

# Background Characteristics and Patterns of Access to Postsecondary Education in Ontario: Evidence from Longitudinal Tax Data

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## Executive Summary

This paper exploits longitudinal tax-filer data to provide new empirical evidence for Ontario on i) overall PSE participation rates on an annual basis over the last decade, ii) how access is related to a number of important individual and family characteristics, including sex, family income, area size of residence and family type, and iii) how these relationships have changed over time. This is done for Ontario as a whole, in comparison to the rest of Canada, and then broken down by region within Ontario. The findings are informative, in some cases surprising, and highly relevant to public policy regarding access to postsecondary education.

The findings are many, and there is room to mention only a few of the most important ones here. Our focus here was on access to university – although we do present results for college attendance as well. We do this for two main reasons. The first is that the PSE-related tax credit information available in the Longitudinal Administrative Databank (LAD) dataset which we employ to identify participation in PSE do not do as good a job of finding college students, simply because the credits available are not generally worth as much to college students as they are to university students. Secondly, the effects of individual and family background characteristics on PSE attendance – a principal focus of our study – tend to come out much more strongly in university access rates, while the overall (net) effects on college attendance are more unambiguous and are almost always found to be much smaller from an empirical perspective.

We use a range of analytical approaches, from simple graphical presentations of access rates over time and how access is related to each of the background variables considered on an annual basis over the period covered by our analysis, to various sets of multinomial logit models which allow us to disentangle the independent effects of each of these variables while taking the other factors into account and to also see how these relationships shifted over the period covered by our analysis.

Our first main finding is that university access in Ontario generally increased over this period, reflecting not only the dramatic ratcheting up at age 18 associated with the elimination of the final year of high school in 2003, but to a more general upward trending pattern at other ages (we focus on participation through age 21) as well. These Ontario increases were, furthermore, greater than those observed in the provinces that comprise our “Rest of Canada” (ROC) basis of comparison.

Second, we find that females not only access university at much higher rates than males, but that this gap continued to widen over this period, so that by 2008, 55.9 per cent of Ontario females had attended university by age 21 as compared to just 38.4 per cent of males, representing a 17.5 percentage point gap, or a 46 per cent higher rate in relative terms. This represents a profound change from earlier generations, the consequences of which will only be played out in the years to come.

We also find that participation rates are strongly correlated with family income, with individuals from progressively higher income levels attending university at higher rates than those from lower brackets. But while this replicates the general findings of previous studies, we are also able to see that these gaps are smaller in Ontario than in the ROC, and actually decreased over this period, principally due to gains among those at the three lower income levels. It appears, therefore, that access to university in Ontario is less income dependent than in at least some other provinces, and that there has been some convergence in university participation rates by family income level in Ontario over the last decade or so.

University attendance also varies significantly with area size of residence – large cities versus smaller cities, towns and rural areas. Furthermore, the large city gap, in particular, appears to have generally grown wider over time.

Being from a lone-parent family is associated with significantly lower rates of university attendance, but our data conform to some other recent studies in indicating that much of this effect is due to the other factors with which family type is correlated, family income (and parental education when it is available) in particular. It is thus not so much an issue of family type as it is of these other influences – although some gap does remain after these other influences are accounted for. Furthermore, this gap appears to have increased over time.

## Table of Contents

|  |    |
|--|----|
| Introduction .....   | 4  |
| Previous Research.....   | 6  |
| Access to PSE .....  | 6  |
| Specific Background Characteristics.....                               | 7  |
| The Model and Data .....   | 8  |
| The Model .....  | 8  |
| The Longitudinal Administrative Database (LAD) .....                   | 8  |
| Sample Selection .....   | 9  |
| The PSE Identifiers .....  | 14 |
| Definitions of the Regions .....                                       | 19 |
| Family Background Information: Variables Included in the Analysis..... | 20 |
| YITS – LAD Comparison.....   | 21 |
| Results .....  | 24 |
| Overall PSE Access Rates.....  | 24 |
| Access Rates by Background Characteristics .....                       | 26 |
| Ontario Regional PSE Access Rates by Background Characteristics .....  | 34 |
| Ontario/ROC Regression Results: The Baseline Models.....               | 42 |
| Ontario/ROC Comparisons .....  | 47 |
| Male-Female Comparisons .....  | 50 |
| Ontario Regional Comparisons .....                                     | 53 |
| Ontario Regional Comparisons – Male/Female .....                       | 55 |
| Conclusion .....   | 58 |
| References.....  | 60 |

## Introduction<sup>1</sup>

Ensuring access to postsecondary education (PSE) for all those with the desire to attend and the talent to do so, without regard to family background or other factors over which individuals have no control, is vital to Canada's future economic competitiveness, and is equally important from an equity perspective (i.e., a sense of fairness in terms of individuals' life chances, which are so strongly related to education).

For many young people, there is little doubt that they will attend PSE. Research has shown, for example, that those from high-income families, and even more so those with high levels of parental education (which tends to dominate family income effects), are likely to go on to PSE, especially university. But other youth with different family background characteristics – lower levels of parental education and family income, coming from a lone-parent family or rural area, or even simply being male rather than female – are not so likely to access PSE, and again, university in particular.

This paper exploits the tax-based Longitudinal Administrative Databank (LAD) that has been constructed by Statistics Canada from individuals' tax files to provide new empirical evidence on overall PSE participation rates in Ontario over the last decade, how these rates are related to a number of important individual and family characteristics, including sex, family income, area size of residence and family type, and how some of these relationships have changed over this period while others have remained stable.

The LAD is uniquely well-suited to this analysis for a number of reasons. First, the annual basis of the LAD allows us to calculate PSE access rates on a similarly annual basis and to track PSE access rates on a year-by-year basis over time. Second, the LAD permits us to link youths to their families and therefore to observe how access is related to various family characteristics previously found to be important in the literature, including those mentioned above.<sup>2</sup> And finally, the immense sample sizes available – the LAD captures 20 per cent of the tax-filing population – allow us to probe into these relationships specifically for Ontario in a way that no other dataset permits.

In fact, sample sizes are sufficiently large to permit an analysis *by region within Ontario*, allowing us to compare rates of participation in PSE, the patterns of participation with respect to family background, and the time trends in these rates and patterns for the South, the North, the East and the Central parts of the province. While many of the regional patterns are similar, the differences that we find are not only interesting, but are also relevant to policy. For example, living in a rural area has very different effects on PSE access in some regions, family income effects also differ significantly between regions, whereas gender differences are fairly consistent, with females going to PSE, university in particular, at substantially higher rates than males in all regions.

No analysis of this type has, to our understanding, ever been carried out for Ontario or for any other specific Canadian region, while the key aspects of the study – the annual basis of the analysis, the linking to family background characteristics on the same annual basis, and the comparison of trends over time in both overall access rates and the patterns of access with respect to family background – stand out at the international level as well.

We also present results for the rest of Canada, but our focus is on Ontario, partly because of the terms of reference underlying this research project and also partly because the PSE identifiers we construct from the

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<sup>1</sup> The authors wish to gratefully acknowledge the financial support for this research provided by the Higher Education Quality Council of Ontario (HEQCO), and the access to the data used in the analysis provided by Statistics Canada. The paper significantly benefitted from an extensive set of editorial comments provided by Nicholas Dion of HEQCO.

<sup>2</sup> It should be noted and emphasized from the outset that while the LAD has an accurate measure of family income, it does not include information on parental education. As a result, the measured "income effects" capture both pure income effects and parental education effects, as mentioned in various places in the paper.

information available in the tax files which underlie the construction of the LAD data employed in the analysis appear to perform better for Ontario than in most other provinces.<sup>3</sup>

While Ontario's PSE sector includes both colleges (both public and private) and universities, this report focuses on university access. This decision is not motivated by a belief that university attendance is any way more important than going to college, but is again driven, at least in part, by the data and the reliability of the PSE identifiers that we construct, which appear to be considerably more reliable for university participation than college participation.

A second reason for focusing on university attendance is that previous research has shown that family background effects tend to be much stronger for university attendance than for college attendance. This is because the individual and family characteristics associated with PSE participation tend to have two offsetting effects on college attendance. For example, higher family income and (especially) higher levels of parental education tend to have positive effects on youths' tendency to participate in PSE, thus driving both college and university attendance rates upward, but also tend to result in young people going to university rather than college. The net effect of these factors (as well as others) is therefore unambiguously positive for university access, but mixed for college access. It is therefore not that these variables do not affect college attendance, as is often suggested, but rather that the effects on college attendance cut both ways, as just explained. Our work is thus consistent with much of the existing literature that also focuses on access to university because this is where family background effects are most evident. This said, college results are reported for sake of completeness.

We begin our analysis with a graphical presentation of the PSE participation rates of youths at age 18, at 19, at 20 and at 21 on an annual basis from 1999 through 2008, the full period covered by our analysis (the numbers underlying the graphs are available in a set of background tables). We then continue the graphical analysis by showing access rates by age 21 (the sort of *cumulative* access measure which is standard in the literature) by sex and by the family background characteristics listed above (income, area size of residence, family type), on a year-by-year basis from 2001 through 2008.<sup>4</sup> We do this first for Ontario as a whole, then for each of the specific regions within Ontario (North, South, East and Central).

We then analyse these participation rates in a multinomial logit regression framework, which allows us to take the various family background factors into account simultaneously and thus identify the "net" effects of each characteristic on university and college attendance (separately).<sup>5</sup> As part of this analysis, we also explore the evolution of these relationships from 2001 to 2008, cutting the full period into two intervals of four years each, thus allowing us to address the question: "How has the structure of access to PSE shifted over time?"

The results are informative, interesting, and sometimes surprising. For example, some access gaps (e.g., by family type) become much smaller when we control for the other factors (including the key family income variable) than when taken on their own, whereas others change less. As another example, the differences in university access rates by family income level are substantially smaller in Ontario than in the rest of Canada, and get smaller in both Ontario and elsewhere over time. Some of the more interesting regional patterns have been alluded to above.

<sup>3</sup> Future research could lead to improvements in these identifiers, for both Ontario and the rest of Canada, especially if the LAD data were linked to other datasets that included PSE status or alternative means of identifying this.

<sup>4</sup> These series start two years later than the age-specific series because we need to observe given individuals at age 19 through 21 (as explained below, including the reason for starting at age 19 rather than age 18), which takes us to 2001 for those who are 19 in 1999, the first year of the data.

<sup>5</sup> When we discuss the average marginal effects derived from the estimation (often shortened to "effects"), we are referring to statistical correlations and are not necessarily making any claims about causal relationships.



Since increasing overall PSE participation rates and closing the gaps related to family background are stated priorities for policy makers in Ontario – as in many other jurisdictions – this analysis should help provide a firmer empirical basis for understanding PSE access patterns and for policy formulation regarding access.

The paper is organized as follows. Section II contains an overview of the previous research on this topic. Section III briefly presents the econometric model and then discusses the data, including the general characteristics of the LAD, the samples constructed for this analysis, and the definitions of the variables employed in the analysis. The results of the analysis are the topic of section IV. Section V concludes the paper, summarizing the major findings and identifying some of their more important policy implications. While those interested in the context and underpinnings of the analysis will want to read through the entire paper, those more interested in the empirical findings and their implications could skip straight to the final two sections of the paper.

## Previous Research

### Access to PSE

This analysis takes place in the context of a general trend where the literature has been moving beyond a narrow focus on financial factors (tuition fees, student financial aid, family income, etc.) towards increased consideration of a fuller set of factors that affect PSE access, including other aspects of family background, high school experiences and other early influences. This progress has been possible in large part due to the availability of longitudinal surveys, including the Youth in Transition Survey (YITS) in the Canadian context, which have allowed researchers to make these connections.

These recent findings present a fundamental challenge to previous thinking about barriers to PSE. In particular, the earlier focus on the relationship between family income and participation in PSE was typically interpreted within the economists' standard rational choice model, according to which schooling decisions were assumed to be the result of comparisons of the future returns of PSE to the up-front costs, and income effects were typically thought to represent financing barriers (or liquidity constraints) that stood in the way of some youths' participation in PSE.

But more recent evidence suggests that this interpretation of family income effects was misplaced, and it is rather that household income is highly correlated with parental education (a factor previously omitted from many studies – as here, we should note from the outset). And parental education is actually a much more important determinant of whether a young person will go to PSE, university in particular.

The main drivers of PSE participation now appear to be cultural factors, which include the individual gaining a good understanding of the benefits of PSE, a sense that PSE is a real and meaningful option for them, the early preparation for going to PSE once high school is completed, and other such factors. These sets of influences are complex, interconnected, largely rooted in the family and start early in life (Finnie, Sweetman, & Usher, 2008).

It is thus not so much that those from low-income families are not able to go to PSE but that they face other disadvantages that have little to do with income per se. It is no longer a story of “barriers” so much as who wants to go to PSE and who prepares themselves to do so.

Reinforcing these developments, the effects of tuition levels and student financial assistance are also typically found to be small when measured directly,<sup>6</sup> while other family background factors increasingly point to the

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<sup>6</sup> See Coelli (2009), Johnson (2008) and Neill (2009) for recent studies of the effects of tuition fees, and Day (2008) on student financial aid.



kind of cultural factors referred to above.<sup>7</sup> The American and international literature have been going in similar directions as these developments in Canada.<sup>8</sup>

The policy implications of these results are potentially far-reaching. Instead of putting additional resources into addressing financial constraints (e.g., keeping tuition levels down, providing more generous and accessible grants and loans, and so on), we should probably be turning more of our attention to improving student motivation and performance during (or even before) high school, providing better information to youth and their families about the costs and benefits of education from an early age, and other such interventions that influence the early-rooted and family-based factors that seem to be the main determinants of access.

Furthermore, in a context where cultural factors – as defined above – appear to be extremely important to decisions regarding participation in PSE, it may not be the actual *information* provided to young people (e.g., future earnings for PSE graduates versus others) so much as the *message* they receive: “You can and should consider going to university or college, and prepare yourself to do so.”<sup>9</sup>

### Specific Background Characteristics

This paper focuses on a particular set of background characteristics, driven principally by the information available in the LAD data. These are as follows.

Differences in access rates by **sex** figure prominently in our analysis. This emphasis can be placed in a context where the literature has established a strong and important trend towards females attending PSE, university in particular, at considerably higher rates than males. At the national level, for example, females appear to make up about 60 per cent of incoming classes at university (see references above). The differences at graduation are even greater, since females are also more likely to continue in their studies than are men (Finnie & Qiu, 2008).

**Family income** should also be viewed in light of the preceding literature review. To repeat, a consensus has emerged that parental education is a much better predictor of PSE participation than is parental income, and that “culture” trumps “money,” where culture is a shorthand term meant to represent the multi-faceted and family-based influences described above that affect a young person’s attitude to, and preparation for, PSE, and money may perhaps be best thought of in terms of the financial barriers that could potentially block a student’s participation in PSE.<sup>10</sup> Of critical importance to our analysis is that there is no measure of parental education in the LAD, so we are left to assume that the observed “income effects” are in fact to a large extent “parental education effects.”

Previous studies (Looker & Thiessen, 2004) find that **rural students** tend to have lower PSE participation rates than their urban counterparts. This is generally thought to be due to reduced local access to PSE institutions, especially universities, and the related influence of cost factors, whereby rural students must travel greater distances and live away from home to attend PSE (Frenette, 2004; 2006). It is, however, difficult to separate “ruralness” – and the cultural differences it may capture (e.g., individuals living in rural areas may have different attitudes to PSE) – from distance factors *per se*, so the precise meaning of the observed urban-rural differences remains ambiguous. In this spirit, Looker (2010) finds differences in PSE participation rates, especially university rates, in rural students across Canada, but reports that these gaps are largely explained

<sup>7</sup> See various papers in Finnie, Mueller, Sweetman, and Usher (2008), and Finnie, Frenette, Mueller, and Sweetman (2010).

<sup>8</sup> See Christophides, Cirello, and Hoy (2001), Drolet (2005), Finnie, Lascelles, and Sweetman (2005), Finnie and Mueller (2008a; 2008b), Frenette (2008), Johnson (2008), Lefebvre and Merrigan (2010) and other papers in Finnie et al. (2008; 2010) for recent Canadian work on this; Cameron and Heckman (1998; 2001), Cameiro and Heckman (2002), Cunha, Heckman, Lochner, and Masterov (2006), Cunha and Heckman (2007), Ermish and Francesconi (2001), Heckman (2000; 2007), Heckman and Masterov (2007), Plug and Vijverberg (2003), and Sacerdote (2002) for recent US work; and Mueller (2008a; 2008b) for a general review of the literature.

<sup>9</sup> See Finnie (2012a; 2012b) for a treatment of these cultural factors.

<sup>10</sup> Finnie, Childs, and Wismer (2011a; 2011b) find similar results for Ontario.

by other factors with which rural residence is correlated. Some residual effects do remain, however, and vary by province (e.g., there is a smaller urban-rural divide in university attendance in Quebec than in other provinces).

There are no Canadian studies of which we are aware that focus on the PSE access rates of students from **single-parent families**, although numerous analyses do include an indicator of this status. As an example, Finnie and Mueller (2008a; 2009) find no effect of family type once family income and parental education are included in the model.<sup>11</sup> Both “unadjusted” (for other factors) and “adjusted” effects of family type are investigated here.

## The Model and Data

### The Model

This research uses a multinomial logit regression framework developed and employed in earlier work (e.g., Finnie & Mueller, 2008a; 2008b) for estimating access to PSE at either the college or university level, including the differences in access rates across identifiable groups. The model may be expressed as follows:

$$Y = X\beta + \mu$$

where Y is the access measure of interest (participation in college or in university as opposed to no PSE), X represents a set of covariates that influence Y, the  $\beta$  are the coefficients associated with each of the variables included in X, and  $\mu$  is the classical stochastic error term. This set-up allows the variables included in our models to have different effects on college and university participation while still allowing these processes to be related.

We also consider access to private colleges, but relatively few individuals enrol in these institutions, and again the results are not as conclusive as the results for university attendance in particular. The private college results are therefore not included in any of the results we report or in our discussions apart from the explanation of how they enter our construction of the PSE identifiers which follows.<sup>12</sup>

### The Longitudinal Administrative Database (LAD)

The Longitudinal Administrative Databank, or LAD, comprises a 20 per cent representative sample of Canadian tax filers constructed from Canadian Revenue Agency tax files that follows individuals over time and matches them into family units on an annual basis. It thus provides individual and family-level information on incomes, taxes and basic demographic characteristics in a dynamic framework. The first year of data of the LAD is 1982 and the file ran through to 2008, which is when this project was undertaken. We, however, focus on data from 1999 to 2008 in our analysis, since the PSE tax credits upon which we depend to identify students are of only of sufficient quality during this time period.<sup>13</sup>

Individuals are selected into the LAD by a random sampling algorithm and are then linked across all the years when they file a tax form based on their Social Insurance Numbers (SINs).<sup>14</sup> The LAD’s coverage of the adult population is very good, since the rate of tax filing in Canada is very high. This is because upper-income

<sup>11</sup> Finnie, Childs, and Wismer (2011a; 2011b) again find similar results for Ontario using the Youth in Transition Survey.

<sup>12</sup> These results are available from the authors on request.

<sup>13</sup> Where appropriate, we use data dating as far back as the mid to late 1990s to identify students’ families’ income levels.

<sup>14</sup> Individuals who are selected in the LAD but do not appear in the LAD for one particular year, either because they did not file a tax return or because they were out of the country, can nonetheless appear again in the LAD in later years if they file again. This obviously boosts the representativeness of the file in a longitudinal framework relative to sampling regimes where a missed year results in permanent attrition from the sample.

Canadians are required to file, while lower income individuals have strong incentives to do so in order to recover income tax and other payroll tax deductions made throughout the year and to receive tax credits and other transfer program benefits. The full set of annual files from which the LAD is constructed is estimated to cover 95 to 97 per cent of the target adult population in any given year. Attrition from the LAD is low for these same reasons, and also because it captures individuals who file taxes after not doing so (and thus being “missing” from the sample) for any particular year. These are important general advantages of administrative data of this type.

While the LAD has been used for many studies, it has a number of characteristics that make it uniquely well suited to this particular study. First, the LAD allows us to construct identifiers of PSE participation in any given year due to the presence of information on PSE-related tax credits earned by postsecondary students. This includes the general PSE tax credit, which depends only on the months of part-time or full-time study, and the tuition credit, which is based on the fees actually paid. More is said below on how we use this information to identify PSE students, including their level of study (public college, university or private college).

Second, the LAD allows individuals who file taxes while still living at home or who otherwise use their parents’ address to be linked to their families of origin, which we are able to do for the vast majority of youth, as discussed below. Furthermore, because the LAD is derived from tax files, the family information it contains is detailed and reliable.

Third, the LAD allows us to calculate access PSE rates on an annual basis and relate access to family background over different intervals, since the data exist for all years covered by the time span mentioned above (1999-2008).

Finally, the very large number of observations contained in the LAD (around five million individuals in recent years) allows us to conduct a detailed analysis, including not only a robust study of overall PSE participation in Ontario but also further analysis at the regional level.

No other Canadian dataset has this combination of attributes or permits an analysis of this type. While the analysis we conduct is thus unique and informative, we also see this as being but one early use of the LAD to look at access to PSE and related issues and predict the undertaking of further work which exploits the particular attributes of the LAD for these purposes.

## Sample Selection

Our focus is on the PSE access rates of individuals by age 21 which, following the established literature, we define as whether the individual has gone to college or university at any point up to that age.

To do this, we start with four different samples, each of which includes an observation for each year individuals are identified in the LAD at age 18, 19, 20 or 21 at any point between 1999 and 2008. For example, individuals who are 18 in any year over this period are included in the ‘age 18 sample’ for that year, individuals who are 19 in any year between the years 1999 and 2008 are included in the ‘age 19 sample’ for that year, and so on for age 20 and age 21. Individuals can be included in any of four age-specific samples and at this point need not be present in all years.

We then restrict our sample to students who were identified as “child tax filers” at least once between the ages of 15 and 21.<sup>15</sup> This restriction stems from our need to link parental information (family income, etc.) to the individuals included in our analysis. We initially considered three separate time windows: when the child filers were between the age of a) 15 and 17, b) 15 and 19, or c) 15 and 21.

<sup>15</sup> In the LAD, filers who live with at least one of their parents are considered child tax filers, regardless of their age.

As Table 1 illustrates, this choice of age over which the family linkage is made has a significant effect on sample size and coverage for our relevant populations. For example, those who are linked to their families at any point from age 15 through 17 include only 56 per cent of the full sample at age 18 and 41 per cent at age 21. In comparison, the age 15-21 restriction – which allows us to look for the parental link up to a higher age – includes 86 per cent of the sample at age 18 and 82 per cent at age 21. In other words, when we use a six-year window, our ability to find at least one year where parental information is available increases greatly over when we use shorter windows.

**Table 1: Number of Observations as a Ratio of the Full LAD Sample, by Family Linkage Sample Restriction, Ontario**

| Age   | 15-17 | 15-19 | 15-21 |
|-------|-------|-------|-------|
| 18    | 0.56  | 0.85  | 0.86  |
| 19    | 0.48  | 0.82  | 0.85  |
| 20    | 0.44  | 0.77  | 0.83  |
| 21    | 0.41  | 0.75  | 0.82  |
| 19-21 | 0.48  | 0.83  | 0.86  |

Note: For further information about this table, please see the text.

Table 2 shows the differences in access rates (we discuss the construction of these below) between the full LAD sample and the restricted samples. The 15-21 sample is the least restricted and most closely matches the full LAD in terms of PSE access rates, although both college and university access rates are higher in our sample of child tax filers linked to their parents than in the general population, pointing to a moderate bias in our samples in this direction.

