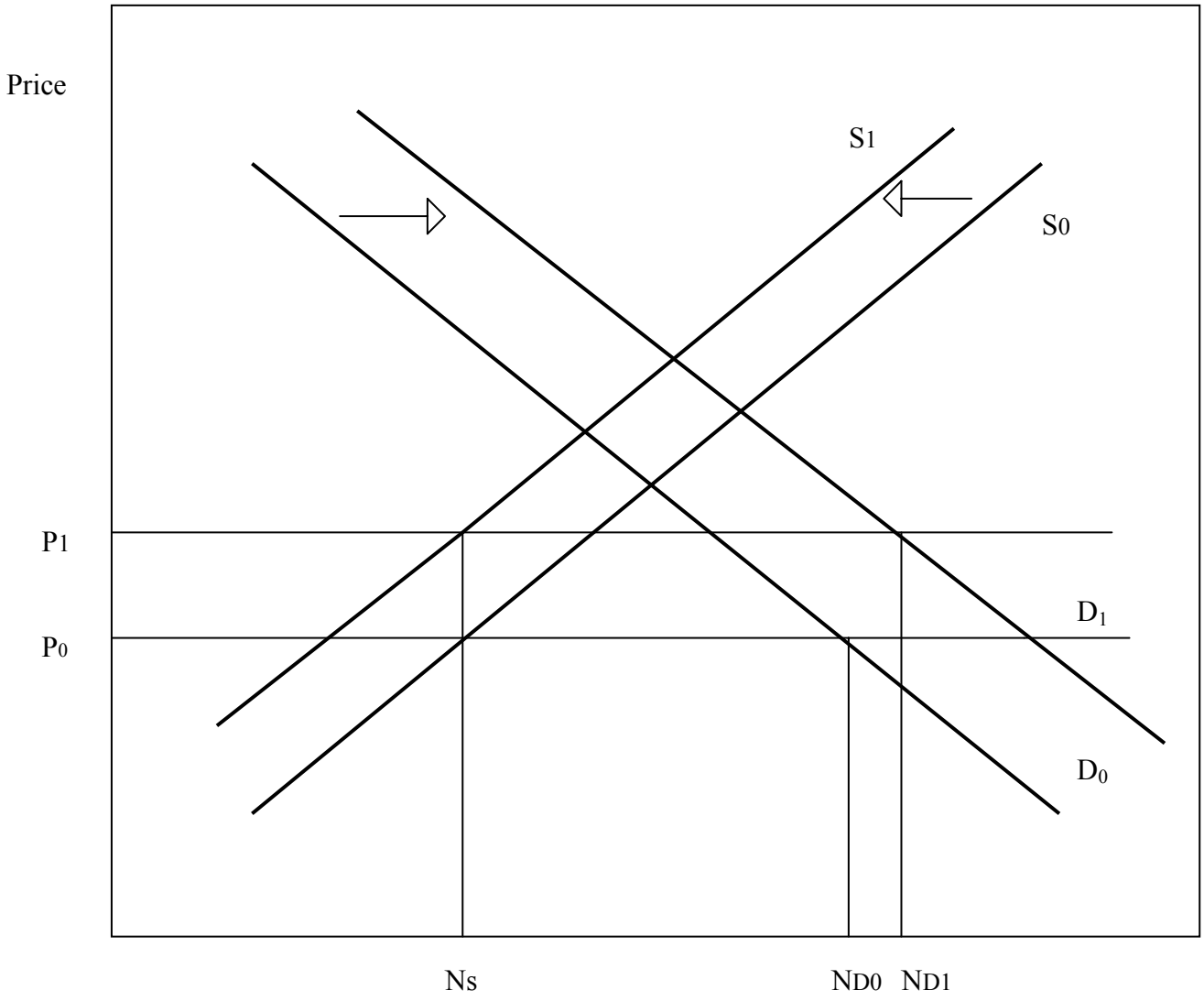


Figure 5: Recent Developments in Canada



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