**Table 2: College and University Access Rates (%), by Family Linkage Sample Restriction, Ontario**

|               | Full LAD |            | 15-17   |            | 15-19   |            | 15-21   |            |
|---------------|----------|------------|---------|------------|---------|------------|---------|------------|
|               | College  | University | College | University | College | University | College | University |
| <b>Age 18</b> |          |            |         |            |         |            |         |            |
| 1999          | 5.9      | 2.6        | 6.9     | 2.7        | 6.2     | 2.7        | 6.3     | 2.7        |
| 2000          | 6.1      | 3.0        | 6.9     | 3.1        | 6.4     | 3.2        | 6.4     | 3.2        |
| 2001          | 6.3      | 3.2        | 7.4     | 3.6        | 6.6     | 3.4        | 6.6     | 3.4        |
| 2002          | 9.1      | 6.3        | 10.3    | 6.9        | 9.6     | 6.8        | 9.5     | 6.7        |
| 2003          | 11.0     | 21.8       | 12.8    | 24.4       | 11.6    | 23.5       | 11.6    | 23.4       |
| 2004          | 9.8      | 23.8       | 11.4    | 27.2       | 10.3    | 25.7       | 10.3    | 25.5       |
| 2005          | 9.6      | 25.0       | 11.0    | 28.2       | 10.3    | 26.8       | 10.2    | 26.7       |
| 2006          | 10.7     | 26.1       | 12.4    | 29.0       | 11.3    | 27.9       | 11.3    | 27.8       |
| 2007          | 11.1     | 26.9       | 12.6    | 30.3       | 11.6    | 29.1       | 11.6    | 29.1       |
| 2008          | 11.3     | 27.8       | 12.8    | 31.0       | 12.0    | 30.2       | 12.0    | 30.2       |
| <b>Age 19</b> |          |            |         |            |         |            |         |            |
| 1999          | 16.9     | 21.2       | 20.5    | 27.1       | 18.2    | 24.5       | 18.2    | 23.9       |
| 2000          | 17.5     | 23.5       | 21.1    | 30.0       | 19.1    | 26.9       | 19.0    | 26.2       |
| 2001          | 17.4     | 26.1       | 20.9    | 32.8       | 18.9    | 29.4       | 18.7    | 29.1       |
| 2002          | 19.3     | 27.1       | 22.8    | 33.2       | 20.8    | 30.3       | 20.5    | 29.8       |
| 2003          | 19.5     | 28.0       | 23.1    | 33.5       | 20.9    | 30.9       | 20.8    | 30.6       |
| 2004          | 19.9     | 29.7       | 23.5    | 34.9       | 21.3    | 32.6       | 21.1    | 32.2       |
| 2005          | 18.4     | 31.7       | 21.8    | 37.2       | 19.7    | 34.8       | 19.5    | 34.5       |
| 2006          | 18.8     | 32.9       | 21.6    | 38.7       | 20.1    | 36.1       | 19.9    | 35.8       |
| 2007          | 19.2     | 33.7       | 22.7    | 39.5       | 20.6    | 37.0       | 20.5    | 36.7       |
| 2008          | 19.6     | 33.8       | 22.6    | 40.1       | 20.9    | 37.2       | 20.9    | 37.2       |
| <b>Age 20</b> |          |            |         |            |         |            |         |            |
| 1999          | 21.3     | 25.5       | 25.2    | 33.0       | 23.7    | 30.1       | 23.2    | 29.2       |
| 2000          | 21.5     | 26.5       | 25.5    | 34.1       | 24.1    | 31.5       | 23.4    | 30.2       |
| 2001          | 22.0     | 28.2       | 25.9    | 36.4       | 24.6    | 33.6       | 24.0    | 32.1       |
| 2002          | 22.2     | 28.5       | 26.7    | 36.0       | 24.9    | 33.4       | 24.2    | 32.2       |
| 2003          | 22.6     | 29.1       | 26.9    | 35.5       | 25.1    | 33.2       | 24.3    | 32.3       |
| 2004          | 21.7     | 29.9       | 25.4    | 35.7       | 23.7    | 33.7       | 23.2    | 32.9       |
| 2005          | 21.3     | 29.2       | 25.0    | 34.3       | 23.2    | 32.7       | 22.7    | 31.8       |
| 2006          | 21.0     | 31.0       | 24.5    | 37.0       | 22.8    | 35.0       | 22.3    | 33.9       |
| 2007          | 20.8     | 31.6       | 23.7    | 37.7       | 22.7    | 35.9       | 22.2    | 34.8       |
| 2008          | 21.2     | 32.3       | 24.1    | 38.0       | 23.0    | 36.3       | 22.6    | 35.4       |
| <b>Age 21</b> |          |            |         |            |         |            |         |            |
| 1999          | 21.5     | 25.0       | 25.1    | 32.2       | 23.9    | 30.7       | 23.4    | 29.4       |
| 2000          | 21.2     | 26.2       | 24.8    | 33.7       | 23.9    | 31.4       | 23.5    | 30.4       |
| 2001          | 22.2     | 26.4       | 25.9    | 33.6       | 25.0    | 31.6       | 24.3    | 30.3       |
| 2002          | 22.3     | 27.4       | 25.9    | 35.5       | 25.3    | 32.9       | 24.5    | 31.5       |
| 2003          | 21.7     | 28.0       | 25.9    | 35.4       | 24.5    | 33.0       | 23.8    | 31.9       |
| 2004          | 20.8     | 28.2       | 24.0    | 34.8       | 23.1    | 32.5       | 22.4    | 31.5       |
| 2005          | 19.0     | 29.1       | 21.7    | 35.0       | 20.6    | 33.3       | 20.2    | 32.3       |
| 2006          | 19.5     | 28.9       | 22.3    | 34.1       | 21.3    | 32.9       | 20.8    | 31.8       |
| 2007          | 19.6     | 29.6       | 22.1    | 35.7       | 21.4    | 33.9       | 21.0    | 32.7       |
| 2008          | 19.6     | 30.4       | 22.4    | 36.5       | 21.5    | 35.0       | 21.0    | 33.8       |

Note: For further information about this table, please see the text.

In order to maximize our sample size and maintain as much consistency as possible with the full LAD sample (i.e., better representativeness), we include individuals who were child filers at any age between 15 and 21. While this created better coverage and more representativeness in the sample, it also generates a slight potential bias by capturing family information during years when the youth would normally have already started PSE (e.g., between 18 and 21). After further tests, some of which are discussed below, we decided to accept this trade-off, which appears to be small, as we would expect.<sup>16</sup>

To classify youths according to their relevant family background characteristics (parental income, family type, etc.), we use the earliest year for which the relevant information is available. For example, to identify whether a youth comes from a single-parent family, we check their parents' marital status in the year the youth was age 15. If the individual is missing the family tax information at that age (i.e., they were not linked to their family in that year), we take this information from the next earliest year it is available, up to age 21. For the parental income variable, we use the average of total parental (after-tax) income over the years for which the information is available. We do so simply by averaging parental income (in constant dollars) for the years in which the young person is present in the LAD and is a "child filer."<sup>17</sup>

In addition, we construct what we call our merged 19-21 sample, which includes only individuals who are present in all of the age 19, 20 and 21 samples. This allows us to calculate access rates based on whether an individual was ever enrolled in PSE (and at which level) up to age 21, which is the sort of measure of access that is generally employed in this area of research. We do not look at age 18 in the merged sample because sample size decreases with the addition of each (lower) age to the merged sample (since fewer youth are filing taxes at younger ages), and tests that we conducted indicated that most individuals identified as attending PSE at age 18 were also picked up at an older age.

We are, more specifically, interested in the "highest" level of education that an individual has accessed by age 21. If an individual has attended university at any point between the ages of 19 and 21, we consider them as having accessed that level of PSE, even if they have also accessed another type of PSE within the timeframe. In the same vein, we consider public college as the second-highest level of access and private college as the third-highest level. A "no PSE" classification is thus reserved only for individuals who do not access any kind of PSE between the ages of 19 and 21. We recognise the ad hoc nature of this approach but defend it on grounds of tractability, since further separating out those who attended both levels of PSE would further complicate the analysis. This is again standard practice in research in this area.<sup>18</sup>

In order to verify that our merged sample preserves the accuracy of the separate samples, in Table 3a we compare access rates of the full (i.e., separate) age 19, 20 and 21 samples with access rates of the merged sample for the years covered by our analysis. As the table illustrates, the rates remain highly comparable across the samples, although our merged sample slightly overestimates both college and university rates, thus again indicating a slight bias in our samples as compared to the full youth population.

<sup>16</sup> For example, some families might actively increase their earnings after their child goes to PSE in order to help finance his or her studies, meaning income would to some degree be a function of PSE participation, as well as a determinant of that participation.

<sup>17</sup> In other related projects, after individuals are linked to their families of origin, those families are followed back in time by tracking their parents' records (which are present in 20 per cent of the cases in the LAD). The family information obtained in earlier years, sometimes going as far back as the child's infancy, is then included in the analysis. The current project has less of a focus on family effects going back in time, however, and more of a focus on observing PSE participation rates in a given calendar year and linking them to some reasonable measure of family background characteristics. To this end, we put the emphasis on keeping our samples as large as possible – hence our use of family characteristics as measured at age 15 to 21 rather than that going back further in time for the smaller samples just described.

<sup>18</sup> Also, for our observations from Quebec, this resolves the issue of individuals normally attending two years of CEGEP (i.e., college) before going on to university.

**Table 3a: College and University Access Rates (%), Full 15-21 Sample and Merged Age 15-21 Sample, Ontario**

|               | Full 15-21 Sample |            | Merged 15-21 Sample |            | Difference |            |
|---------------|-------------------|------------|---------------------|------------|------------|------------|
|               | College           | University | College             | University | College    | University |
| <b>Age 19</b> |                   |            |                     |            |            |            |
| 1999          | 18.2              | 23.9       | 18.8                | 25.0       | 0.6        | 1.1        |
| 2000          | 19.0              | 26.2       | 19.7                | 27.4       | 0.7        | 1.2        |
| 2001          | 18.7              | 29.1       | 19.4                | 30.6       | 0.7        | 1.5        |
| 2002          | 20.5              | 29.8       | 21.3                | 31.1       | 0.8        | 1.3        |
| 2003          | 20.8              | 30.6       | 21.5                | 32.0       | 0.7        | 1.4        |
| 2004          | 21.1              | 32.2       | 21.9                | 33.7       | 0.8        | 1.5        |
| 2005          | 19.5              | 34.5       | 20.1                | 36.1       | 0.6        | 1.6        |
| 2006          | 19.9              | 35.8       | 20.3                | 37.3       | 0.4        | 1.5        |
| 2007          | 20.5              | 36.7       | ‡                   | ‡          | ‡          | ‡          |
| 2008          | 20.9              | 37.2       | ‡                   | ‡          | ‡          | ‡          |
| <b>Age 20</b> |                   |            |                     |            |            |            |
| 1999          | 23.2              | 29.2       | ‡                   | ‡          | ‡          | ‡          |
| 2000          | 23.4              | 30.2       | 24.6                | 31.8       | 1.2        | 1.6        |
| 2001          | 24.0              | 32.1       | 24.9                | 33.8       | 0.9        | 1.7        |
| 2002          | 24.2              | 32.2       | 25.3                | 34.0       | 1.1        | 1.8        |
| 2003          | 24.3              | 32.3       | 25.5                | 34.0       | 1.2        | 1.7        |
| 2004          | 23.2              | 32.9       | 24.1                | 34.6       | 0.9        | 1.7        |
| 2005          | 22.7              | 31.8       | 23.7                | 33.7       | 1.0        | 1.9        |
| 2006          | 22.3              | 33.9       | 23.1                | 35.8       | 0.8        | 1.9        |
| 2007          | 22.2              | 34.8       | 23.0                | 36.9       | 0.8        | 2.1        |
| 2008          | 22.6              | 35.4       | ‡                   | ‡          | ‡          | ‡          |
| <b>Age 21</b> |                   |            |                     |            |            |            |
| 1999          | 23.4              | 29.4       | ‡                   | ‡          | ‡          | ‡          |
| 2000          | 23.5              | 30.4       | ‡                   | ‡          | ‡          | ‡          |
| 2001          | 24.3              | 30.3       | 25.3                | 31.8       | 1.0        | 1.5        |
| 2002          | 24.5              | 31.5       | 25.6                | 32.9       | 1.1        | 1.4        |
| 2003          | 23.8              | 31.9       | 24.8                | 33.6       | 1.0        | 1.7        |
| 2004          | 22.4              | 31.5       | 23.4                | 33.0       | 1.0        | 1.5        |
| 2005          | 20.2              | 32.3       | 20.9                | 34.2       | 0.7        | 1.9        |
| 2006          | 20.8              | 31.8       | 21.6                | 33.5       | 0.8        | 1.7        |
| 2007          | 21.0              | 32.7       | 21.7                | 34.7       | 0.7        | 2.0        |
| 2008          | 21.0              | 33.8       | 21.8                | 35.9       | 0.8        | 2.1        |

Notes: ‡ Not defined given the construction of the sample.

For further information about this table, please see the text.

In order to further verify the validity of our merged sample, we have also run simple OLS (regression) tests to compare the effects of the family background variables included in our models – sex, town/rural vs. urban, family type, official language preference, and parental income – on access to university versus access to another level of PSE (i.e., public college or private college) or no access to PSE. We perform this comparison for all individuals at age 19, 20 and 21 in both our full and merged sample. Table 3b shows the results of these comparisons. The results are highly comparable and provide an important validation of our use of the merged 19-21 sample.

Table 3b shows the results of these comparisons. The results are highly comparable and provide an important validation of our use of the merged 19-21 sample.



**Table 3b: University Access – OLS Comparison Estimates by Age, Ontario**

|                              | Separate Samples     |                      |                      | Merged Sample        |                      |                      |
|------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
|                              | 19                   | 20                   | 21                   | 19                   | 20                   | 21                   |
| Intercept                    | 0.238***<br>(0.002)  | 0.248***<br>(0.002)  | 0.243***<br>(0.002)  | 0.236***<br>(0.002)  | 0.264***<br>(0.002)  | 0.262***<br>(0.002)  |
| Female                       | 0.148***<br>(0.002)  | 0.142***<br>(0.002)  | 0.134***<br>(0.002)  | 0.144***<br>(0.002)  | 0.146***<br>(0.002)  | 0.142***<br>(0.002)  |
| Town/Rural                   | -0.089***<br>(0.002) | -0.097***<br>(0.002) | -0.094***<br>(0.002) | -0.091***<br>(0.003) | -0.104***<br>(0.003) | -0.102***<br>(0.003) |
| Lone-Parent Family           | -0.113***<br>(0.003) | -0.110***<br>(0.003) | -0.105***<br>(0.003) | -0.109***<br>(0.003) | -0.112***<br>(0.003) | -0.109***<br>(0.003) |
| Official Lang. Min.          | -0.007<br>(0.009)    | 0.005<br>(0.009)     | 0.016<br>(0.009)     | -0.012<br>(0.010)    | -0.005<br>(0.011)    | 0.002<br>(0.011)     |
| Parental Income in \$10,000s | 0.006***<br>(0.000)  | 0.006***<br>(0.000)  | 0.006***<br>(0.000)  | 0.006***<br>(0.000)  | 0.006***<br>(0.000)  | 0.006***<br>(0.000)  |

Notes: OLS parameter estimates are shown. University is compared against other PSE outcomes (No PSE, College, Private College). Standard errors in brackets. \*\*\* p<0.01 \*\* p<0.05 \* p<0.1. For further information about this table, please see the text.

Considering students from both Ontario and the rest of Canada (ROC), the four samples respectively include 434,490 18-year-olds, 478,120 19-year-olds, 482,515 20-year-olds and 478,470 21-year-olds. Our merged sample includes 353,245 individuals who are present at the age of 19, 20 and 21. We now proceed with a reasonable level of confidence that our samples not only include the required family information but are also generally representative of the underlying populations of youth.

## The PSE Identifiers

As already mentioned, we can identify when youths access PSE through the information they give on their tax forms in order to receive PSE-related tax credits. A simple way to identify if individuals were in PSE at some level in a given year is to see if they have claimed any education-related tax credits.

One problem is that not all youths will give this information. This is more likely for college students than university students, since the associated tax credit benefits will tend to be smaller. The problem is also greater in Quebec than elsewhere, because CEGEP is essentially free. Part-time students are also less likely to apply for tax credits for similar reasons. This results in a general under-reporting of college students, in particular, in our samples, and especially those enrolled in lower cost programs or otherwise attending part-time. This bias seems inherently insurmountable in the LAD, although linking the LAD with other datasets possessing information on PSE students, such as PSE institutions' own administrative files, might represent a solution to this problem in the future.

Another problem is that individuals do not explicitly disclose whether they attended university, college or a private PSE institution on their tax form. In the remainder of this section we explain our approach to estimating the level of study based on the information available on tax forms.<sup>19</sup>

It is first worth explaining some specifics regarding the information individuals put on their T4 tax forms.

<sup>19</sup> Those who are not interested in the details of how this is done and are willing to take our approach on faith, as well as those who are otherwise more interested in the results of our analysis and less concerned with how we arrived at those results, may wish to skip to the next section of the paper at this point.

Individuals begin by disclosing the amount of tuition they paid to PSE institutions in Canada in the given calendar year. Next, they multiply the number of months they were a student by the pre-specified full-time or part-time study amounts (as these apply to the individual) and enter this information.

This yields three useful pieces of information: 1) tuition paid, 2) a full-time deduction amount, and 3) a part-time deduction amount. By combining this individual-based information with outside information on the average tuition costs of attending university for a full academic year (assumed to be eight months) versus the base tuition costs of attending college, we classify youths according to their estimated level of PSE participation.

To do this we first transform all the tuition amounts declared by individuals into eight-month equivalents so that they are directly comparable to the published data on tuition fees. We explain this procedure with the aid of some examples.

In 2004, the pre-specified amount an individual could deduct for each month of full-time study was \$400. Now, suppose an individual gave \$3,200 as a full-time deduction amount. This would imply that they were a full-time student for eight months that year ( $3,200/400 = 8$ ). The tuition amount they give would therefore not need to be adjusted for our purposes – it is already at an eight-month equivalent.

But suppose a second student gave \$1,600 as a full-time deduction amount. We would know that they were a full-time student for only four months ( $1,600/400 = 4$ ), so we scale up their tuition amount to an eight-month equivalent by multiplying this amount by two. Similar calculations would be made for students with other amounts of full-time deductions to arrive at eight-month equivalents.

Now take a third student who calculated \$960 as a part-time deduction amount in 2004. In that year, the pre-specified amount that a student could claim was \$120 per part-time month, so this student must have been a part-time student for eight months ( $960/120 = 8$ ). We then make the assumption that part-time fees amount to 60 per cent of full-time fees (we only have published data on tuition fees for full-time students). In this example, our only adjustment would consist of multiplying the disclosed tuition amount by  $1/0.6$  to get it into a full-year, full-time equivalent.

A fourth example is a student who indicated that they were in school part-time for only four months. We would double their disclosed tuition amount to account for the fact they were only in school for four months, then multiply that amount by  $1/0.6$  to transform it into a full-time equivalent. Using these procedures, we are able to adjust all students' disclosed tuition amounts to what they would have been had they attended school full-time for eight months.

Once this standardised tuition amount is calculated for each student (in each province in each year – i.e., for any student-year observation in the LAD), the next step is to find a set of thresholds that separate university students from college students. We formulated a number of thresholds, carried out sensitivity tests, and settled on what we considered to be the three best options.

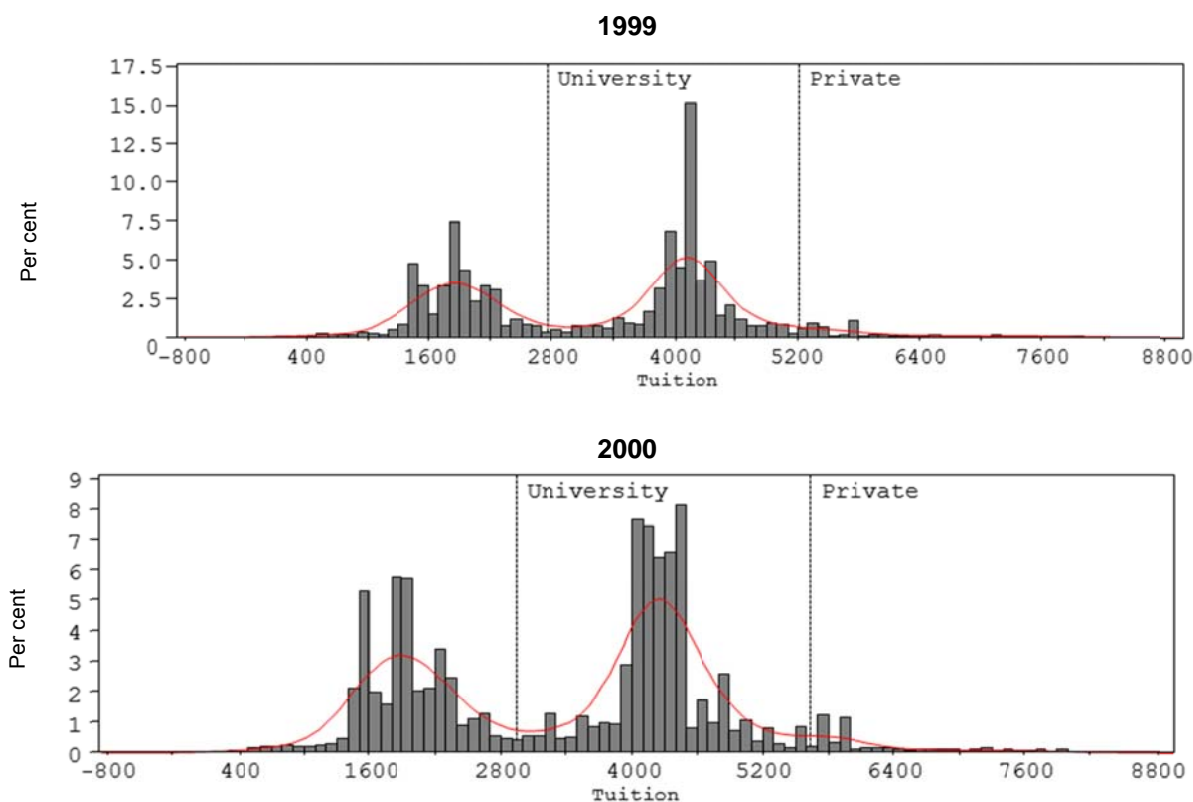
The first threshold is based on the normal university tuition level in the province in question in a given year, with the college-university cut-off threshold set at 80 per cent of that value (this cut-off varying in dollar terms by province and year). If the standardised tuition level we calculate for an individual student is above the threshold, the student is deemed to be a university student; if below, college. The second threshold is based on college tuition levels rather than university tuition levels, with the threshold set at base college tuition plus 50 per cent. Students are then deemed to be college or university students in a similar fashion as before, only this time we consider all those who are calculated to have adjusted tuition fees above the “college threshold” to be university students.

In essence, the first threshold takes university tuition levels and chooses a cut-off at a level below that which is likely to separate college students from university students, while the second works from college tuition levels and chooses a higher level which should again separate college and university students. The third method uses an average of the two. In all cases, the threshold of Quebec is set at a flat \$500 to account for the fact that college is essentially free in that province.

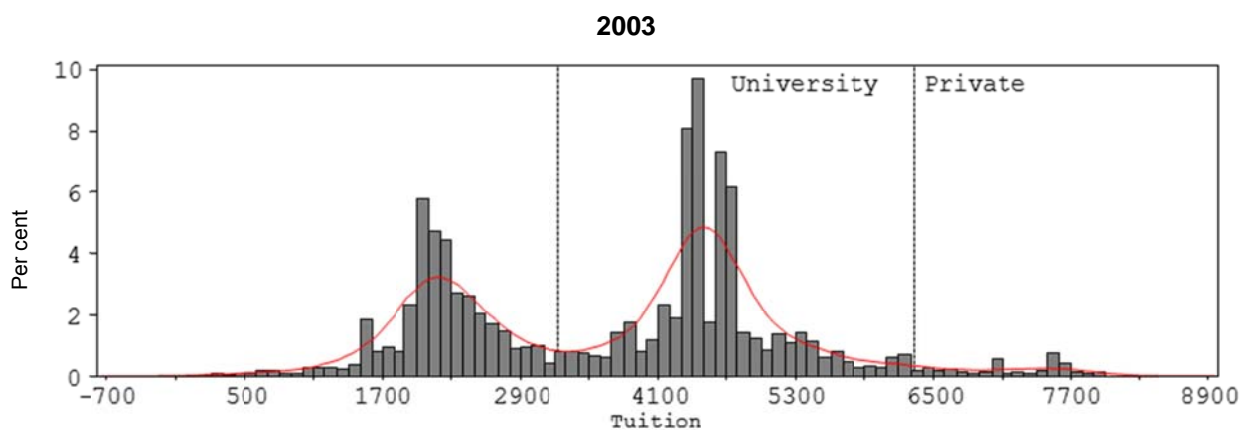
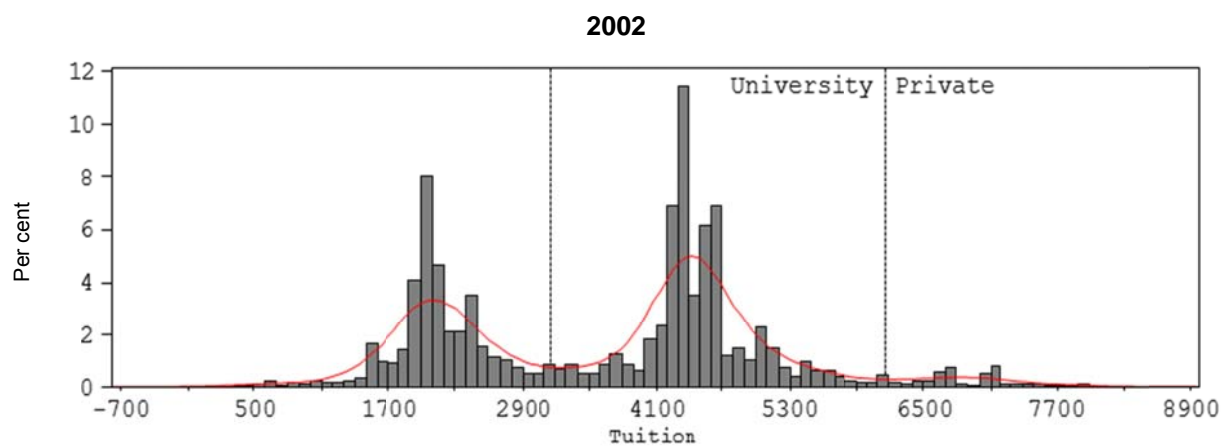
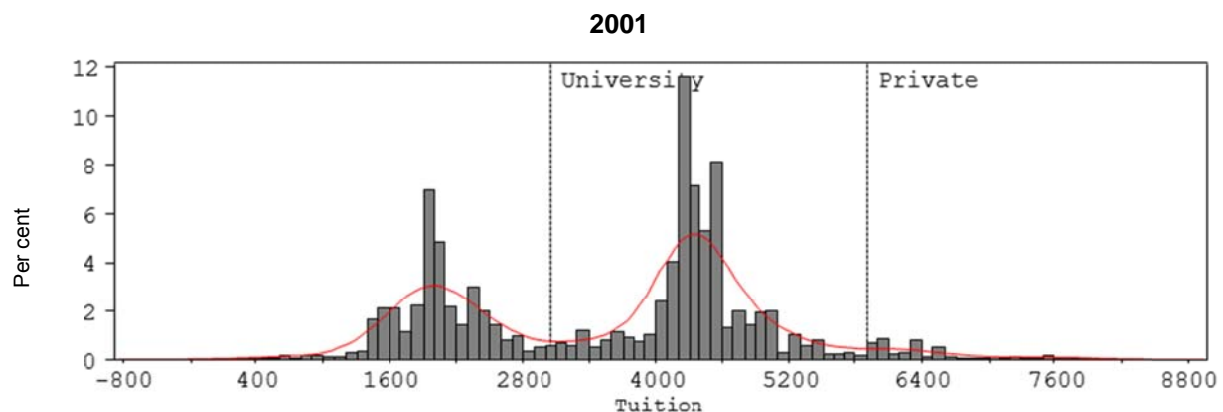
We have also tested three comparable sets of thresholds to identify private colleges, which are generally very expensive. For the first threshold, we use the average university tuition rate multiplied by 1.25. The second threshold uses a multiplier of 1.35, and the third a multiplier of 1.50.

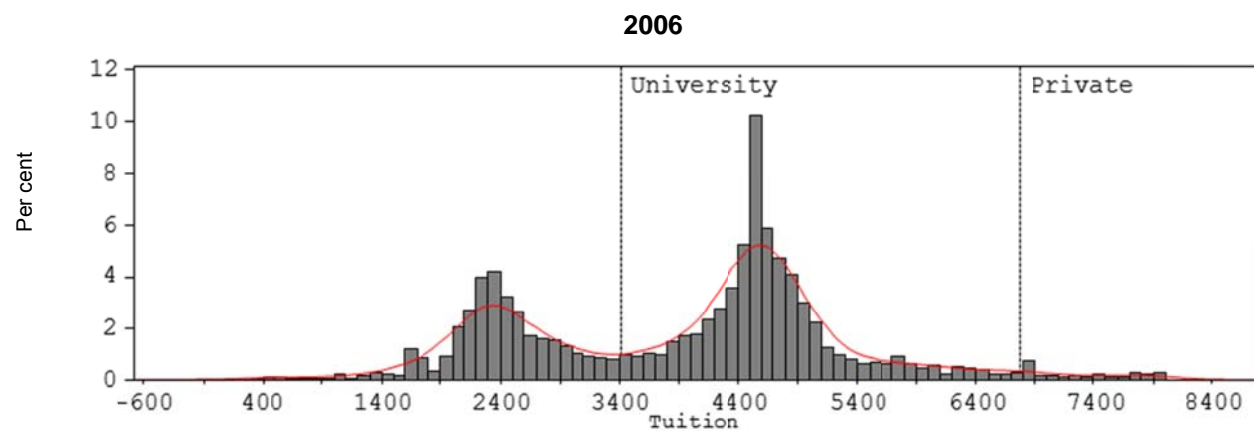
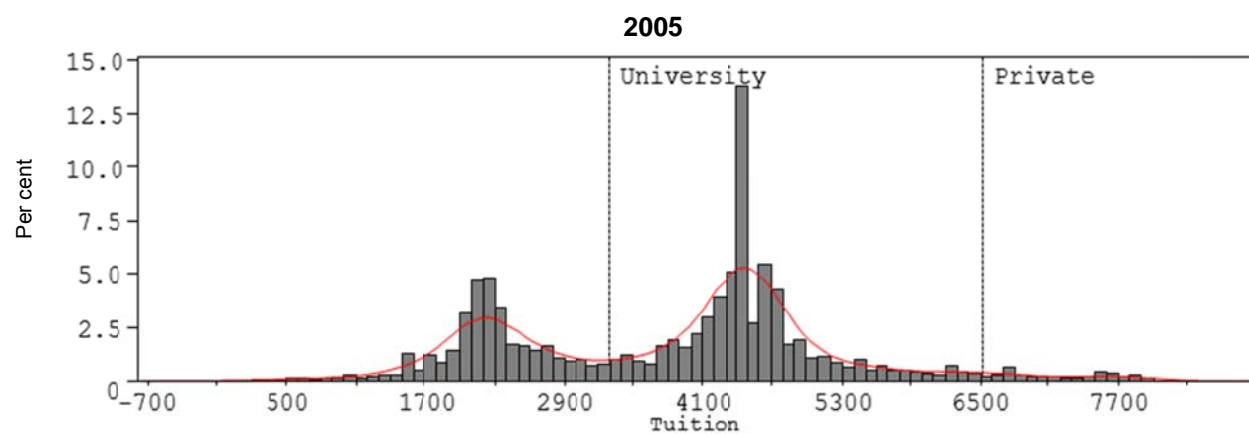
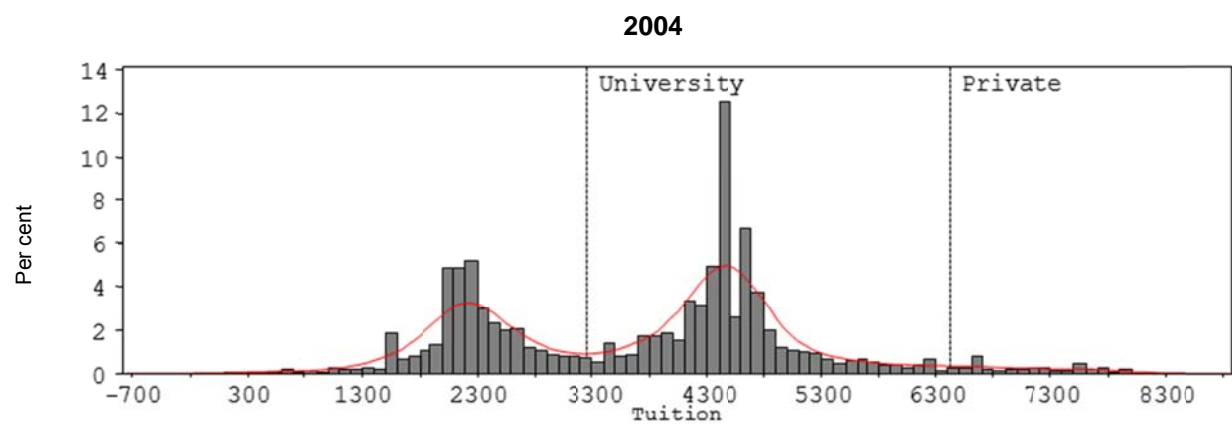
For the purposes of this paper, we use the third (average) threshold for separating college and university students, and the 1.35 multiplier for separating university and private college students. We arrived at this decision largely based on observing the data (using kernel densities), which identified these thresholds as being the most appropriate for separating out college and university students. The kernel density estimations for our preferred threshold choices in Ontario are shown for each calendar year in Figure 1, where we see a very nice separation at the thresholds employed.<sup>20</sup>

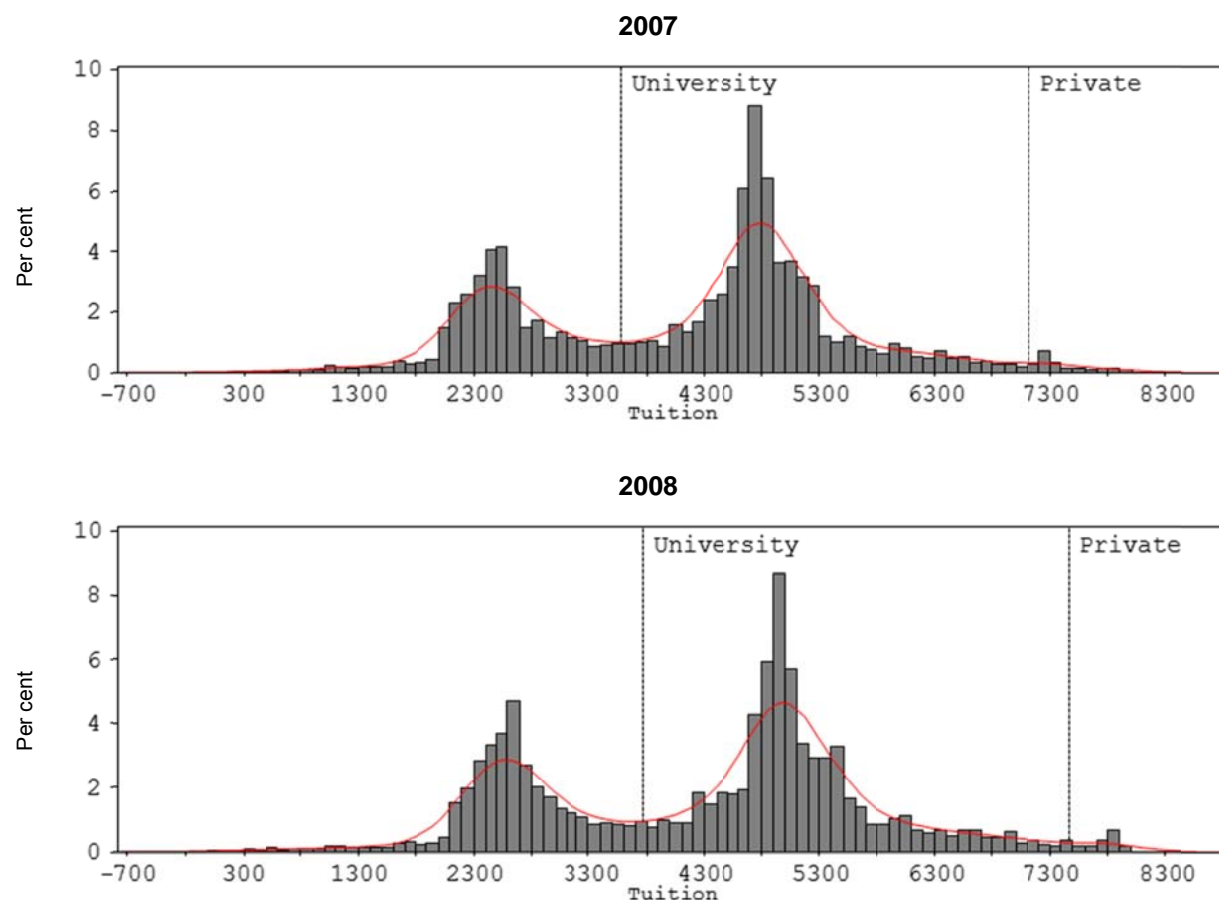
**Figure 1: Kernel Densities of Adjusted Tuition Rates**



<sup>20</sup> We also compared our results to the access rates yielded by the Youth in Transition Survey, discussed further below.







The identification of PSE status in this manner is potentially sufficiently accurate only for the period since 1997. Prior to that year, the PSE tax credits claimed represented only what students – or those to whom the credits were transferred (e.g., parents) – used for themselves in that year.

Furthermore, with the advent of the carry-forward provisions for tuition and education deductions introduced in 1997, declaring these credits was not only all the more worthwhile but was also (of necessity) tracked by Revenue Canada to make sure that they were used only once (on the part of either the student or another eligible family member). A new schedule (schedule 11) became available in 1997, designed to help students calculate the portion of the tuition that could be claimed in each year, the portion used by either the student or another eligible family member, and the portion carried forward to the following year. In schedule 11, the tax filer therefore enters the actual amount of tuition fees paid before their use by the student, their transfer to someone else, or their carry-forward.

After inspecting the data, we decided that only starting in 1999 does the information on students' PSE status become sufficiently reliable for the purposes of analysis, with such "learning periods" being typical in data of this type.

## Definitions of the Regions

One of the distinguishing features of this study is that it not only provides comparisons for Ontario versus the rest of Canada, but it also breaks the analysis down by region within Ontario. We consider both the overall

access rates by region – North, South, East and Central – and how the structure of access to PSE differs across regions.

Information on a youth's province and region is based on their postal code address, identified when they were first observed as a child tax filer. Their province of residence is imputed from postal code information and then grouped into Ontario or the rest of Canada (ROC) for the main part of our analysis.

That said, the kernel density estimations of our PSE identifiers (as explained above) revealed that we could not be confident in our college/university threshold cut-offs in British Columbia and Alberta. As a result, we exclude these two provinces from our ROC sample. Our resulting merged 19-21 sample contains 353,245 individuals, of which 170,190 are from Ontario and 183,040 are from the ROC.

In addition to the national comparison, a comparison of the regions within Ontario is also conducted. The regional split is achieved by matching each individual's postal code information with the corresponding geographic census division (CD). Ontario's 49 CDs are then aggregated into four separate regions in order to provide an adequately large sample size for each region, while retaining their meaning as well defined geographical agglomerations. These regional breakdowns parallel the provincial government's Ontario Municipal Service Office (MSO) jurisdictions, with one exception: North-West and North-East Ontario are aggregated into one region – North Ontario – due to sample size constraints.

The Ontario regional analysis thus examines four regions: North Ontario, South Ontario, Central Ontario and East Ontario. North Ontario is the smallest region, with a total sample of 12,635 individuals in all years, followed by East Ontario at 26,080 individuals, and South Ontario at 38,680 individuals. Central Ontario has the largest sample, with a total of 92,580 individuals.

## Family Background Information: Variables Included in the Analysis

In addition to analysing overall PSE access gaps by **sex**, we also estimate our preferred multinomial models for males and females separately. Our preferred “national” sample (Ontario and ROC as defined above) contains slightly more males (180,760) than females (172,470). More males (86,470) than females (83,720) are also present in the Ontario sample.<sup>21</sup>

We compare **parental (or “family”) income**<sup>22</sup> across five different cut-offs: below \$25,000, \$25,000-50,000, \$50,000-75,000, \$75,000-100,000, and over \$100,000. These are arbitrary demarcations, but allow us to examine PSE access by family income level in some detail.<sup>23</sup> In our regression analysis, we also present results using a linear parental income variable in order to provide an overall summary measure of the relationship between access to PSE and family income.

**Area size of residence** is classified according to the LAD “ASR” (area size of residence) variable. This six-category variable is collapsed into four categories for this analysis: “large city” (population over 100,000), “medium city” (population between 30,000 and 100,000), “town” (population between 1,000 and 30,000) and “rural” (population below 1,000). For the descriptive component of the analysis by region within Ontario, we collapse these into a binary category in order to maintain reasonable sample sizes: these two categories split individuals into large/medium cities and town/rural areas.

<sup>21</sup> The greater numbers of males reflects filing patterns by sex.

<sup>22</sup> We use these terms interchangeably, as is often done in the literature, but the variable actually represents the incomes of parents only and not any children present in the family, which is the preferred measure.

<sup>23</sup> Incomes are adjusted neither for family size nor the cost of living in order to keep the measure simple and easy to interpret. Adjusting for these factors would not change the results greatly.



As would be self-evident, lone-parent families are those who live in a family with only one parent.<sup>24</sup> Students from lone-parent families make up 17.2 per cent of the national sample and between 15 and 20 per cent across the Ontario regions.

We identify respondents who are members of an **official language minority** based on the official language of correspondence requested by the tax filer and their province of residence, and represent Anglophones in Quebec and Francophones elsewhere. It is, however, highly likely that this variable underestimates the level of Francophone minorities in much of English Canada, simply due to the local availability of tax forms and other technical issues. As a result, we only look at the French linguistic minority in Ontario and regions of Ontario, while in the ROC we only examine the English linguistic minority in Quebec.

## YITS – LAD Comparison

Before presenting the results of our main analysis, we provide here a comparison of how the access rates of our LAD sample compare to those found using the Youth in Transition Survey (YITS), which has in recent years been the preferred data source for many studies of access to PSE, including PSE access specifically in Ontario (e.g., Finnie et al., 2011a; 2011b). We do this by comparing overall access rates and then by comparing access models estimated with the two different datasets.

Table 4a first shows overall access rates for college and university attendance by age 21 using both the older YITS-B (age 18-20 in 1999) and the younger YITS-A (age 15 in 1999). Each is lined up with a roughly comparable period of data for the LAD, as indicated in the table. The results show that the LAD seems to seriously underestimate college access rates, as already suspected, but is very close to both the YITS-A and YITS-B in terms of university access rates – within 2 percentage points for the former and within 3.5 percentage points for the latter (a margin of error under 10 per cent in relative terms).

**Table 4a: LAD-YITS Access Rates by Age 21 Comparison, Ontario**

|                     | Coll. | Univ. |
|---------------------|-------|-------|
| LAD-A <sup>‡</sup>  | 27.2  | 43.6  |
| YITS-A              | 36.1  | 45.4  |
| LAD-B <sup>‡‡</sup> | 29.5  | 41.8  |
| YITS-B              | 34.4  | 40.5  |

Notes: College access does not include private college in the LAD. <sup>‡</sup> LAD in 2005. <sup>‡‡</sup> LAD in 2002.  
For further information about this table, please see the text.

As previously mentioned, we suspect that the substantial underestimation of college participation rates in the LAD is due to the lower benefits attached to claiming tax credits for college students as compared to university students, especially in Quebec, where college tuition is essentially free. These comparisons help drive this study's focus on university access, as discussed earlier.

A second check involved comparing access models using the YITS-A and the LAD. To adjust the variables included in our LAD-based analysis to be as comparable as possible to what is available in the YITS, we include sex, parental income, and indicators of rural residence, lone-parent family and official language minority. In the YITS-A, our variables include female, parental income, rural dweller, a multi-category family type set of indicators, and official language minority. For both the LAD and YITS-A samples, we estimate the model using two separate model specifications. In the first specification, parental income is separated into discrete categories, while it is linear (in \$10,000s) in the second specification.

<sup>24</sup> The relatively few individuals living in father-only families are included together with those in mother-only due principally to sample size issues. By construction, child filers in the LAD must be in either a one-parent or two-parent family (i.e., there is no "other" category).

Even with these modifications, the two datasets do not possess identical variables. For example, while parental income is averaged out over a number of years in the LAD, it is based on a single year in the YITS-A. Furthermore, while we have four distinct area size categories in the LAD, we only have a rural vs. non-rural indicator in the YITS-A. As a result, we combine non-rural area sizes together in the LAD, in order to make the specifications more directly comparable. Moreover, the rural indicator in the LAD is based on the place of residence at the earliest age that tax information is available for an individual. In the YITS-A, the rural indicator is based on whether the individual attended a rural high school. Finally, our family type variable separates individuals into married/common-law family or any single-parent family group in the LAD, whereas the YITS-A is more detailed and includes a married/common-law reference group and three separate single-parent groups (single mother, single father, and other).

As a result of these differences in the variables and the overall differences in samples constructed from the LAD and YITS-A, we do not expect to get exactly the same results using the two datasets, but we do expect the relationships identified in them to be at least roughly comparable.

Table 4b shows the results of the LAD and YITS-A comparisons for Ontario. Focusing on access to university, the results match closely. First, holding other factors constant, females are much more likely to access university in both the LAD and the YITS-A samples, with only a couple of percentage points separating the results.

**Table 4b: LAD-YITS Multinomial Logit Comparison, Ontario**

|                               | LAD                  |                      |                      |                      | YITS-A               |                      |                      |                      |
|-------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
|                               | Categorical Income   |                      | Linear Income        |                      | Categorical Income   |                      | Linear Income        |                      |
|                               | Coll.                | Univ.                | Coll.                | Univ.                | Coll.                | Univ.                | Coll.                | Univ.                |
| Female                        | -0.025***<br>(0.005) | 0.150***<br>(0.006)  | -0.026***<br>(0.005) | 0.150***<br>(0.006)  | -0.074***<br>(0.020) | 0.176***<br>(0.021)  | -0.076***<br>(0.020) | 0.177***<br>(0.021)  |
| Parental Income (\$25-50,000) |                      |                      |                      |                      |                      |                      |                      |                      |
| <\$25,000                     | -0.064***<br>(0.009) | -0.033***<br>(0.010) |                      |                      | -0.067<br>(0.057)    | 0.036<br>(0.057)     |                      |                      |
| \$50-75,000                   | 0.024***<br>(0.008)  | 0.038***<br>(0.008)  |                      |                      | -0.035<br>(0.034)    | 0.087***<br>(0.034)  |                      |                      |
| \$75-100,000                  | -0.008<br>(0.009)    | 0.166***<br>(0.009)  |                      |                      | -0.024<br>(0.035)    | 0.125***<br>(0.036)  |                      |                      |
| >\$100,000                    | -0.087***<br>(0.008) | 0.304***<br>(0.009)  |                      |                      | -0.056<br>(0.038)    | 0.235***<br>(0.039)  |                      |                      |
| Parental Income in \$10,000s  |                      |                      | 0.002<br>(0.001)     | 0.024***<br>(0.002)  |                      |                      | -0.002<br>(0.004)    | 0.017***<br>(0.005)  |
| Rural Dweller <sup>‡</sup>    | 0.043***<br>(0.010)  | -0.095***<br>(0.008) | 0.048***<br>(0.010)  | -0.102***<br>(0.009) | 0.204***<br>(0.030)  | -0.133***<br>(0.028) | 0.208***<br>(0.030)  | -0.131***<br>(0.028) |
| Lone Parent Family            | 0.012<br>(0.008)     | -0.068***<br>(0.008) | 0.007<br>(0.009)     | -0.078***<br>(0.009) |                      |                      |                      |                      |
| Family Structure (Two-Parent) |                      |                      |                      |                      |                      |                      |                      |                      |
| Single Mother                 |                      |                      |                      |                      | 0.049<br>(0.041)     | -0.056<br>(0.037)    | 0.041<br>(0.040)     | -0.062<br>(0.038)    |
| Single Father                 |                      |                      |                      |                      | 0.161**<br>(0.082)   | -0.104<br>(0.071)    | 0.168*<br>(0.088)    | -0.116<br>(0.079)    |
| Other                         |                      |                      |                      |                      | 0.007<br>(0.121)     | -0.078<br>(0.118)    | 0.003<br>(0.121)     | -0.084<br>(0.116)    |
| Official Lang. Min.           | 0.038<br>(0.026)     | -0.002<br>(0.025)    | 0.034<br>(0.026)     | 0.004<br>(0.025)     | 0.059<br>(0.039)     | -0.050<br>(0.039)    | 0.057<br>(0.039)     | -0.044<br>(0.039)    |

Notes: <sup>‡</sup> The rural dweller variable is identified in the LAD according to parental residence. In the YITS, it is identified according to whether the student went to a rural high school. \*\*\* p<0.01 \*\* p<0.05 \* p<0.1.  
For further information about this table, please see the text.

Parental income effects tend to be considerably greater in the LAD, using either the categorical indicators or the linear variable. This is at least partly due to the different definitions and sources of information in the two datasets. We use parental income as reported on tax returns (and therefore assumed to generally be very reliable) averaged over all the years it is available in the LAD for the youth in question, whereas we have it from just one time point in the YITS-A (when the youth was age 15) and it is self-reported by parents. Even with the larger effects seen in the LAD, the overall impacts are certainly all in the right direction, correctly ordered in the case of the categorical specification and of roughly similar magnitudes.

Of course, with parental education unavailable in the LAD, in both these specifications family income is also picking up the effects of parental education and any other omitted variables with which family income is correlated. This must be kept in mind through the analysis.<sup>25</sup>

<sup>25</sup> Parental education is purposefully omitted from the YITS models here even though it is available in the YITS dataset in order to allow us to estimate comparable models, as explained above. See Finnie and Mueller (2008a; 2008b) on the degree to which family income also picks up the effects of parental education when the latter is omitted.

Rural residence disadvantages university access in both the LAD and YITS-A samples. Once again, the disadvantage is slightly greater in the YITS-A sample, but the results are highly comparable.

Our family structure variables are not directly comparable in the LAD and the YITS-A. The YITS-A includes three separate single-parent family groups which are compared to the reference category, whereas the LAD measure is less differentiated. Nonetheless, the negative effect on university access for single-parent families is comparable in the two datasets, although the YITS-A results are not statistically significant – possibly related to the much smaller sample sizes available (and thus pointing to the advantage of the large sample sizes available in the LAD). Finally, the university access results for members of the official language minority (i.e., Francophones in the case of Ontario) are dissimilar in the LAD and the YITS-A, but neither is statistically significant from zero.

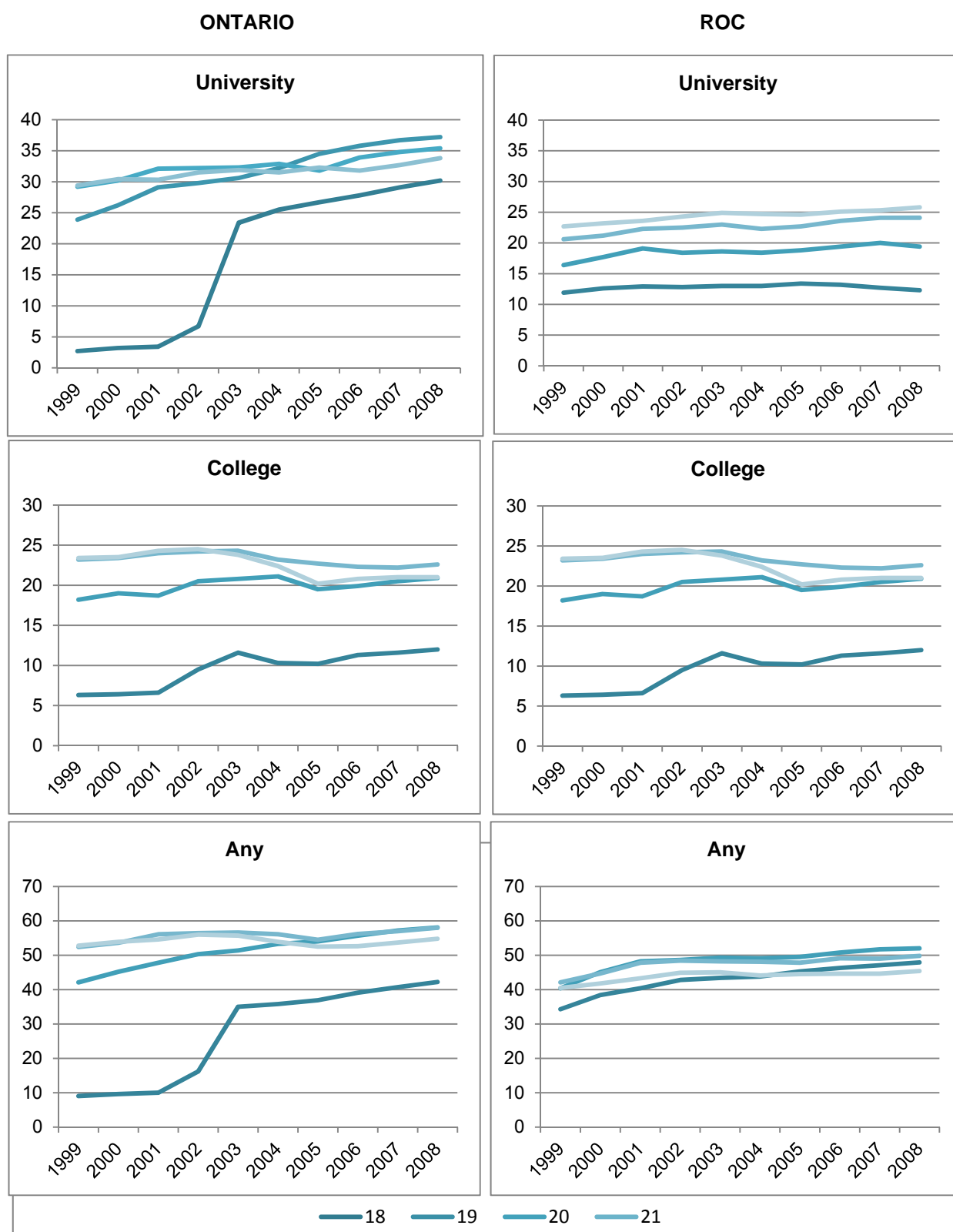
Overall, we conclude that the results obtained with the two datasets are reasonably comparable, especially in regards to university access, and particularly when we consider the difference in variable definition and the very different construction of the two datasets. We proceed with these comparisons established.

## Results

### Overall PSE Access Rates

We start by using the separate age 18, 19, 20 and 21 samples to present overall PSE access rates at each of those ages (see Figure 2, which corresponds to the last column of numbers in Table 2 for the age 15-21 linked sample). Each set of figures contains three panels. The first panel shows university access rates, the second shows access rates for college, and the final panel shows the sum of the college and university access rates (i.e., “Any PSE”). These are shown for Ontario and for the provinces included in our definition of “ROC” (i.e., excluding British Columbia and Alberta).

**Figure 2: PSE Access Rates (%) by Age**



Most obvious here is that university access in Ontario increased dramatically from 2002 to 2003 for those aged 18, reflecting the double cohort effect related to the elimination of the fifth year of high school. We also see how our measure of access to university captures the lead-up to that shift in the increase seen from 2001 to 2002, as some individuals tried to get ahead of the coming surge.

University access in Ontario has of course been much more stable at ages 19, 20 and 21, with no clear pattern across those ages for the period taken as a whole. Those who start school later will tend to drive up participation rates at the older ages, while individuals who start school when younger but then leave the system before finishing will push the age patterns in the opposite direction. In the latter part of the period, participation rates generally decrease with age. In the final year of data available (2008), for example, the university participation rate was 37.2 per cent for the age 19 group, 35.4 per cent for those aged 20, and 33.8 per cent for those aged 21.

Also evident is a significant general increase in university attendance rates over the period covered. The increases for those aged 19 are greatest, even since the double cohort, but rates rise for the other age groups as well, the numbers just cited representing increases from rates in 2003 of 30.9 per cent, 32.3 per cent, and 31.9 per cent, respectively, for those aged 19, 20 and 21.<sup>26</sup>

For the ROC, university access rates are of course much more stable across the different ages over time since there was no change in the general structure of high school (which ends after 11 years of study in Quebec and 12 years in the ROC). All show, however, a general trending upwards over time.

As mentioned several times previously, we do not have as much confidence in our results for college students or, therefore, total PSE participation rates (“any PSE”), so while these are shown for sake of completeness, our discussion here and below is focused on university attendance.

## Access Rates by Background Characteristics

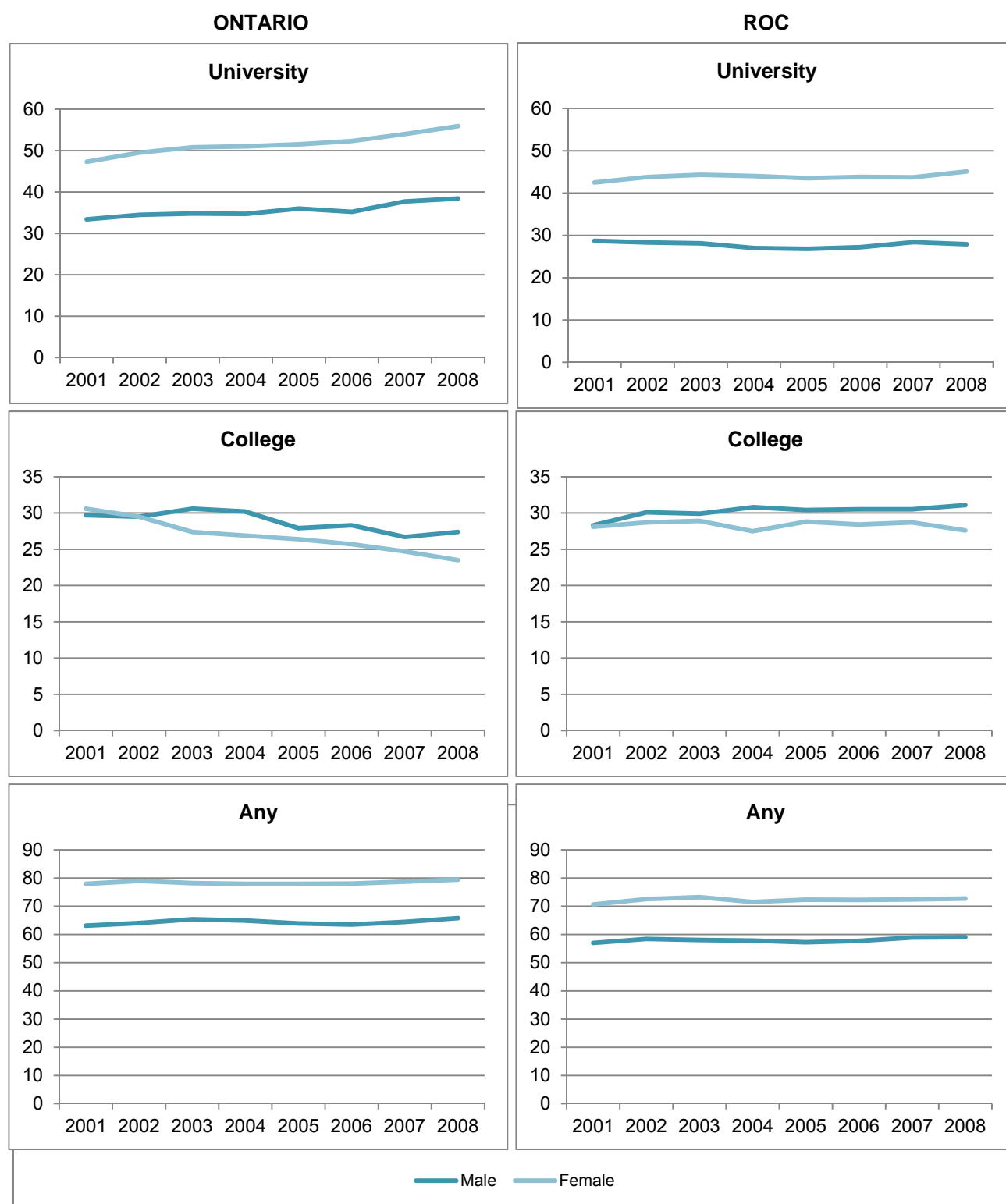
We now use the merged sample described above (i.e., representing those individuals present in our data for each of the three ages considered – 19, 20 and 21) to present and analyse changes in access rates by age 21 according to the various individual and family characteristics which concern us here, including sex, parental income, area size of residence and family type. We omit presenting the descriptive results of the official language minority groups because sample size constraints prevent their inclusion on a yearly basis; we include them only later, in our regression framework. We continue to focus on university rates for the reasons explained above. The numbers underlying these graphs are shown in the various tables included in Appendix A.

### Sex

Figure 3 (underlying numbers in Appendix A, Table 3) shows PSE access rates by sex. Keeping our attention on university access rates, we observe a pronounced disparity in access between the sexes, with females being much more likely to attend than males. Furthermore, while Ontario university attendance grew over time for both groups, it grew considerably more for females than males, so that by the end of our study period in 2008, 55.9 per cent of Ontario females had attended university by age 21 as compared to 38.4 per cent of males, representing a 17.5 percentage point gap. In the ROC, we find a similar gender gap, although males register no growth in university access over the period and the female growth is significantly more modest than in Ontario.

<sup>26</sup> Part of these shifts in age patterns over time would presumably be due to the delayed normal start year and the age-related participation dynamics pertaining to later versus earlier starters described above. We note the stability in the patterns by age from 2006.

**Figure 3: PSE Access Rates (%) by Age 21 by Sex**





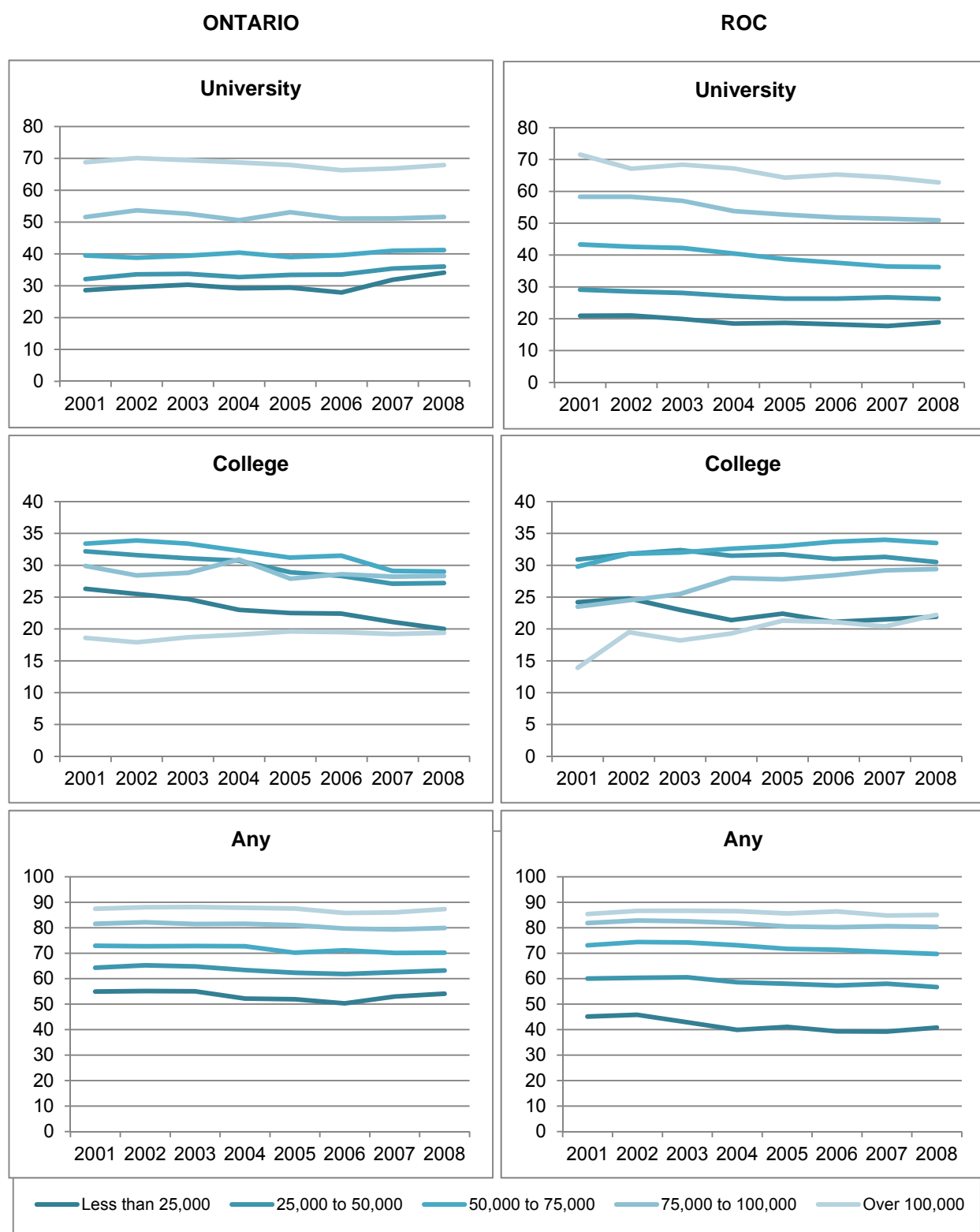
In contrast, while keeping in mind the various caveats regarding college rates provided above, college access rates in Ontario appear to have decreased for both males and females over this period. However, while college access for both sexes is similar in 2001, females appear to be less likely (by 3.9 percentage points) than males to attend college by 2008 – a trend that is more than offset by their increases in university participation.

Finally, we note that the final panel in our chart, which indicates attendance in either a college or university program, suggests that females attend some form of PSE at a significantly greater rate than males. In other words, the slight male advantage in college access does not (especially in the later years) offset the considerably larger female university access advantage. Precisely because the “Any PSE” rates are the simple summation of the university and college participation rates, and because we have doubts concerning the validity of the latter, we mostly avoid discussing these results in the remaining part of this section.

### *Parental Income*

Figure 4 (underlying numbers in Appendix A, Table 4) shows PSE access rates by income level. University participation rates are strongly correlated with income, with individuals from each higher income bracket attending university at higher rates than those from lower brackets. These gaps are, however, less pronounced among the lower income brackets. Indeed, individuals in the second-lowest (\$25,000-50,000) and lowest (less than \$25,000) income brackets have nearly equal access rates by 2008 (36.0 and 34.1 per cent, respectively).

**Figure 4: PSE Access Rates (%) by Age 21 by Parental Income**



Also of interest is that over time, university access rates increased for those at the three lower income levels, with the increases being progressively greater the lower the income group, whereas they held steady and decreased slightly for the second-highest and highest income categories, respectively. It appears, therefore, that there has been significant convergence in university participation rates by family income level in Ontario over the last decade or so.

While the gaps in university participation by family income level in Ontario are substantial, they are considerably narrower than in the ROC, with the difference being mainly in the relatively higher participation rates among those from lower income families in Ontario as compared to the ROC. These results are consistent with earlier research on provincial differences in access, including Finnie et al. (2011a; 2011b).

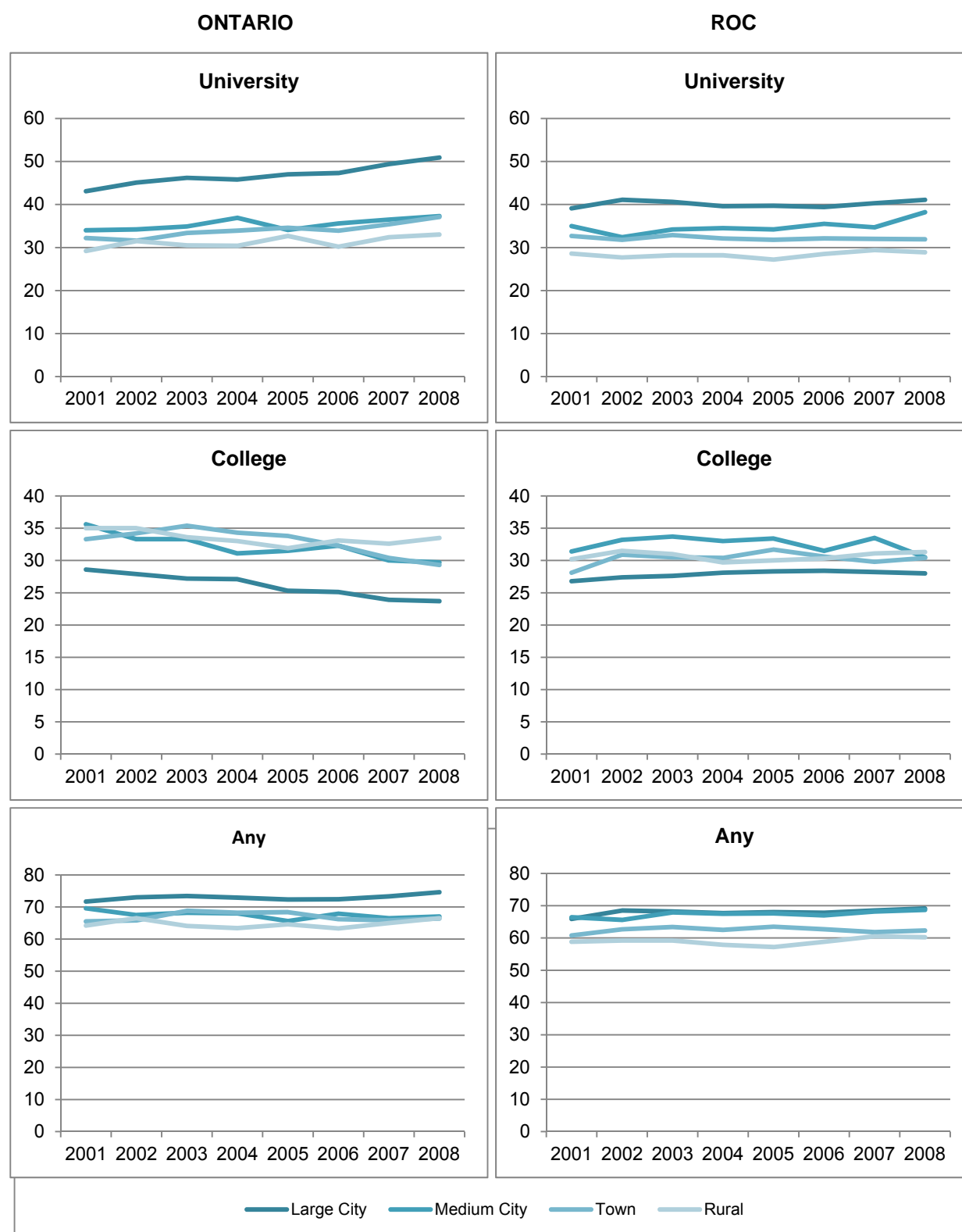
In addition, while there is a general convergence over time in university access rates by family income level in the ROC, it takes a very different form than in Ontario. In the ROC, we see declines in participation rates among youth across all family income levels, but especially among those from middle and higher income families, whereas in Ontario all rates rise, but they rise more at the bottom than at the top – obviously a very different set of dynamics.<sup>27</sup>

### *Area Size of Residence*

Figure 5 (numbers in Appendix A, Table 5) shows attendance rates according to the four area sizes. Individuals from large Ontario cities enroll in university at considerably higher rates than those from the other area sizes. Furthermore, the rates for this group increased the most over time, thus widening their advantage over the period covered.

<sup>27</sup> This also means that the relative stability of overall participation rates in the ROC – slight increases for women and slight declines for men – are offset by more families being at the higher income levels associated with higher access rates, even as the participation rates within any given income class decline.

**Figure 5: PSE Access Rates (%) by Age 21 by Area Size**



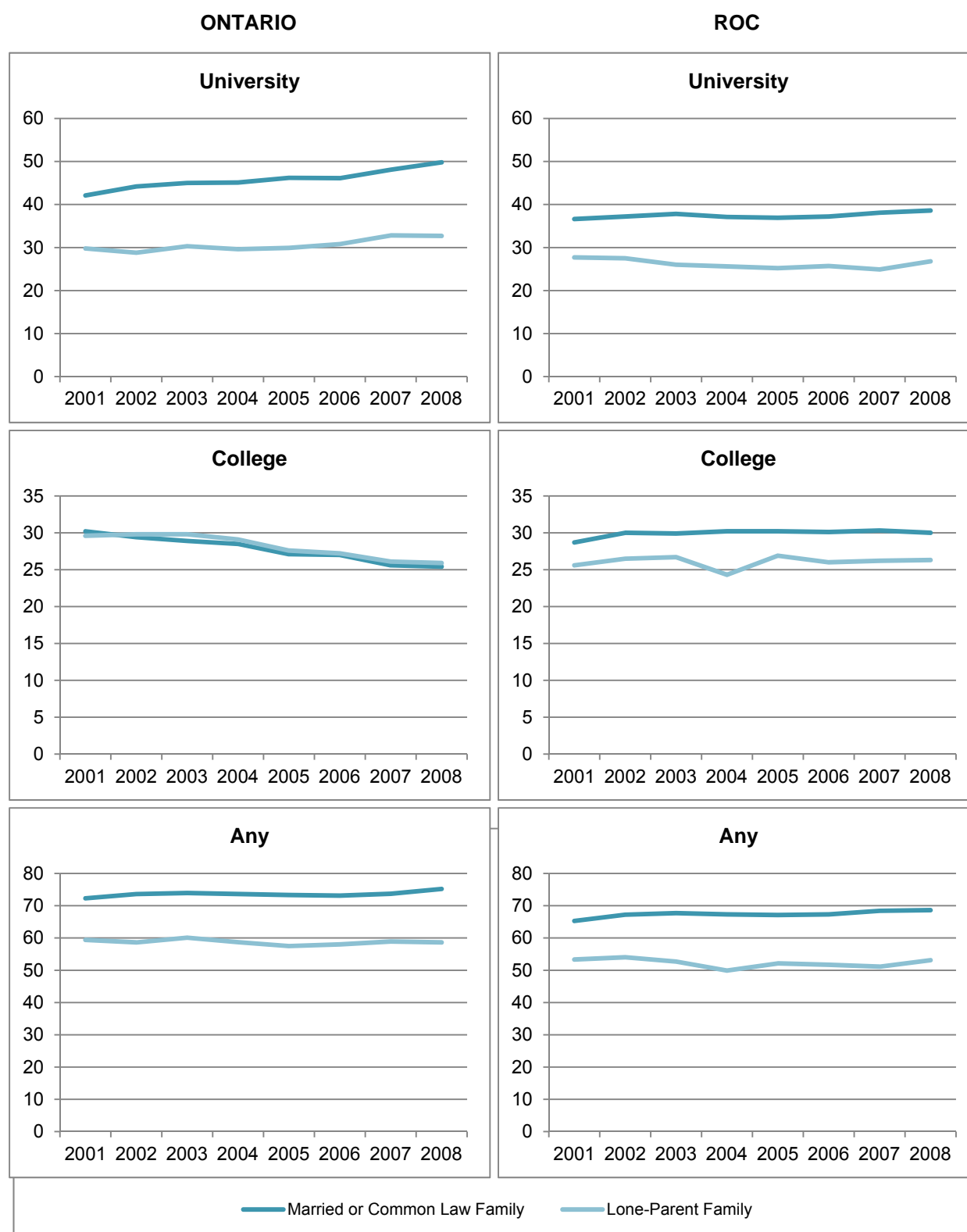
Individuals from large cities are 13.6 percentage points more likely to access university by 2008 compared to those from medium cities, the group with the second-highest levels of university access. In contrast, differences in access between the residents of medium cities, towns and rural area are relatively minor; nonetheless, rural residents consistently have the lowest rates of university attendance throughout our study period. The inequality in university access between large cities and other urban zones also exists in the ROC, although discrepancies in access are more compressed, particularly between large cities and other areas.

Still probing the college results with caution, the numbers suggest that whereas individuals from large cities enroll into universities at a greater rate than those from other area sizes, the relationship is reversed for college attendance: individuals from large Ontario cities are less likely to access college than individuals from any other area. In contrast, rural students generally – but not always – have the highest rates of college access, suggesting that individuals from rural areas are most likely to substitute or prefer college over university. Residents of the largest cities were also least likely to access college in the ROC. However, unlike Ontario, residents from medium cities tended to have the highest college access rates.

### *Family Type*

Figure 6 (numbers in Appendix A, Table 6) shows PSE access by family type. In Ontario, individuals from married (including common-law) households appear to have a large advantage in accessing university over lone-parent families (49.8 per cent compared to 32.7 per cent by 2008). Furthermore, the overall increase in university attendance over time is considerably more modest for individuals from lone-parent families. The trend is similar in the ROC, although rates of university access among individuals from lone-parent families slightly decline over time. We will see below, however, that more than half of this gap is explained by other factors, rather than being related to family type *per se*.

**Figure 6: PSE Access Rates (%) by Age 21 by Family Type**



In comparison, college access between the two family type groups is similar. Both groups attend college at roughly 30 per cent in 2001 and slightly over 25 per cent by 2008. In comparison, individuals in the ROC from lone-parent families attend college at slightly lower rates during the entire time period.

## Ontario Regional PSE Access Rates by Background Characteristics

In this section we break down our merged sample by Ontario region (North, South, Central and East). The descriptive regional results tend to be comparable to those of Ontario in the aggregate – the rates of overall access may be different, but the patterns are broadly similar. This would be expected to some extent because the all-Ontario results of course represent those from all regions taken together – but this also leaves room for considerable differences by region. Therefore, in this section our intent is mostly to highlight regional results that deviate from overall Ontario trends. Again, all the numbers underlying the figures are reported in Appendix A.

### Sex

Figure 7 shows Ontario's regional PSE access rates by sex. These can first be seen as showing the overall differences in university attendance rates by region as well as sex: access rates are highest in Central Ontario, with females and males having rates of 60.5 and 43.4 per cent, respectively, in the final year of data. In the other regions, rates were generally lower – 47.2, 49.8 and 51.3 per cent for females in each of the North, South and Central regions respectively – while they were 27.2, 31.0 and 35.9 per cent for males.



**Figure 7: PSE Access Rates (%) by Age 21 by Sex, by Ontario Region**



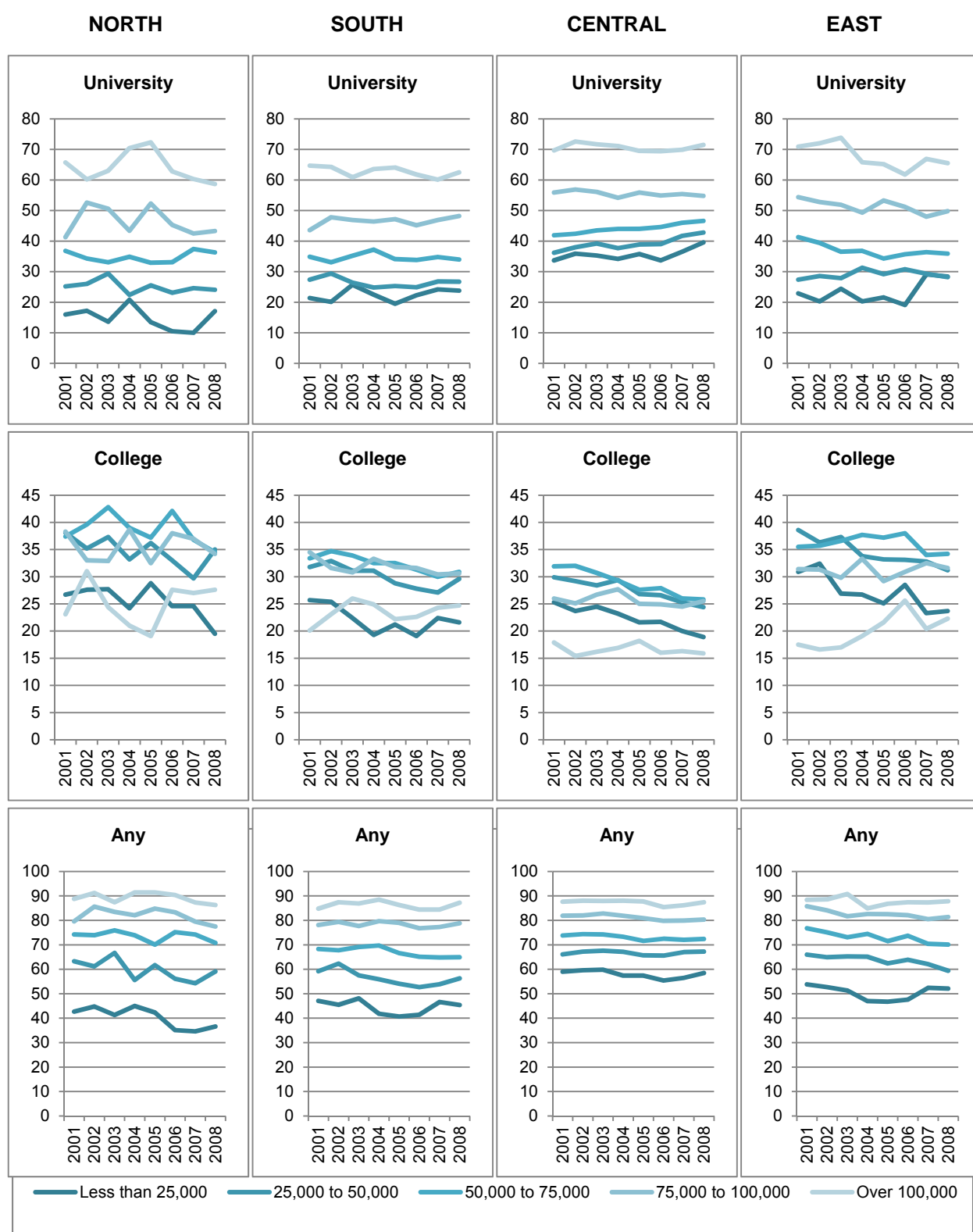
The spread between the highest and lowest rates is thus 60.5 per cent for females in the Central region, to 27.2 per cent for males in the North – a difference of 122 per cent in relative terms. These are remarkable differences: both sex and region are strong determinants of who goes to university. Furthermore, the gender gap, in particular, widens over time in all regions as well. Indeed, the differences by sex are interesting most of all precisely because they are so comparable across every region.

In comparison, college access rates – with our caveats with respect to the college results to continue to be kept in mind throughout our discussion in this section – are more variable. Males and females start with similar rates of college access in every region, but by the end of our study period, access is lower for females in each region (the results are more variable in the East region).

### ***Parental Income***

Figure 8 breaks down regional PSE access rates by parental income. The overall regional income effects are again similar to the broader provincial picture. Some differences, however, emerge over time. In particular, the near-convergence among the two bottommost parental income brackets is more apparent in South and East Ontario than it is in North and East Ontario. There is considerable year-to-year variability in the rates for specific income groups in some regions over some periods, however, due at least in part to the underlying sample sizes getting small.

**Figure 8: PSE Access Rates (%) by Age 21 by Parental Income, by Ontario Region**



As is the case with the province of Ontario as a whole, college access rates are lowest in every region among individuals whose parents were in the two opposite income extremes: those who earned less than \$25,000 or over \$100,000. Access rates among individuals whose parents belonged to three middle income categories are broadly similar, with an overall tendency towards convergence in all regions.

### ***Area Size of Residence***

Figure 9 shows regional PSE access rates for urban and town/rural categories (see above for the precise definitions of these). University attendance is higher among individuals from large or medium cities in every region. The access penalty for town and rural residents is smallest in South Ontario (between 5.5 and 8.5 percentage points during our study period). It is more evident in other regions, and especially East Ontario, where residents of large and medium cities are between 9.6 and 15.4 percentage points more likely to attend university than are town or rural residents.

**Figure 9: PSE Access Rates (%) by Age 21 by Area Size, by Ontario Region**

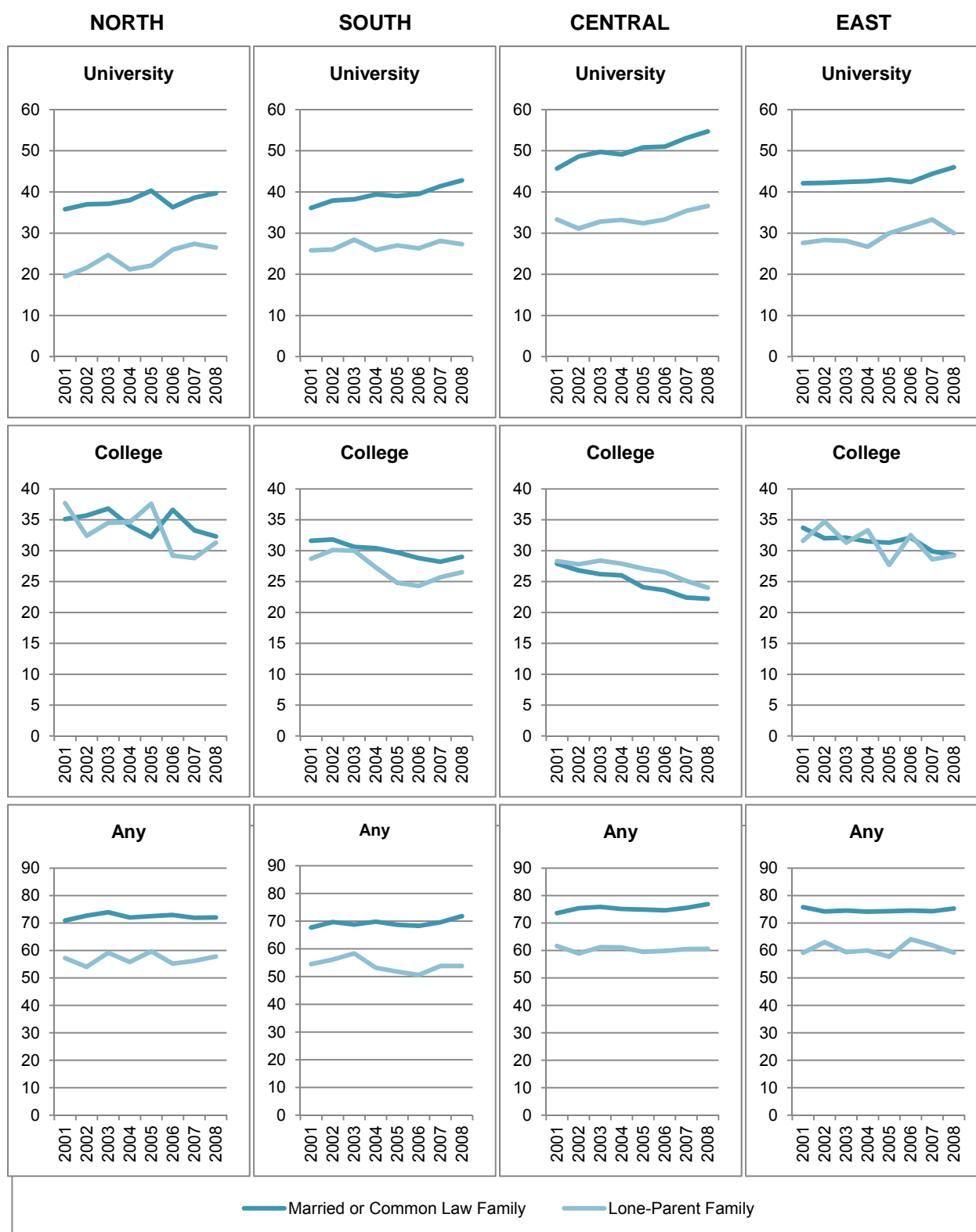


In contrast to the university picture, individuals from towns or rural areas generally have higher rates of college access than individuals from large or medium cities. However, this access advantage is modest and is most apparent in East Ontario: in this region, the town and rural residents have up to a seven percentage point access advantage when compared to large and medium city dwellers during our study period.

*Family Type*

Figure 10 separates PSE access rates according to family type. Individuals from married or common-law families are more likely than those from lone-parent families to access university in every region. It is also clear that access to university is increasing at a slower rate for individuals from lone-parent families than for individuals from married or common-law families in South, Central and East Ontario. Therefore, the general university attendance gap increases between these two groups over time in these regions, while it remains steady in North Ontario.

**Figure 10: PSE Access Rates (%) by Age 21 by Family Type, by Ontario Region**



Regional college access rates, however, are comparable between the two groups. Indeed, access rates between the two groups often converge in North and East Ontario. In comparison, individuals from married or common-law families access college at a slightly higher rate than those from lone-parent families in South Ontario; however, the opposite is true in Central Ontario.

## Ontario/ROC Regression Results: The Baseline Models

This section begins to extend the descriptive analysis presented above by placing those same comparisons in a regression framework. We present the average marginal effects, or average differences in the probabilities of attending university or attending college as compared to the no PSE outcome. We also include a third PSE outcome – private college attendance – in our models, but do not present these results, largely because the sample sizes in this outcome group are relatively small but also because of the diverse nature of these institutions.

Throughout this section we specify two types of models. In the first kind, henceforth termed “separate” models, the explanatory variables are included individually along with a basic set of controls (for cohort) and without controlling for the other key independent variables we consider. In the second kind, henceforth termed “joint” models, all independent variables are included together. This allows us to identify the overall (or “gross”) differences in access rates for the main variables under consideration (family income, area size of residence, family type), and then the differences that remain once the other factors are taken into account (i.e., the “net” differences).

We present several different sets of regression results: (1) separate and joint Ontario regressions along with the absolute changes and remaining relative effects between the two sets; (2) joint Ontario and joint ROC regressions; (3) joint Ontario and joint ROC regressions separated by sex; (4) joint Ontario regional regressions; and (5) joint Ontario regional regressions separated by sex.

All the configurations include two different specifications concerning parental income: one where parental income is entered as five separate income categories, and a second where parental income is entered as a linear variable with income represented in \$10,000s. We mostly focus on the categorical parental income specification, as the income effects are not generally linear. However, the linear specification provides a nice overall summary measure of the income effects. We therefore present most of the linear income estimates in Appendix B, with the exception of our first two basic regression tables.

All regressions also include a common set of cohort dummy variables, representing the year in which the individual was age 21, as controls, to allow for general time trends in access rates across different student cohorts. Finally, with the exception of the first configurations, all our regressions also include a set of interactions of an indicator variable representing observation taken from the latter half of the period of our analysis (i.e., 2005-2008) with each of the explanatory variables, in order to test for shifts in the relationships in question over the period covered by our analysis.

We begin by presenting Table 5a. Here we run “separate” regressions for each independent variable as described above; estimated average marginal effects are shown. These results correspond very closely to the access rate patterns presented in our descriptive figures. This is as expected, since we are estimating those overall differences in a very simple regression framework with only the addition of some very standard control variables (including the cohort indicators).



**Table 5a: Multinomial Estimates of Access to College and University, Separate and Joint Estimates (Categorical Income), Ontario**

|                               | Separate             |                      | Joint                |                      | Absolute Change |        | Remaining Relative Effect (%) |       |
|-------------------------------|----------------------|----------------------|----------------------|----------------------|-----------------|--------|-------------------------------|-------|
|                               | Coll.                | Univ.                | Coll.                | Univ.                | Coll.           | Univ.  | Coll.                         | Univ. |
| Female                        | -0.033***<br>(0.002) | 0.153***<br>(0.002)  | -0.031***<br>(0.002) | 0.154***<br>(0.002)  | -0.002          | -0.001 | 94                            | 101   |
| Parental Income (\$25-50,000) |                      |                      |                      |                      |                 |        |                               |       |
| <\$25,000                     | -0.064***<br>(0.003) | -0.038***<br>(0.003) | -0.065***<br>(0.003) | -0.029***<br>(0.003) | 0.001           | -0.008 | 101                           | 78    |
| \$50-75,000                   | 0.017***<br>(0.003)  | 0.060***<br>(0.003)  | 0.020***<br>(0.003)  | 0.048***<br>(0.003)  | -0.003          | 0.012  | 119                           | 81    |
| \$75-100,000                  | -0.013***<br>(0.003) | 0.177***<br>(0.003)  | -0.004<br>(0.003)    | 0.153***<br>(0.003)  | -0.010          | 0.024  | 27                            | 87    |
| >\$100,000                    | -0.105***<br>(0.002) | 0.324***<br>(0.003)  | -0.093***<br>(0.003) | 0.298***<br>(0.003)  | -0.012          | 0.026  | 88                            | 92    |
| Area Size (Medium City)       |                      |                      |                      |                      |                 |        |                               |       |
| Large City                    | -0.061***<br>(0.003) | 0.116***<br>(0.004)  | -0.054***<br>(0.003) | 0.100***<br>(0.004)  | -0.007          | 0.016  | 89                            | 86    |
| Town                          | 0.008*<br>(0.005)    | -0.013***<br>(0.005) | 0.005<br>(0.005)     | -0.012**<br>(0.005)  | 0.003           | -0.001 | 65                            | 89    |
| Rural                         | 0.015***<br>(0.005)  | -0.041***<br>(0.005) | 0.013***<br>(0.005)  | -0.030***<br>(0.004) | 0.002           | -0.010 | 89                            | 75    |
| Lone-Parent Family            | -0.003<br>(0.003)    | -0.149***<br>(0.002) | 0.011***<br>(0.003)  | -0.061***<br>(0.003) | ‡               | -0.088 | ‡                             | 41    |
| Official Lang. Min.           | 0.065***<br>(0.009)  | -0.022**<br>(0.010)  | 0.055***<br>(0.010)  | -0.014<br>(0.009)    | 0.011           | -0.009 | 84                            | 61    |

Notes: Average marginal effects are shown. College and University are compared against the base (No PSE) outcome. Regressions are calculated together with a Private College outcome, the results for which are omitted from this table (sample sizes are relatively small). Standard errors in brackets. \*\*\* p<0.01 \*\* p<0.05 \* p<0.1. Omitted categories in parenthesis. The "separate" columns report the results of five separate regressions, each run with a group variable included by itself. Cohort dummy variables were included in each separate regression; their average marginal effects varied depending on which variable was also included. The "joint" columns report the results when all variables are included together. The "absolute change" columns give the differences in average marginal effects between the separate regressions and the joint regression for each variable. The "remaining relative effect" represents the effect in the jointly regression as compared to the effect in the separate regressions.

‡ The "absolute change" and "remaining relative effect" numbers are not displayed unless p<0.05.

For further information about this table, please see the text.

The next set of columns, labelled “joint,” represents the results (average marginal effects) obtained from one single model that includes all the indicator variables for the groups of interest treated together (the basic cohort controls are again included). Differences in the two sets of results – i.e., “separate” versus “joint” – reflect the correlations of the independent factors that we consider and how taking account of these correlations changes the findings for each specific variable.

The third and fourth sets of columns summarize the differences between the two sets of models. The first of these represents the absolute change in the estimated average marginal effects between the separate and joint models. The final set of columns indicates what proportion of the effect found in the separate models remains when the other influences are considered: the higher the proportion, the more the effect is robust to adding in the additional effects.

As becomes clear, females are again seen to access university in Ontario at a far higher rate (15.3 percentage points on average over the entire period) than males in our separate model. This effect is maintained (in fact, very slightly increased) in our joint estimate model (15.4 per cent higher access rates). In other words, even when we take all the other factors into account, the female advantage remains completely stable. This makes this variable unique in our regression model, as all other variables are at least partly diminished in the joint model when measuring university access. In comparison, females are less likely than males to enroll in college: the female disadvantage in enrollment is estimated to be 3.3 percentage points in our separate model, but this is far less pronounced than the female university access advantage. Moreover, the college effect softens to 3.1 percentage points in our joint model.

We see large overall differences in PSE access, especially university access, when we turn to our categorical income variable. Here the reference group is the \$25,000-50,000 category. Given our descriptive results, it is not surprising that university attendance is 3.8 percentage points lower in the lowest parental category (less than \$25,000) than our reference group in the separate model. Although still highly significant, this gap shrinks to a slightly lower 2.9 percentage point disadvantage for our lowest parental income category in the joint model.

Conversely, individuals whose parents earn between \$50,000 and 75,000 are six percentage points more likely to attend university in our separate estimation, with the effect reduced to 4.8 percentage points in our joint estimation. Our second highest parental income category (\$75,000-100,000) continues this pattern: individuals from this category are 17.7 percentage points more likely to attend university than our reference group in the separate model, with the effect slightly lessened (to 15.3 percentage points) in our joint model. Individuals from the highest parental income category (over \$100,000) are far more likely (32.4 percentage points) to attend university than our reference group in our separate model. This large access advantage is slightly diminished, to 29.8 percentage points, in our joint model.

In comparison, the college results follow a less clear-cut pattern with respect to family, as anticipated and as is generally found in research in this area, for the reasons explained above.

While the income effects reported here are the clearest predictors of PSE access, it is once again important to emphasize that recent research (e.g., Finnie & Mueller, 2008a; 2008b, as well as Finnie et al., 2011a; 2011b for Ontario specifically) has indicated that this income effect is to a large degree capturing the effects of parental education. As we do not have information on parental education in the LAD, we must consider income as capturing both income and parental education effects, and probably more the latter than the former.

When considering area size of residence in these models, our omitted group includes the individuals from medium-sized cities in our regression framework in both the separate and joint models. As becomes clear, large city dwellers are far more likely (by 11.6 percentage points) than medium city dwellers to attend university. The advantage shrinks in the joint estimate, but only slightly, to ten percentage points.

In comparison, individuals from towns are 1.3 percentage points (1.2 percentage points in the joint model) less likely to enroll in a university than the reference group. Those from rural areas are 4.1 percentage points less likely than the reference group to attend university in the separate model, although the effect is reduced to three percentage points in our joint model. These results therefore point to a considerable gap in university attendance between residents of rural and town areas on the one hand and large cities on the other. The college results tend to follow a reverse pattern.

Youth from single-parent families, often thought to be a substantially disadvantaged group, are in fact 14.9 percentage points less likely (on average) to attend university than those from two-parent families in our separate model. However, this university disadvantage shrinks to 6.1 per cent when we take other factors into account, only 41 per cent of the original effect. In other words, a large part of the effect of family type appears to be related to the other characteristics of the students (as captured by the other variables included in the “joint” model), although the difference in attendance between two-parent and single-parent families remains considerable. The separate model demonstrates no significant difference in college attendance between the two family types. However, children from single-parent families are slightly more likely (1.1 percentage points) to attend college in the joint model, where the effect also becomes statistically significant.

Official language minorities in Ontario (i.e., Francophones) – introduced to the analysis at this point – are 2.2 percentage points less likely to attend university than Anglophones in our separate estimates. However, the negative marginal effects are smaller and not statistically significant in the joint estimation. In comparison, the college access rates of Francophones are considerably higher than those of Anglophones in both the separate (6.5 percentage points) and the joint model (5.5 percentage points).

Turning our attention briefly to Table 5b, we see that the linear estimation model produces very similar results for most variables, as would be expected. The linear parental income offers an alternative insight to the set of categorical income variables seen above. In our separate model, every \$10,000 of parental income increases the university enrollment rate by 2.7 percentage points, with the effect diminishing slightly to 2.3 percentage points in our joint model. In comparison, there is little discernible effect between parental income and college attendance. Again we must assume that a large share of this effect is actually capturing parental education effects, but the joint effect is interesting, because they represent broadly similar sets of advantages with respect to family background.

**Table 5b: Multinomial Estimates of Access to College and University, Separate and Joint Estimates (Linear Income), Ontario**

|                              | Separate             |                      | Joint                |                      | Absolute Change |        | Remaining Relative Effect (%) |       |
|------------------------------|----------------------|----------------------|----------------------|----------------------|-----------------|--------|-------------------------------|-------|
|                              | Coll.                | Univ.                | Coll.                | Univ.                | Coll.           | Univ.  | Coll.                         | Univ. |
| Female                       | -0.033***<br>(0.002) | 0.153***<br>(0.002)  | -0.031***<br>(0.002) | 0.154***<br>(0.002)  | -0.001          | -0.001 | 96                            | 101   |
| Parental Income in \$10,000s | 0.001*<br>(0.000)    | 0.027***<br>(0.001)  | 0.001***<br>(0.000)  | 0.023***<br>(0.001)  | ‡               | 0.004  | ‡                             | 84    |
| Area Size (Medium City)      |                      |                      |                      |                      |                 |        |                               |       |
| Large City                   | -0.061***<br>(0.003) | 0.116***<br>(0.004)  | -0.056***<br>(0.003) | 0.103***<br>(0.004)  | -0.004          | 0.013  | 93                            | 89    |
| Town                         | 0.008*<br>(0.005)    | -0.013***<br>(0.005) | 0.007<br>(0.005)     | -0.013***<br>(0.005) | ‡               | 0.000  | ‡                             | 100   |
| Rural                        | 0.015***<br>(0.005)  | -0.041***<br>(0.005) | 0.014***<br>(0.005)  | -0.033***<br>(0.004) | 0.001           | -0.008 | 95                            | 81    |
| Lone-Parent Family           | -0.003<br>(0.003)    | -0.149***<br>(0.002) | 0.004<br>(0.003)     | -0.069***<br>(0.003) | ‡               | -0.080 | ‡                             | 46    |
| Official Lang. Min.          | 0.065***<br>(0.009)  | -0.022**<br>(0.010)  | 0.053***<br>(0.010)  | -0.009<br>(0.009)    | 0.012           | -0.013 | 81                            | 42    |

Notes: Average marginal effects are shown. College and University are compared against the base (No PSE) outcome. Regressions are calculated together with a Private College outcome, the results for which are omitted from this table (sample sizes are relatively small). Standard errors in brackets. \*\*\* p<0.01 \*\* p<0.05 \* p<0.1. Omitted categories in parenthesis. The "separate" columns report the results of five separate regressions, each run with a group variable included by itself. Cohort dummy variables were included in each separate regression; their average marginal effects varied depending on which variable was also included. The "joint" columns report the results when all variables are included together. The "absolute change" columns give the differences in average marginal effects between the separate regressions and the joint regression for each variable. The "remaining relative effect" represents the effect in the jointly regression as compared to the effect in the separate regressions.

‡ The "absolute change" and "remaining relative effect" numbers are not displayed unless p<0.05.

For further information about this table, please see the text.

In summary, these results illustrate some important "gross" and "net" gaps in PSE attendance across various family background characteristics. The differences are greatest for university participation, while in most cases these are offset partly by differences in the opposite direction in college rates. We now turn to comparison estimates between Ontario and the ROC.

## Ontario/ROC Comparisons

Table 6 presents the comparison between Ontario and ROC joint models with both categorical and linear parental income specifications. In addition, a “later part of the period” (2005-2008) interaction is added for each set of explanatory variables in order to capture shifts in their effects on access over the period covered. Essentially, the explanatory variables on their own represent the effects for the earlier half of the total period, the “later” interactions represent the change from these effects for the second part of the period, and the total of these represent the “total” effects which capture the full magnitude of the later period effects. We focus mostly on the first estimates, while noting the more significant changes that are found. We also included provincial dummy variables as controls, but do not report them.<sup>28</sup>

**Table 6: Multinomial Estimates of Access to College and University, Categorical and Linear Income with Time Interactions, Ontario & ROC**

|                      | Ontario              |                     |                      |                     | ROC                  |                      |                      |                      |
|----------------------|----------------------|---------------------|----------------------|---------------------|----------------------|----------------------|----------------------|----------------------|
|                      | Categorical Income   |                     | Linear Income        |                     | Categorical Income   |                      | Linear Income        |                      |
|                      | Coll.                | Univ.               | Coll.                | Univ.               | Coll.                | Univ.                | Coll.                | Univ.                |
| Calendar Year (2001) |                      |                     |                      |                     |                      |                      |                      |                      |
| 2002                 | -0.004<br>(0.004)    | 0.007<br>(0.004)    | -0.005<br>(0.004)    | 0.007*<br>(0.004)   | 0.016***<br>(0.002)  | -0.005***<br>(0.001) | 0.011***<br>(0.003)  | -0.004<br>(0.004)    |
| 2003                 | -0.008*<br>(0.004)   | 0.009**<br>(0.004)  | -0.009**<br>(0.004)  | 0.011***<br>(0.004) | 0.033***<br>(0.002)  | -0.029***<br>(0.001) | 0.012***<br>(0.003)  | -0.010***<br>(0.004) |
| 2004                 | -0.009**<br>(0.004)  | 0.003<br>(0.004)    | -0.012***<br>(0.004) | 0.007*<br>(0.004)   | 0.037***<br>(0.002)  | -0.039***<br>(0.001) | 0.012***<br>(0.003)  | -0.026***<br>(0.004) |
| 2005                 | -0.021**<br>(0.008)  | -0.009<br>(0.009)   | -0.017*<br>(0.010)   | 0.021*<br>(0.011)   | 0.031***<br>(0.003)  | -0.040***<br>(0.003) | 0.006<br>(0.008)     | 0.002<br>(0.011)     |
| 2006                 | -0.022***<br>(0.008) | -0.015*<br>(0.009)  | -0.018*<br>(0.010)   | 0.016<br>(0.012)    | 0.034***<br>(0.003)  | -0.049***<br>(0.003) | 0.006<br>(0.008)     | -0.002<br>(0.011)    |
| 2007                 | -0.034***<br>(0.008) | 0.000<br>(0.009)    | -0.031***<br>(0.010) | 0.033***<br>(0.012) | 0.035***<br>(0.003)  | -0.052***<br>(0.003) | 0.007<br>(0.008)     | -0.006<br>(0.012)    |
| 2008                 | -0.033***<br>(0.008) | 0.007<br>(0.009)    | -0.032***<br>(0.010) | 0.041***<br>(0.012) | 0.033***<br>(0.003)  | -0.050***<br>(0.003) | 0.004<br>(0.008)     | -0.009<br>(0.012)    |
| Female               | -0.024***<br>(0.003) | 0.151***<br>(0.003) | -0.027***<br>(0.003) | 0.149***<br>(0.003) | -0.023***<br>(0.002) | 0.160***<br>(0.003)  | -0.023***<br>(0.002) | 0.160***<br>(0.003)  |
| 2005-2008            | -0.009**<br>(0.004)  | 0.010**<br>(0.004)  | -0.010**<br>(0.004)  | 0.008**<br>(0.004)  | -0.007**<br>(0.003)  | 0.015***<br>(0.004)  | -0.007***<br>(0.003) | 0.014***<br>(0.004)  |

<sup>28</sup> Once again we also include (and show) a set of cohort dummies, which capture overall trends in access rates after taking into account the influences of the variables included in the analysis, but these are not discussed because the overall changes over time covered in the descriptive section are more interesting in terms of capturing overall trends over time.

|                               | Ontario            |           |               |           | ROC                |           |               |           |
|-------------------------------|--------------------|-----------|---------------|-----------|--------------------|-----------|---------------|-----------|
|                               | Categorical Income |           | Linear Income |           | Categorical Income |           | Linear Income |           |
|                               | Coll.              | Univ.     | Coll.         | Univ.     | Coll.              | Univ.     | Coll.         | Univ.     |
| Parental Income (\$25-50,000) |                    |           |               |           |                    |           |               |           |
| <\$25,000                     | -0.063***          | -0.029*** |               |           | -0.051***          | -0.094*** |               |           |
|                               | (0.004)            | (0.005)   |               |           | (0.003)            | (0.003)   |               |           |
| 2005-2008                     | -0.001             | -0.003    |               |           | -0.008             | 0.003     |               |           |
|                               | (0.007)            | (0.007)   |               |           | (0.005)            | (0.007)   |               |           |
| \$50-75,000                   | 0.018***           | 0.056***  |               |           | 0.000              | 0.142***  |               |           |
|                               | (0.004)            | (0.004)   |               |           | (0.003)            | (0.004)   |               |           |
| 2005-2008                     | 0.003              | -0.013**  |               |           | 0.006              | -0.019*** |               |           |
|                               | (0.005)            | (0.005)   |               |           | (0.004)            | (0.005)   |               |           |
| \$75-100,000                  | -0.012***          | 0.168***  |               |           | -0.039***          | 0.270***  |               |           |
|                               | (0.004)            | (0.005)   |               |           | (0.004)            | (0.005)   |               |           |
| 2005-2008                     | 0.016**            | -0.023*** |               |           | 0.016***           | -0.018*** |               |           |
|                               | (0.006)            | (0.006)   |               |           | (0.005)            | (0.006)   |               |           |
| >\$100,000                    | -0.107***          | 0.320***  |               |           | -0.088***          | 0.363***  |               |           |
|                               | (0.004)            | (0.005)   |               |           | (0.004)            | (0.006)   |               |           |
| 2005-2008                     | 0.039***           | -0.037*** |               |           | 0.023***           | -0.012    |               |           |
|                               | (0.008)            | (0.007)   |               |           | (0.008)            | (0.009)   |               |           |
| Parental Income in 10,000s    |                    |           | 0.002**       | 0.026***  |                    |           | 0.003***      | 0.042***  |
|                               |                    |           | (0.001)       | (0.001)   |                    |           | (0.001)       | (0.001)   |
| 2005-2008                     |                    |           | -0.000        | -0.005*** |                    |           | 0.001         | -0.005*** |
|                               |                    |           | (0.001)       | (0.001)   |                    |           | (0.001)       | (0.001)   |
| Area Size (Medium City)       |                    |           |               |           |                    |           |               |           |
| Large City                    | -0.046***          | 0.084***  | -0.051***     | 0.089***  | -0.025***          | 0.036***  | -0.026***     | 0.037***  |
|                               | (0.005)            | (0.006)   | (0.005)       | (0.006)   | (0.003)            | (0.005)   | (0.003)       | (0.005)   |
| 2005-2008                     | -0.010             | 0.029***  | -0.009        | 0.026***  | 0.009              | -0.015**  | 0.009*        | -0.016**  |
|                               | (0.007)            | (0.008)   | (0.007)       | (0.008)   | (0.005)            | (0.007)   | (0.005)       | (0.007)   |
| Town                          | 0.007              | -0.023*** | 0.009         | -0.023*** | 0.006              | -0.012**  | 0.007         | -0.013**  |
|                               | (0.007)            | (0.007)   | (0.007)       | (0.007)   | (0.005)            | (0.006)   | (0.005)       | (0.006)   |
| 2005-2008                     | -0.005             | 0.021**   | -0.005        | 0.019*    | 0.007              | -0.018**  | 0.008         | -0.019**  |
|                               | (0.009)            | (0.010)   | (0.009)       | (0.010)   | (0.006)            | (0.008)   | (0.006)       | (0.008)   |
| Rural                         | 0.009              | -0.035*** | 0.010         | -0.035*** | 0.019***           | -0.033*** | 0.021***      | -0.038*** |
|                               | (0.007)            | (0.007)   | (0.007)       | (0.007)   | (0.004)            | (0.005)   | (0.005)       | (0.005)   |
| 2005-2008                     | 0.007              | 0.006     | 0.008         | 0.003     | 0.001              | -0.012    | 0.001         | -0.014*   |
|                               | (0.009)            | (0.010)   | (0.010)       | (0.010)   | (0.006)            | (0.008)   | (0.006)       | (0.008)   |

|                     | Ontario            |           |               |           | ROC                |           |               |           |
|---------------------|--------------------|-----------|---------------|-----------|--------------------|-----------|---------------|-----------|
|                     | Categorical Income |           | Linear Income |           | Categorical Income |           | Linear Income |           |
|                     | Coll.              | Univ.     | Coll.         | Univ.     | Coll.              | Univ.     | Coll.         | Univ.     |
| Lone-Parent Family  | 0.012***           | -0.060*** | 0.007         | -0.061*** | -0.016***          | 0.000     | -0.017***     | -0.012*** |
|                     | (0.004)            | (0.004)   | (0.004)       | (0.004)   | (0.003)            | (0.004)   | (0.003)       | (0.005)   |
| 2005-2008           | -0.002             | -0.004    | -0.003        | -0.015**  | 0.002              | -0.012**  | 0.002         | -0.016**  |
|                     | (0.006)            | (0.006)   | (0.006)       | (0.007)   | (0.004)            | (0.006)   | (0.005)       | (0.006)   |
| Official Lang. Min. | 0.037***           | -0.005    | 0.033**       | -0.000    | -0.084***          | 0.078***  | -0.085***     | 0.074***  |
|                     | (0.013)            | (0.013)   | (0.013)       | (0.013)   | (0.003)            | (0.006)   | (0.003)       | (0.006)   |
| 2005-2008           | 0.031*             | -0.013    | 0.037**       | -0.017    | 0.004              | -0.029*** | 0.005         | -0.033*** |
|                     | (0.018)            | (0.018)   | (0.019)       | (0.018)   | (0.006)            | (0.007)   | (0.006)       | (0.007)   |

Notes: Average marginal effects are shown. College and University are compared against the base (No PSE) outcome. Regressions are calculated together with a Private College outcome, the results for which are omitted from this table (sample sizes are relatively small). Calculations also include provincial variable dummies, which are also not shown in the table (in order to clearly highlight the differences between Ontario and ROC). Standard errors in brackets. \*\*\* p<0.01 \*\* p<0.05 \* p<0.1. Omitted categories in parenthesis. For further information about this table, please see the text.

Females in both Ontario and the ROC have significantly higher rates (roughly 15 percentage points in Ontario and 16 percentage points in ROC) of access to university than males in both the categorical and linear models. Both increased in the range of about one percentage point in the later period (0.8 per cent for Ontario and 1.4 per cent in the ROC). College access rates – again we repeat our caveats regarding the college results – are estimated to be between two and three percentage points lower for females in both regions.

Reflecting what was seen in the raw data captured in the earlier analysis based on simple graphical presentations, parental income effects on university access rates are even more pronounced in the ROC than in Ontario. For example, when compared to our reference group (\$25,000-50,000), individuals from Ontario in the lowest parental income category (less than \$25,000) are 2.9 percentage points less likely to attend university, whereas individuals from the ROC in the same category are 9.4 percentage points less likely to attend. At the other extreme, those from Ontario in the highest parental category are 32 percentage points more likely to attend university compared to our reference group, whereas the difference is 36.3 percentage points in the ROC.

The linear income estimation captures this overall set of results nicely; every \$10,000 increases university attendance by 2.6 percentage points in Ontario, but this effect increases to 4.2 percentage points in the ROC. These would seem to reflect substantial differences in the effects of our key background measure – family income, which (again) captures both income effects *per se* and the parental education effects with which income is correlated – in Ontario and the ROC. That said, in both Ontario and the ROC the effects of family income decline about half a percentage point per \$10,000 in the later period.

The area size of residence variables also reveals some differences between Ontario and the ROC. The large city advantage, when compared to our reference group, is substantially larger in Ontario (8.4 percentage points) than in the ROC (3.6 percentage points), while the differences for the other area sizes are more similar. The large city advantage increased in Ontario over time, whereas it decreased in the ROC, as it did for rural areas as well.

Single-parent family access rates also differ considerably between the two regions. Individuals from single-parent families are approximately six percentage points less likely to access university in Ontario than those from two-parent families (see the two models). In the ROC, the single-parent access disadvantage is estimated to be either zero or fairly marginal, depending on the parental income specification, but the disadvantage seemed to grow a bit in both regions in the later period.

Official language minorities in Ontario (i.e., Francophones by our definition) attend university at about the same rate as do non-minorities, though their college rates are, on average, over three percentage points higher in both the categorical and linear income models. In comparison, the official language minorities in Quebec (the only other province where this variable is defined, representing Anglophones there) attend university at a considerably greater rate (7.8 percentage points) than non-minorities and access college at a far lower rate – although this advantage seems to have fallen over time.

### Male-Female Comparisons

So far we have presented results for males and females pooled together in one model, while allowing for overall differences in access rates for males and females with the single shift variable representing the individual's sex. In this section, results are presented separately for females and males in order to identify any differences by sex in the underlying access patterns. We touch on these results only briefly, since the focus of this paper is not gender differences in access, which is left for another analysis, and leave the more detailed results for interested readers to peruse. We show only the categorical income specification, but the linear parental income effects from that model are also shown, while the full results for the linear income variable are available in Appendix B, Table 7.



**Table 7: Multinomial Estimates of Access to College and University, by Sex (Categorical Income), Ontario & ROC**

|                               | Ontario   |           |           |           | ROC       |           |           |           |
|-------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|                               | Male      |           | Female    |           | Male      |           | Female    |           |
|                               | Coll.     | Univ.     | Coll.     | Univ.     | Coll.     | Univ.     | Coll.     | Univ.     |
| Calendar Year (2001)          |           |           |           |           |           |           |           |           |
| 2002                          | -0.001    | -0.000    | -0.008    | 0.014**   | 0.014***  | -0.014*** | 0.009**   | 0.003     |
|                               | (0.006)   | (0.005)   | (0.006)   | (0.006)   | (0.004)   | (0.005)   | (0.004)   | (0.006)   |
| 2003                          | 0.011*    | -0.000    | -0.027*** | 0.020***  | 0.015***  | -0.025*** | 0.011**   | -0.000    |
|                               | (0.006)   | (0.005)   | (0.006)   | (0.006)   | (0.004)   | (0.005)   | (0.004)   | (0.006)   |
| 2004                          | 0.010*    | -0.009    | -0.030*** | 0.017***  | 0.023***  | -0.047*** | 0.003     | -0.014**  |
|                               | (0.006)   | (0.005)   | (0.006)   | (0.006)   | (0.004)   | (0.005)   | (0.004)   | (0.006)   |
| 2005                          | -0.019    | -0.012    | -0.035*** | 0.006     | 0.006     | -0.025**  | 0.004     | 0.001     |
|                               | (0.011)   | (0.012)   | (0.012)   | (0.013)   | (0.008)   | (0.011)   | (0.008)   | (0.012)   |
| 2006                          | -0.015    | -0.026**  | -0.040*** | 0.010     | 0.007     | -0.029*** | 0.003     | -0.005    |
|                               | (0.011)   | (0.012)   | (0.011)   | (0.013)   | (0.008)   | (0.011)   | (0.008)   | (0.011)   |
| 2007                          | -0.030*** | -0.006    | -0.048*** | 0.019     | 0.007     | -0.027**  | 0.007     | -0.016    |
|                               | (0.011)   | (0.012)   | (0.011)   | (0.013)   | (0.008)   | (0.011)   | (0.009)   | (0.012)   |
| 2008                          | -0.021*   | -0.006    | -0.058*** | 0.033***  | 0.010     | -0.040*** | -0.000    | -0.012    |
|                               | (0.011)   | (0.012)   | (0.011)   | (0.013)   | (0.008)   | (0.011)   | (0.008)   | (0.012)   |
| Parental Income (\$25-50,000) |           |           |           |           |           |           |           |           |
| <\$25,000                     | -0.061*** | -0.001    | -0.067*** | -0.061*** | -0.062*** | -0.071*** | -0.039*** | -0.119*** |
|                               | (0.006)   | (0.006)   | (0.006)   | (0.007)   | (0.004)   | (0.004)   | (0.005)   | (0.005)   |
| 2005-2008                     | -0.001    | -0.015    | -0.002    | 0.010     | -0.009    | 0.017     | -0.010    | -0.004    |
|                               | (0.010)   | (0.010)   | (0.010)   | (0.010)   | (0.007)   | (0.010)   | (0.007)   | (0.010)   |
| \$50-75,000                   | 0.036***  | 0.050***  | 0.000     | 0.063***  | 0.017***  | 0.136***  | -0.019*** | 0.152***  |
|                               | (0.005)   | (0.005)   | (0.005)   | (0.006)   | (0.004)   | (0.005)   | (0.004)   | (0.005)   |
| 2005-2008                     | 0.001     | -0.019*** | 0.006     | -0.008    | 0.009*    | -0.024*** | 0.003     | -0.015**  |
|                               | (0.007)   | (0.007)   | (0.007)   | (0.008)   | (0.005)   | (0.006)   | (0.005)   | (0.007)   |
| \$75-100,000                  | 0.030***  | 0.146***  | -0.056*** | 0.189***  | -0.010*   | 0.268***  | -0.072*** | 0.277***  |
|                               | (0.007)   | (0.007)   | (0.006)   | (0.007)   | (0.005)   | (0.007)   | (0.005)   | (0.007)   |
| 2005-2008                     | 0.009     | -0.027*** | 0.024***  | -0.019**  | 0.016**   | -0.024*** | 0.018**   | -0.012    |
|                               | (0.009)   | (0.008)   | (0.009)   | (0.009)   | (0.007)   | (0.008)   | (0.008)   | (0.010)   |
| >\$100,000                    | -0.070*** | 0.319***  | -0.147*** | 0.319***  | -0.067*** | 0.395***  | -0.111*** | 0.335***  |
|                               | (0.006)   | (0.007)   | (0.005)   | (0.006)   | (0.006)   | (0.009)   | (0.006)   | (0.009)   |
| 2005-2008                     | 0.049***  | -0.037*** | 0.027**   | -0.038*** | 0.028**   | -0.024**  | 0.017     | 0.000     |
|                               | (0.011)   | (0.008)   | (0.011)   | (0.011)   | (0.012)   | (0.011)   | (0.012)   | (0.014)   |

|   | Ontario   |           |           |           | ROC       |           |           |           |
|---|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|   | Male      |           | Female    |           | Male      |           | Female    |           |
|   | Coll.     | Univ.     | Coll.     | Univ.     | Coll.     | Univ.     | Coll.     | Univ.     |
| Parental Income in \$10,000s <sup>‡</sup> | 0.006***  | 0.023***  | -0.004*** | 0.031***  | 0.007***  | 0.040***  | -0.001    | 0.045***  |
|   | (0.001)   | (0.001)   | (0.001)   | (0.001)   | (0.001)   | (0.001)   | (0.002)   | (0.002)   |
| 2005-2008                                 | -0.001    | -0.005*** | -0.000    | -0.005*** | 0.001     | -0.006*** | 0.000     | -0.004    |
|   | (0.001)   | (0.002)   | (0.001)   | (0.002)   | (0.001)   | (0.002)   | (0.002)   | (0.002)   |
| Area Size (Medium City)                   |           |           |           |           |           |           |           |           |
| Large City                                | -0.039*** | 0.085***  | -0.055*** | 0.082***  | -0.028*** | 0.046***  | -0.022*** | 0.028***  |
|   | (0.007)   | (0.009)   | (0.006)   | (0.008)   | (0.005)   | (0.007)   | (0.005)   | (0.007)   |
| 2005-2008                                 | -0.009    | 0.035***  | -0.010    | 0.022**   | 0.007     | -0.015    | 0.011     | -0.016    |
|   | (0.010)   | (0.011)   | (0.010)   | (0.011)   | (0.007)   | (0.010)   | (0.008)   | (0.010)   |
| Town                                      | -0.004    | -0.025*** | 0.018*    | -0.020**  | 0.003     | -0.014*   | 0.009     | -0.010    |
|   | (0.010)   | (0.009)   | (0.010)   | (0.010)   | (0.006)   | (0.008)   | (0.007)   | (0.008)   |
| 2005-2008                                 | 0.005     | 0.021     | -0.014    | 0.018     | 0.010     | -0.022**  | 0.004     | -0.013    |
|   | (0.013)   | (0.014)   | (0.012)   | (0.014)   | (0.009)   | (0.011)   | (0.009)   | (0.012)   |
| Rural                                     | -0.003    | -0.041*** | 0.021**   | -0.027*** | 0.017***  | -0.044*** | 0.021***  | -0.022*** |
|   | (0.010)   | (0.008)   | (0.010)   | (0.010)   | (0.006)   | (0.007)   | (0.006)   | (0.008)   |
| 2005-2008                                 | 0.013     | 0.010     | 0.001     | 0.001     | 0.006     | -0.017    | -0.005    | -0.008    |
|   | (0.013)   | (0.014)   | (0.013)   | (0.014)   | (0.008)   | (0.011)   | (0.008)   | (0.011)   |
| Lone-Parent Family                        | -0.004    | -0.071*** | 0.029***  | -0.047*** | -0.015*** | -0.006    | -0.017*** | 0.008     |
|   | (0.006)   | (0.005)   | (0.006)   | (0.006)   | (0.004)   | (0.006)   | (0.004)   | (0.006)   |
| 2005-2008                                 | -0.004    | 0.003     | -0.001    | -0.010    | 0.001     | -0.011    | 0.003     | -0.013    |
|   | (0.008)   | (0.009)   | (0.008)   | (0.009)   | (0.006)   | (0.008)   | (0.006)   | (0.008)   |
| Official Lang. Min.                       | 0.066***  | -0.005    | 0.006     | -0.005    | -0.079*** | 0.105***  | -0.089*** | 0.051***  |
|   | (0.019)   | (0.018)   | (0.018)   | (0.019)   | (0.005)   | (0.008)   | (0.005)   | (0.009)   |
| 2005-2008                                 | -0.000    | -0.053**  | 0.055**   | 0.015     | -0.005    | -0.031*** | 0.014     | -0.027**  |
|   | (0.026)   | (0.026)   | (0.027)   | (0.027)   | (0.009)   | (0.010)   | (0.010)   | (0.011)   |

Notes: Average marginal effects are shown. College and University are compared against the base (No PSE) outcome. Regressions are calculated together with a Private College outcome, the results for which are omitted from this table (sample sizes are relatively small). Calculations also include provincial variable dummies, which are also not shown in the table (in order to clearly highlight the differences between Ontario and ROC). Standard errors in brackets. \*\*\* p<0.01 \*\* p<0.05 \* p<0.1. ‡ Linear Parental Income is not a part of this model and is presented here for ease of comparison between categorical and linear parental incomes. The full model equivalent to the one presented above but which substitutes linear parental income for categorical parental income can be found in appendix table A-7. Omitted categories in parenthesis. For further information about this table, please see the text.

Perhaps the most striking result is how females from lower income families are at a significantly greater disadvantage in terms of university access than their male counterparts in both Ontario and the ROC. (This is also reflected in the larger coefficient on the linear income variable in the alternative specification.) The area size effects for Ontario are roughly similar for males and females, while rural and lone-parent females appear to be less disadvantaged than males in similar situations.

## Ontario Regional Comparisons

Table 8 presents our estimation results for each of the four regions of Ontario. These are shown for the categorical parental income specification, but the linear income effects from the alternative specification are also again shown (with the full results of those models found in Appendix B Table 8). We run only the joint model for individual regions, as we are mostly interested in how they compare to each other.

**Table 8: Multinomial Estimates of Access to College and University, by Ontario Region (Categorical Income)**

|                               | North Ontario |           | South Ontario |           | Central Ontario |           | East Ontario |           |
|-------------------------------|---------------|-----------|---------------|-----------|-----------------|-----------|--------------|-----------|
|                               | Coll.         | Univ.     | Coll.         | Univ.     | Coll.           | Univ.     | Coll.        | Univ.     |
| Calendar Year (2001)          |               |           |               |           |                 |           |              |           |
| 2002                          | 0.000         | 0.002     | 0.004         | 0.004     | -0.009          | 0.012**   | -0.008       | -0.004    |
|                               | (0.014)       | (0.014)   | (0.008)       | (0.009)   | (0.006)         | (0.006)   | (0.011)      | (0.010)   |
| 2003                          | 0.009         | 0.010     | -0.002        | 0.005     | -0.012**        | 0.016***  | -0.013       | -0.005    |
|                               | (0.014)       | (0.014)   | (0.008)       | (0.008)   | (0.006)         | (0.006)   | (0.011)      | (0.010)   |
| 2004                          | -0.009        | -0.002    | -0.007        | 0.004     | -0.012**        | 0.011*    | -0.007       | -0.020**  |
|                               | (0.014)       | (0.014)   | (0.008)       | (0.008)   | (0.006)         | (0.005)   | (0.011)      | (0.010)   |
| 2005                          | 0.046*        | -0.050**  | -0.011        | -0.037**  | -0.106***       | 0.041     | -0.061***    | 0.012     |
|                               | (0.025)       | (0.024)   | (0.015)       | (0.015)   | (0.022)         | (0.027)   | (0.018)      | (0.020)   |
| 2006                          | 0.072***      | -0.079*** | -0.023        | -0.045*** | -0.109***       | 0.039     | -0.048***    | 0.007     |
|                               | (0.026)       | (0.023)   | (0.015)       | (0.015)   | (0.022)         | (0.027)   | (0.018)      | (0.020)   |
| 2007                          | 0.036         | -0.070*** | -0.023        | -0.036**  | -0.119***       | 0.057**   | -0.066***    | 0.019     |
|                               | (0.025)       | (0.023)   | (0.015)       | (0.015)   | (0.021)         | (0.028)   | (0.018)      | (0.020)   |
| 2008                          | 0.037         | -0.073*** | -0.010        | -0.031**  | -0.121***       | 0.067**   | -0.070***    | 0.017     |
|                               | (0.026)       | (0.023)   | (0.015)       | (0.016)   | (0.021)         | (0.028)   | (0.018)      | (0.020)   |
| Female                        | -0.008        | 0.148***  | -0.022***     | 0.165***  | -0.022***       | 0.144***  | -0.036***    | 0.161***  |
|                               | (0.010)       | (0.011)   | (0.005)       | (0.006)   | (0.003)         | (0.004)   | (0.007)      | (0.008)   |
| 2005-2008                     | -0.045***     | 0.031**   | -0.018**      | 0.020**   | -0.007          | 0.010*    | 0.015        | -0.010    |
|                               | (0.014)       | (0.014)   | (0.008)       | (0.008)   | (0.005)         | (0.005)   | (0.010)      | (0.010)   |
| Parental Income (\$25-50,000) |               |           |               |           |                 |           |              |           |
| <\$25,000                     | -0.093***     | -0.071*** | -0.080***     | -0.046*** | -0.053***       | -0.020*** | -0.064***    | -0.066*** |
|                               | (0.016)       | (0.015)   | (0.009)       | (0.010)   | (0.005)         | (0.006)   | (0.012)      | (0.011)   |
| 2005-2008                     | 0.029         | -0.076*** | 0.014         | 0.009     | -0.007          | -0.008    | -0.003       | 0.013     |
|                               | (0.031)       | (0.029)   | (0.017)       | (0.018)   | (0.009)         | (0.009)   | (0.019)      | (0.021)   |
| \$50-75,000                   | 0.031**       | 0.079***  | 0.015**       | 0.081***  | 0.021***        | 0.041***  | -0.004       | 0.089***  |
|                               | (0.014)       | (0.014)   | (0.008)       | (0.008)   | (0.005)         | (0.005)   | (0.010)      | (0.011)   |
| 2005-2008                     | -0.004        | 0.022     | 0.006         | -0.007    | -0.007          | -0.012*   | 0.024*       | -0.026*   |
|                               | (0.019)       | (0.020)   | (0.011)       | (0.011)   | (0.007)         | (0.007)   | (0.014)      | (0.013)   |

|                               | North Ontario        |                      | South Ontario        |                      | Central Ontario      |                      | East Ontario         |                      |
|-------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
|                               | Coll.                | Univ.                | Coll.                | Univ.                | Coll.                | Univ.                | Coll.                | Univ.                |
| \$75-100,000                  | -0.006<br>(0.017)    | 0.191***<br>(0.017)  | 0.008<br>(0.009)     | 0.182***<br>(0.010)  | -0.017***<br>(0.006) | 0.159***<br>(0.007)  | -0.044***<br>(0.011) | 0.206***<br>(0.012)  |
| 2005-2008                     | 0.004<br>(0.023)     | 0.015<br>(0.022)     | 0.007<br>(0.013)     | 0.010<br>(0.013)     | 0.016*<br>(0.009)    | -0.039***<br>(0.008) | 0.020<br>(0.016)     | -0.018<br>(0.015)    |
| >\$100,000                    | -0.108***<br>(0.018) | 0.354***<br>(0.020)  | -0.069***<br>(0.009) | 0.336***<br>(0.011)  | -0.105***<br>(0.005) | 0.305***<br>(0.006)  | -0.163***<br>(0.009) | 0.363***<br>(0.012)  |
| 2005-2008                     | 0.029<br>(0.033)     | 0.016<br>(0.028)     | 0.008<br>(0.016)     | -0.003<br>(0.014)    | 0.031***<br>(0.010)  | -0.044***<br>(0.009) | 0.096***<br>(0.022)  | -0.059***<br>(0.016) |
| Parental Income in \$10,000s† | 0.009***<br>(0.002)  | 0.037***<br>(0.002)  | 0.006***<br>(0.001)  | 0.032***<br>(0.001)  | 0.000<br>(0.001)     | 0.023***<br>(0.001)  | -0.001<br>(0.002)    | 0.034***<br>(0.002)  |
| 2005-2008                     | -0.002<br>(0.003)    | 0.001<br>(0.003)     | -0.003*<br>(0.002)   | -0.005**<br>(0.002)  | -0.000<br>(0.001)    | -0.006***<br>(0.002) | 0.002<br>(0.002)     | -0.005**<br>(0.002)  |
| Area Size (Medium City)       |                      |                      |                      |                      |                      |                      |                      |                      |
| Large City                    | 0.044***<br>(0.014)  | -0.022*<br>(0.013)   | -0.024***<br>(0.009) | 0.022**<br>(0.009)   | -0.052***<br>(0.014) | 0.098***<br>(0.020)  | -0.059***<br>(0.010) | 0.111***<br>(0.012)  |
| 2005-2008                     | -0.058***<br>(0.018) | 0.044**<br>(0.019)   | -0.000<br>(0.012)    | 0.034***<br>(0.013)  | 0.078***<br>(0.027)  | -0.019<br>(0.026)    | 0.011<br>(0.015)     | -0.005<br>(0.015)    |
| Town                          | 0.054***<br>(0.016)  | -0.077***<br>(0.013) | 0.007<br>(0.011)     | -0.022**<br>(0.010)  | -0.020<br>(0.021)    | -0.020<br>(0.023)    | -0.010<br>(0.014)    | 0.024*<br>(0.013)    |
| 2005-2008                     | -0.051**<br>(0.021)  | 0.025<br>(0.021)     | 0.003<br>(0.014)     | 0.023<br>(0.015)     | 0.071**<br>(0.032)   | 0.026<br>(0.034)     | 0.017<br>(0.019)     | -0.025<br>(0.019)    |
| Rural                         | 0.019<br>(0.015)     | -0.088***<br>(0.013) | 0.016<br>(0.011)     | -0.027**<br>(0.011)  | 0.005<br>(0.021)     | -0.025<br>(0.021)    | -0.008<br>(0.014)    | 0.010<br>(0.013)     |
| 2005-2008                     | -0.028<br>(0.021)    | 0.013<br>(0.021)     | 0.006<br>(0.015)     | 0.011<br>(0.015)     | 0.073**<br>(0.031)   | -0.019<br>(0.031)    | 0.025<br>(0.018)     | -0.017<br>(0.018)    |
| Lone-Parent Family            | 0.034**<br>(0.017)   | -0.045***<br>(0.016) | 0.009<br>(0.009)     | -0.017*<br>(0.009)   | 0.011**<br>(0.005)   | -0.078***<br>(0.005) | -0.004<br>(0.011)    | -0.027**<br>(0.011)  |
| 2005-2008                     | -0.035<br>(0.021)    | 0.076***<br>(0.024)  | -0.022*<br>(0.012)   | -0.007<br>(0.013)    | 0.008<br>(0.008)     | -0.014*<br>(0.008)   | -0.009<br>(0.015)    | 0.020<br>(0.016)     |
| Official Lang. Min.           | 0.051<br>(0.031)     | 0.032<br>(0.029)     | -0.011<br>(0.107)    | 0.172<br>(0.107)     | -0.049<br>(0.043)    | 0.046<br>(0.051)     | 0.016<br>(0.016)     | -0.023<br>(0.016)    |
| 2005-2008                     | 0.027<br>(0.043)     | -0.044<br>(0.037)    | -0.288***<br>(0.002) | -0.355***<br>(0.002) | 0.117<br>(0.080)     | -0.117*<br>(0.060)   | 0.018<br>(0.023)     | 0.018<br>(0.023)     |

Notes: Average marginal effects are shown. College and University are compared against the base (No PSE) outcome. Regressions are calculated together with a Private College outcome, the results for which are omitted from this table (sample sizes are relatively small). Standard errors in brackets. \*\*\* p<0.01 \*\* p<0.05 \* p<0.1. † Linear Parental Income is not a part of this model and is presented here for ease of comparison between categorical and linear parental incomes. The full model equivalent to the one presented above but which substitutes linear parental income for categorical parental income can be found in appendix table A-8. Omitted categories in parenthesis. For further information about this table, please see the text.

Unsurprisingly, the female university advantage that we see in the overall Ontario model and as we saw in the descriptive results by region remains robust in each region. Furthermore, with the exception of East Ontario, female access rates increase in the latter years, especially in North Ontario. The data also again show how females again enter college less often than males in all regions.

Regional differences also exist in the parental income results. For example, for the lowest income bracket (compared to the reference group) the university access penalty is 7.1, 4.6 and 6.6 percentage points for North, South and East Ontario respectively, but only two percentage points in Central Ontario. Central Ontario also consistently receives the smallest – though still very large – boost in university access rates as incomes get larger, while the opposite is true for East Ontario.

Moving to the other parental income extreme, we find that the individuals belonging to the highest parental income category enjoy a large university access advantage in every region compared to the reference group. This advantage is greatest in North, East Ontario and South Ontario (35.4, 36.3 and 33.6 percentage points respectively), whereas it is the smallest, although still dramatic at 30.5 percentage points, in Central Ontario.

Overall, the linear income variable specification suggests that family income matters most, in descending order, in North, East, South and Central Ontario. The same model shows that income effects fell over time in all regions except North Ontario. (The effects of income on college are once again much smaller, where they matter at all.)

The area size of residence effects also show considerable disparity across different regions. Perhaps most interestingly, rural and town residents have a large university access penalty (compared to the medium city residents) in the North, followed by South Ontario, whereas differences in Central and East Ontario are negligible. In comparison, differences in college access rates almost never reach the significance threshold in any of the four regions for town or rural residents. Differences also exist in the large city category: large city dwellers are actually disadvantaged in university access in North Ontario, whereas the reverse holds in every other region. This contrast is especially prevalent in Central and East Ontario, where university attendance in larger cities is ten or more percentage points higher.

We see a surprisingly large regional divergence in university access rates among individuals from single-parent families. Indeed, children of lone parents are almost eight percentage points less likely to attend university in Central Ontario and 4.5 percentage points less likely to attend in North Ontario compared to children of two-parent families. In contrast, the gap is only 2.7 percentage points in East Ontario and disappears almost entirely in South Ontario.

We cannot make any conclusions about official language minorities in any of the Ontario regions. Both college and university access rates are statistically insignificant in every region of Ontario.

## Ontario Regional Comparisons – Male/Female

Finally, we turn our attention to results broken down both by Ontario region and sex. We present our categorical income model separated for males (Table 9a) and females (Table 9b). Appendix B Tables 9a and 9b show the same results using the linear income variable, but again we include the linear parental income variable itself with the main estimates. The results are comparable to what we find in Ontario as a whole: we present these more as a service to those who may be interested in any explicit regional nuances, and pass immediately to the conclusion of the paper.

**Table 9a: Multinomial Estimates of Access to College and University, by Ontario Region (Categorical Income), Males**

|                               | North Ontario        |                      | South Ontario        |                     | Central Ontario      |                      | East Ontario         |                      |
|-------------------------------|----------------------|----------------------|----------------------|---------------------|----------------------|----------------------|----------------------|----------------------|
|                               | Coll.                | Univ.                | Coll.                | Univ.               | Coll.                | Univ.                | Coll.                | Univ.                |
| Calendar Year (2001)          |                      |                      |                      |                     |                      |                      |                      |                      |
| 2002                          | -0.004<br>(0.019)    | 0.004<br>(0.020)     | -0.001<br>(0.012)    | -0.003<br>(0.011)   | -0.004<br>(0.008)    | 0.007<br>(0.007)     | 0.010<br>(0.015)     | -0.023<br>(0.014)    |
| 2003                          | 0.029<br>(0.020)     | -0.002<br>(0.020)    | 0.011<br>(0.012)     | 0.004<br>(0.011)    | 0.009<br>(0.008)     | 0.003<br>(0.007)     | 0.012<br>(0.015)     | -0.021<br>(0.014)    |
| 2004                          | 0.003<br>(0.019)     | -0.007<br>(0.019)    | 0.009<br>(0.012)     | 0.008<br>(0.011)    | 0.005<br>(0.008)     | -0.004<br>(0.007)    | 0.032**<br>(0.015)   | -0.053***<br>(0.013) |
| 2005                          | 0.037<br>(0.033)     | -0.063**<br>(0.029)  | -0.039*<br>(0.020)   | -0.003<br>(0.020)   | -0.134***<br>(0.031) | 0.045<br>(0.037)     | -0.030<br>(0.024)    | -0.027<br>(0.026)    |
| 2006                          | 0.084**<br>(0.035)   | -0.110***<br>(0.026) | -0.055***<br>(0.020) | -0.010<br>(0.020)   | -0.133***<br>(0.031) | 0.029<br>(0.037)     | -0.010<br>(0.025)    | -0.032<br>(0.026)    |
| 2007                          | 0.049<br>(0.034)     | -0.078***<br>(0.029) | -0.054***<br>(0.019) | -0.011<br>(0.020)   | -0.144***<br>(0.030) | 0.053<br>(0.038)     | -0.044*<br>(0.024)   | -0.006<br>(0.027)    |
| 2008                          | 0.064*<br>(0.035)    | -0.106***<br>(0.027) | -0.034*<br>(0.021)   | -0.001<br>(0.020)   | -0.142***<br>(0.030) | 0.056<br>(0.038)     | -0.027<br>(0.025)    | -0.021<br>(0.027)    |
| Parental Income (\$25-50,000) |                      |                      |                      |                     |                      |                      |                      |                      |
| <\$25,000                     | -0.098***<br>(0.022) | -0.033*<br>(0.020)   | -0.088***<br>(0.012) | 0.001<br>(0.013)    | -0.042***<br>(0.008) | 0.001<br>(0.008)     | -0.070***<br>(0.016) | -0.035**<br>(0.015)  |
| 2005-2008                     | -0.004<br>(0.043)    | -0.087**<br>(0.036)  | 0.041<br>(0.026)     | -0.018<br>(0.024)   | -0.007<br>(0.012)    | -0.020<br>(0.012)    | -0.028<br>(0.026)    | 0.009<br>(0.029)     |
| \$50-75,000                   | 0.049**<br>(0.020)   | 0.073***<br>(0.019)  | 0.040***<br>(0.011)  | 0.079***<br>(0.011) | 0.034***<br>(0.007)  | 0.037***<br>(0.007)  | 0.016<br>(0.014)     | 0.073***<br>(0.015)  |
| 2005-2008                     | -0.002<br>(0.027)    | 0.012<br>(0.027)     | 0.005<br>(0.015)     | -0.028*<br>(0.014)  | -0.011<br>(0.009)    | -0.016*<br>(0.010)   | 0.020<br>(0.019)     | -0.012<br>(0.019)    |
| \$75-100,000                  | 0.047*<br>(0.025)    | 0.145***<br>(0.025)  | 0.049***<br>(0.014)  | 0.159***<br>(0.014) | 0.020**<br>(0.009)   | 0.140***<br>(0.009)  | 0.006<br>(0.017)     | 0.189***<br>(0.018)  |
| 2005-2008                     | 0.005<br>(0.033)     | 0.015<br>(0.031)     | 0.002<br>(0.018)     | 0.007<br>(0.017)    | 0.006<br>(0.012)     | -0.038***<br>(0.011) | 0.013<br>(0.022)     | -0.040**<br>(0.020)  |
| >\$100,000                    | -0.092***<br>(0.026) | 0.360***<br>(0.031)  | -0.012<br>(0.015)    | 0.309***<br>(0.017) | -0.071***<br>(0.007) | 0.314***<br>(0.010)  | -0.126***<br>(0.014) | 0.360***<br>(0.018)  |
| 2005-2008                     | 0.093*<br>(0.004)    | 0.002<br>(0.004)     | 0.010<br>(0.002)     | 0.002<br>(0.003)    | 0.028*<br>(0.002)    | -0.050***<br>(0.002) | 0.130***<br>(0.002)  | -0.038*<br>(0.003)   |
| Parental Income in \$10,000s† | 0.011***<br>(0.003)  | 0.032***<br>(0.002)  | 0.012***<br>(0.002)  | 0.026***<br>(0.002) | 0.004***<br>(0.001)  | 0.021***<br>(0.001)  | 0.003<br>(0.002)     | 0.029***<br>(0.002)  |
| 2005-2008                     | 0.004<br>(0.004)     | -0.002<br>(0.004)    | -0.005**<br>(0.002)  | -0.003<br>(0.003)   | -0.001<br>(0.002)    | -0.006***<br>(0.002) | 0.005**<br>(0.002)   | -0.000<br>(0.003)    |

|                         | North Ontario |           | South Ontario |           | Central Ontario |           | East Ontario |           |
|-------------------------|---------------|-----------|---------------|-----------|-----------------|-----------|--------------|-----------|
|                         | Coll.         | Univ.     | Coll.         | Univ.     | Coll.           | Univ.     | Coll.        | Univ.     |
| Area Size (Medium City) |               |           |               |           |                 |           |              |           |
|                         | (0.048)       | (0.035)   | (0.022)       | (0.019)   | (0.014)         | (0.011)   | (0.030)      | (0.022)   |
| Large City              | 0.061***      | -0.049*** | -0.028**      | 0.025*    | -0.024          | 0.078***  | -0.055***    | 0.128***  |
|                         | (0.021)       | (0.016)   | (0.012)       | (0.013)   | (0.021)         | (0.028)   | (0.014)      | (0.018)   |
| 2005-2008               | -0.088***     | 0.108***  | 0.031*        | 0.017     | 0.119***        | -0.025    | -0.002       | -0.000    |
|                         | (0.023)       | (0.028)   | (0.018)       | (0.017)   | (0.042)         | (0.035)   | (0.021)      | (0.021)   |
| Town                    | 0.047**       | -0.087*** | -0.018        | -0.011    | -0.018          | -0.022    | -0.011       | 0.007     |
|                         | (0.022)       | (0.017)   | (0.015)       | (0.013)   | (0.028)         | (0.029)   | (0.019)      | (0.018)   |
| 2005-2008               | -0.065**      | 0.054*    | 0.054**       | -0.026    | 0.133***        | 0.004     | -0.018       | 0.034     |
|                         | (0.030)       | (0.030)   | (0.021)       | (0.018)   | (0.050)         | (0.047)   | (0.025)      | (0.028)   |
| Rural                   | 0.015         | -0.094*** | 0.001         | -0.024*   | 0.015           | -0.047*   | -0.028       | -0.006    |
|                         | (0.021)       | (0.018)   | (0.016)       | (0.014)   | (0.029)         | (0.026)   | (0.018)      | (0.017)   |
| 2005-2008               | -0.040        | 0.030     | 0.046**       | -0.023    | 0.114**         | -0.009    | 0.007        | 0.006     |
|                         | (0.030)       | (0.029)   | (0.022)       | (0.019)   | (0.047)         | (0.043)   | (0.025)      | (0.026)   |
| Lone-Parent Family      | -0.011        | -0.059*** | 0.009         | -0.045*** | -0.009          | -0.084*** | -0.007       | -0.043*** |
|                         | (0.023)       | (0.020)   | (0.013)       | (0.012)   | (0.008)         | (0.007)   | (0.015)      | (0.015)   |
| 2005-2008               | 0.005         | 0.081**   | -0.031*       | -0.003    | 0.004           | -0.012    | -0.021       | 0.048**   |
|                         | (0.034)       | (0.037)   | (0.017)       | (0.018)   | (0.011)         | (0.011)   | (0.021)      | (0.023)   |
| Official Lang. Min.     | 0.116**       | 0.012     | -0.148        | 0.328*    | -0.104*         | 0.078     | 0.046**      | -0.026    |
|                         | (0.046)       | (0.041)   | (0.120)       | (0.169)   | (0.054)         | (0.070)   | (0.023)      | (0.021)   |
| 2005-2008               | -0.072        | -0.087    | -0.293***     | -0.275*** | -0.265***       | -0.349*** | 0.012        | -0.022    |
|                         | (0.068)       | (0.057)   | (0.003)       | (0.003)   | (0.003)         | (0.003)   | (0.032)      | (0.030)   |

Notes: Average marginal effects are shown. College and University are compared against the base (No PSE) outcome. Regressions are calculated together with a Private College outcome, the results for which are omitted from this table (sample sizes are relatively small). Standard errors in brackets. \*\*\* p<0.01 \*\* p<0.05 \* p<0.1. ‡ Linear Parental Income is not a part of this model and is presented here for ease of comparison between categorical and linear parental incomes. The full model equivalent to the one presented above but which substitutes linear parental income for categorical parental income can be found in appendix table A-9a. Omitted categories in parenthesis. For further information about this table, please see the text.

**Table 9b: Multinomial Estimates of Access to College and University, by Ontario Region (Categorical Income), Females**

|                               | North Ontario        |                      | South Ontario        |                      | Central Ontario      |                      | East Ontario         |                      |
|-------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
|                               | Coll.                | Univ.                | Coll.                | Univ.                | Coll.                | Univ.                | Coll.                | Univ.                |
| Calendar Year (2001)          |                      |                      |                      |                      |                      |                      |                      |                      |
| 2002                          | 0.005<br>(0.021)     | -0.001<br>(0.021)    | 0.009<br>(0.012)     | 0.010<br>(0.013)     | -0.015*<br>(0.008)   | 0.018**<br>(0.008)   | -0.027*<br>(0.015)   | 0.016<br>(0.015)     |
| 2003                          | -0.015<br>(0.020)    | 0.022<br>(0.021)     | -0.013<br>(0.011)    | 0.004<br>(0.013)     | -0.033***<br>(0.008) | 0.029***<br>(0.008)  | -0.039***<br>(0.015) | 0.014<br>(0.015)     |
| 2004                          | -0.022<br>(0.020)    | 0.004<br>(0.021)     | -0.022**<br>(0.011)  | -0.001<br>(0.012)    | -0.030***<br>(0.008) | 0.026***<br>(0.008)  | -0.050***<br>(0.015) | 0.015<br>(0.015)     |
| 2005                          | 0.006<br>(0.034)     | 0.006<br>(0.034)     | -0.003<br>(0.021)    | -0.049**<br>(0.022)  | -0.097***<br>(0.032) | 0.054<br>(0.039)     | -0.082***<br>(0.024) | 0.043<br>(0.027)     |
| 2006                          | 0.008<br>(0.035)     | -0.001<br>(0.034)    | -0.009<br>(0.021)    | -0.059***<br>(0.022) | -0.106***<br>(0.031) | 0.068*<br>(0.039)    | -0.074***<br>(0.024) | 0.039<br>(0.027)     |
| 2007                          | -0.026<br>(0.033)    | -0.021<br>(0.033)    | -0.010<br>(0.021)    | -0.036<br>(0.022)    | -0.114***<br>(0.030) | 0.078**<br>(0.039)   | -0.076***<br>(0.025) | 0.036<br>(0.027)     |
| 2008                          | -0.039<br>(0.033)    | 0.003<br>(0.035)     | -0.008<br>(0.021)    | -0.039*<br>(0.022)   | -0.121***<br>(0.030) | 0.096**<br>(0.040)   | -0.103***<br>(0.023) | 0.048*<br>(0.027)    |
| Parental Income (\$25-50,000) |                      |                      |                      |                      |                      |                      |                      |                      |
| <\$25,000                     | -0.095***<br>(0.023) | -0.116***<br>(0.023) | -0.073***<br>(0.013) | -0.095***<br>(0.014) | -0.064***<br>(0.008) | -0.043***<br>(0.009) | -0.062***<br>(0.017) | -0.098***<br>(0.017) |
| 2005-2008                     | 0.063<br>(0.046)     | -0.066<br>(0.046)    | -0.011<br>(0.023)    | 0.039<br>(0.026)     | -0.008<br>(0.012)    | 0.003<br>(0.013)     | 0.011<br>(0.026)     | 0.013<br>(0.029)     |
| \$50-75,000                   | 0.012<br>(0.020)     | 0.083***<br>(0.021)  | -0.010<br>(0.011)    | 0.084***<br>(0.012)  | 0.008<br>(0.007)     | 0.046***<br>(0.008)  | -0.027*<br>(0.014)   | 0.106***<br>(0.015)  |
| 2005-2008                     | -0.005<br>(0.027)    | 0.030<br>(0.028)     | 0.007<br>(0.015)     | 0.013<br>(0.016)     | -0.002<br>(0.010)    | -0.008<br>(0.010)    | 0.029<br>(0.019)     | -0.043**<br>(0.019)  |
| \$75-100,000                  | -0.057***<br>(0.022) | 0.235***<br>(0.024)  | -0.035***<br>(0.012) | 0.203***<br>(0.014)  | -0.058***<br>(0.008) | 0.178***<br>(0.009)  | -0.099***<br>(0.015) | 0.226***<br>(0.016)  |
| 2005-2008                     | 0.001<br>(0.033)     | 0.013<br>(0.033)     | 0.013<br>(0.018)     | 0.010<br>(0.019)     | 0.027**<br>(0.013)   | -0.041***<br>(0.012) | 0.032<br>(0.023)     | 0.007<br>(0.023)     |
| >\$100,000                    | -0.132***<br>(0.024) | 0.347***<br>(0.027)  | -0.126***<br>(0.012) | 0.356***<br>(0.013)  | -0.142***<br>(0.007) | 0.295***<br>(0.008)  | -0.203***<br>(0.013) | 0.366***<br>(0.016)  |
| 2005-2008                     | -0.059<br>(0.033)    | -0.003<br>(0.035)    | 0.005<br>(0.021)     | -0.019<br>(0.022)    | 0.032**<br>(0.030)   | -0.034**<br>(0.040)  | 0.047<br>(0.023)     | -0.093***<br>(0.027) |



|   | North Ontario |           | South Ontario |          | Central Ontario |           | East Ontario |           |
|---|---------------|-----------|---------------|----------|-----------------|-----------|--------------|-----------|
|   | Coll.         | Univ.     | Coll.         | Univ.    | Coll.           | Univ.     | Coll.        | Univ.     |
| Parental Income in \$10,000s <sup>‡</sup> | 0.008**       | 0.043***  | -0.001        | 0.041*** | -0.005***       | 0.025***  | -0.006**     | 0.042***  |
|   | (0.004)       | (0.004)   | (0.001)       | (0.002)  | (0.001)         | (0.001)   | (0.003)      | (0.003)   |
| 2005-2008                                 | -0.010**      | 0.006     | 0.000         | -0.007** | 0.001           | -0.004*   | -0.001       | -0.011*** |
|   | (0.005)       | (0.005)   | (0.002)       | (0.003)  | (0.001)         | (0.002)   | (0.003)      | (0.004)   |
| Area Size (Medium City)                   |               |           |               |          |                 |           |              |           |
|   | (0.046)       | (0.050)   | (0.024)       | (0.023)  | (0.015)         | (0.014)   | (0.032)      | (0.026)   |
| Large City                                | 0.025         | 0.007     | -0.021*       | 0.019    | -0.081***       | 0.116***  | -0.066***    | 0.097***  |
|   | (0.020)       | (0.020)   | (0.012)       | (0.014)  | (0.019)         | (0.029)   | (0.013)      | (0.017)   |
| 2005-2008                                 | -0.032        | -0.027    | -0.030*       | 0.050*** | 0.052           | -0.021    | 0.026        | -0.011    |
|   | (0.027)       | (0.028)   | (0.017)       | (0.019)  | (0.036)         | (0.038)   | (0.022)      | (0.023)   |
| Town                                      | 0.060***      | -0.068*** | 0.031**       | -0.034** | -0.026          | -0.015    | -0.010       | 0.042**   |
|   | (0.022)       | (0.021)   | (0.016)       | (0.016)  | (0.032)         | (0.035)   | (0.019)      | (0.020)   |
| 2005-2008                                 | -0.045        | -0.030    | -0.046**      | 0.072*** | 0.024           | 0.040     | 0.050*       | -0.080*** |
|   | (0.032)       | (0.037)   | (0.019)       | (0.022)  | (0.042)         | (0.047)   | (0.027)      | (0.026)   |
| Rural                                     | 0.027         | -0.084*** | 0.032*        | -0.030*  | -0.011          | 0.000     | 0.013        | 0.027     |
|   | (0.022)       | (0.021)   | (0.017)       | (0.017)  | (0.031)         | (0.033)   | (0.020)      | (0.020)   |
| 2005-2008                                 | -0.018        | -0.012    | -0.034*       | 0.046*   | 0.047           | -0.035    | 0.037        | -0.047*   |
|   | (0.030)       | (0.031)   | (0.020)       | (0.024)  | (0.042)         | (0.045)   | (0.026)      | (0.027)   |
| Lone-Parent Family                        | 0.075***      | -0.032    | 0.008         | 0.009    | 0.031***        | -0.072*** | -0.002       | -0.008    |
|   | (0.024)       | (0.024)   | (0.013)       | (0.014)  | (0.008)         | (0.008)   | (0.015)      | (0.016)   |
| 2005-2008                                 | -0.072***     | 0.063*    | -0.014        | -0.012   | 0.013           | -0.017    | 0.001        | -0.008    |
|   | (0.027)       | (0.033)   | (0.017)       | (0.019)  | (0.011)         | (0.011)   | (0.021)      | (0.022)   |
| Official Lang. Min.                       | -0.008        | 0.051     | 0.087         | 0.058    | 0.014           | -0.001    | -0.015       | -0.019    |
|   | (0.042)       | (0.043)   | (0.142)       | (0.132)  | (0.069)         | (0.077)   | (0.022)      | (0.023)   |
| 2005-2008                                 | 0.110*        | -0.035    | 0.000         | 0.244    | 0.016           | -0.093    | 0.021        | 0.055     |
|   | (0.063)       | (0.056)   | (0.241)       | (0.239)  | (0.100)         | (0.102)   | (0.033)      | (0.034)   |

Notes: Average marginal effects are shown. College and University are compared against the base (No PSE) outcome. Regressions are calculated together with a Private College outcome, the results for which are omitted from this table (sample sizes are relatively small). Standard errors in brackets. \*\*\* p<0.01 \*\* p<0.05 \* p<0.1. ‡ Linear Parental Income is not a part of this model and is presented here for ease of comparison between categorical and linear parental incomes. The full model equivalent to the one presented above but which substitutes linear parental income for categorical parental income can be found in appendix table A-7. Omitted categories in parenthesis. For further information about this table, please see the text.

## Conclusion

This paper exploits the tax-based Longitudinal Administrative Databank (LAD) to provide new and unique empirical evidence for Ontario on i) overall PSE participation rates on an annual basis over the decade from 1999 through 2008, ii) how access is related to a number of important individual and family characteristics, including sex, family income, area size of residence and family type, and iii) how these relationships changed over time. This is done for Ontario as a whole, in comparison to the rest of Canada, and then broken down by region within Ontario. The findings are informative, in some cases surprising, and highly relevant to public policy regarding access to postsecondary education.

The findings are many, and there is room to mention only a few of the most important ones here. We remind the reader at this point of our focus on access to university – although we do present results for college attendance as well. We do this for two main reasons. The first is that the PSE-related tax credit information available in the LAD dataset which we employ to identify participation in PSE do not do as good a job of finding college students simply because the credits available are not generally worth as much to college students as they are to university students. Secondly, the effects of individual and family background characteristics on PSE attendance – a principal focus of our study – tend to come out much more strongly in university access rates, while the overall (net) effects on college attendance are more unambiguous and are almost always found to be much smaller from an empirical perspective.

We use a range of analytical approaches, from simple graphical presentations of access rates over time and how access is related to each of the background variables considered on an annual basis over the period covered by our analysis, to various sets of multinomial logit models which allow us to disentangle the independent effects of each of these variables while taking the other factors into account and to also see how these relationships shifted over the period covered by our analysis.

Our first main finding is that university access in Ontario generally increased over this period, reflecting not only the dramatic ratcheting up at age 18 associated with the elimination of the final year of high school in 2003, but to a more general upward trending pattern at other ages (we focus on participation through age 21) as well. These Ontario increases were, furthermore, greater than those observed in the provinces that comprise our “Rest of Canada” basis of comparison (that group excluding British Columbia and Alberta due to data issues).

Second, we find, as do others, that females not only access university at much higher rates than males, but that this gap continued to widen over this period, so that by 2008, 55.9 per cent of Ontario females had attended university by age 21 as compared to just 38.4 per cent of males, representing a 17.5 percentage point gap, or a 46 per cent higher rate in relative terms. This represents a profound change from earlier generations, the consequences of which will only be played out in the years to come, but which could include deep shifts in labour market outcomes, how children are raised, and gender relationships more generally. But these are only speculations, and we step back immediately to what is revealed in our data.

There, we also find that participation rates are strongly correlated with family income, with individuals from progressively higher income levels attending university at higher rates than those from lower brackets. But while this replicates the general findings of previous studies, we are also able to see that these gaps are smaller in Ontario than in the ROC, and actually decreased over this period, principally due to gains among those at the three lower income levels. It appears, therefore, that access to university in Ontario is less income dependent than in at least some other provinces, and that there has been some convergence in university participation rates by family income level in Ontario over the last decade or so. We emphasize again here, however, that the LAD data do not include information on parental education, so the income variables we use are picking up this influence as well as any pure income effects *per se*, and recent research has suggested that it is in fact the parental education effects which dominate.

University attendance also varies significantly with area size of residence – large cities versus smaller cities, towns and rural areas. Furthermore, the large city gap, in particular, appears to have generally grown wider over time.

Being from a lone-parent family is associated with significantly lower rates of university attendance, but our data conform to some other recent studies in indicating that much of this effect is due to the other factors with which family type is correlated, family income (and parental education when it is available) in particular. It is thus not so much an issue of family type as it is of these other influences – although some gap does remain after these other influences are accounted for. Furthermore, this gap appears to have increased over time.

So what are the underlying causes, meanings and implications of these findings, especially from a policy perspective? Taking the first of these, the underlying causes of why university access rates have generally changed (risen) over time; why they vary by sex, family income, area size of residence, family type and other background influences; and why some of these patterns have shifted over time is beyond the scope of this analysis. But we would hasten to add our firm belief that the factors that determine who goes on to PSE in general, and university in particular, include those that go beyond the traditional economic approach of a relatively narrow choice model focused on up-front costs and longer run benefits. We believe instead that what are now being called “cultural” factors, which include being exposed to the idea of PSE, being able to see PSE as a real option, and being adequately prepared for PSE – all starting at a relatively early age – are also important, and that those influences are present in the results we identify.

As for the meaning of these results and their policy implications, while not pointing to any narrow or direct actions regarding tuition fees or student aid, the opening of new campuses or other traditional measures that could (or might not) lead to possibly greater and more equal access to university and college, we now have a more informed understanding of what access patterns look like, how they have been evolving and how they compare in Ontario to those in other provinces, and such discussions can now move forward from this perspective.

Further research of all types is required to further advance our understanding of the determinants of access to PSE and how access can be influenced even further. We believe that the most important among these are pilot programs that address the cultural barriers mentioned above: these might be the most effective means of achieving the overall rates and patterns of access we desire for reasons of both economic efficiency and equity.

We would include in these measures those that are school-based and which work “PSE access” as an option into the general curriculum, starting at least at the beginning of high school, and ideally earlier. Such programs could be as simple as bringing to a school former students who have since gone on to PSE, visits to campuses on the part of students so that they gain concrete exposure to what otherwise remain at best an abstract notion, or getting parents involved and working with their children to explore PSE options (Gándara, 2001). Such measures may be the most effective among the options available and also have the attractive quality of being low cost.

We believe trying a range of experiments of this type and measuring their effects holds the single greatest chance of identifying the best strategies for improving access to PSE in Ontario, as in other provinces. At the same time, additional research using existing datasets, including the LAD, which has barely been scratched in terms of its potential in this regard, should also be undertaken to further advance our understanding of access trends, patterns and determinants.

## References

- Cameron, S. V., & Heckman, J. J. (1998). Life Cycle Schooling and Dynamic Selection Bias: Models and Evidence for Five Cohorts of American Males. *Journal of Political Economy*, 106(2), 262-333.
- Cameron, S. V., & Heckman, J. J. (2001). The Dynamics of Educational Attainment for Black, Hispanic, and White Males. *Journal of Political Economy*, 109(3), 455-499.
- Carneiro, P., & Heckman, J. J. (2002). The Evidence on Credit Constraints in Post-secondary Schooling. *The Economic Journal*, 112(482), 705-734.
- Christophides, L. N., Cirello, J., & Hoy, M. (2001). Family Income and Post-secondary Education in Canada. *Canadian Journal of Higher Education*, 31(1), 177-208.
- Coelli, M. (2009). Tuition Fees and Equality of University Enrolment. *Canadian Journal of Economics*, 42(3), 1072-1099.
- Cunha, F., & Heckman, J. J. (2007). The Technology of Skill Formation. *American Economic Review, Papers and Proceedings*, 97(2), 31-47.
- Cunha, F., Heckman, J. J., Lochner, L., & Masterov, D. V. (2006). Interpreting Evidence of Life Cycle Skill Formation. In E. A. Hanushek and F. Welch (Eds.), *Handbook of the Economics of Education*, Vol. 1. (pp. 697-812.). New York: Elsevier.
- Day, K. (2008). A Tangled Web: The Relationship between Persistence and Financial Aid. In R. Finnie, R. E. Mueller, A. Sweetman, and A. Usher (Eds.), *Who Goes? Who Stays? What Matters? Accessing and Persisting in Post-secondary Education in Canada* (pp. 327-346). Montreal and Kingston: McGill-Queen's University Press.
- Drolet, M. (2005). *Participation in Post-secondary Education in Canada: Has the Role of Parental Income and Education Changed over the 1990s?* Analytical Studies Branch Research Paper Series, no. 243. Ottawa: Statistics Canada.
- Ermisch, J., & Francesconi, M. (2001). Family Matters: Impacts of Family Background on Educational Attainments. *Economica*, 270, 137-156.
- Finnie, R. (2012a). Access to post-secondary education: The importance of culture. *Children and Youth Services Review*, 34, 1161-1170.
- Finnie, R. (2012b). *Access to postsecondary education: The importance of culture*. Ottawa: Education Policy Research Initiative.
- Finnie, R., Childs, S., & Wismer, A. (2011a). *Access to Postsecondary Education: How Ontario Compares*. Toronto: Higher Education Quality Council of Ontario.
- Finnie, R., Childs, S., & Wismer, A. (2011b). *Under-Represented Groups in Postsecondary Education in Ontario: Evidence From the Youth in Transition Survey*. Toronto: Higher Education Quality Council of Ontario.
- Finnie, R., Frenette, M., Mueller, R. E., & Sweetman, A. (Eds.). (2010). *Pursuing Higher Education in Canada. Economic, Social, and Policy Dimensions*. Montreal and Kingston: McGill-Queen's University Press.

- Finnie, R., Lascelles, E., & Sweetman, A. (2005). Who Goes? The Direct and Indirect Effects of Family Background on Access to Post-secondary Education. In C. Beach, M. Robin, W. Boadway, and R. M. McInni (Eds.), *Higher Education in Canada* (pp. 295-338). Montreal and Kingston: McGill-Queen's University Press.
- Finnie, R., & Mueller, R. E. (2008a). *The Effects of Family Income, Parental Education and Other Background Factors on Access to Post-secondary Education in Canada: Evidence from the YITS*. MESA Project Research Paper. Toronto: Educational Policy Institute.
- Finnie, R., & Mueller, R. E. (2008b). The Backgrounds of Canadian Youth and Access to Postsecondary Education: New Evidence from the Youth in Transition Survey. In R. Finnie, R. E. Mueller, A. Sweetman, and A. Usher (Eds.), *Who Goes? Who Stays? What Matters? Accessing and Persisting in Post-secondary Education in Canada* (pp. 79-107). Montreal and Kingston: McGill-Queen's University Press.
- Finnie, R., & Mueller, R. E. (2009). *Access to Post-secondary Education in Canada Among the Children of Canadian Immigrants*. MESA Project Research Paper. Toronto: Educational Policy Institute.
- Finnie, R., Mueller, R. E., Sweetman, A., & Usher, A. (Eds.). (2008). *Who Goes? Who Stays? What Matters? Accessing and Persisting in Post-secondary Education in Canada*. Montreal and Kingston: McGill-Queen's University Press.
- Finnie, R., Sweetman, A., & Usher, A. (2008). Introduction: A Framework for Thinking about Participation in Post-secondary Education. In R. Finnie, R. E. Mueller, A. Sweetman, and A. Usher (Eds.), *Who Goes? Who Stays? What Matters? Accessing and Persisting in Post-secondary Education in Canada* (pp. 3-32). Montreal and Kingston: McGill-Queen's University Press.
- Finnie, R., & Qiu, T. (2008). Is the Glass (or Classroom) Half-Empty or Nearly Full? New Evidence on Persistence in Post-secondary Education in Canada. In R. Finnie, R. E. Mueller, A. Sweetman, and A. Usher (Eds.), *Who Goes? Who Stays? What Matters? Accessing and Persisting in Post-secondary Education in Canada* (pp. 179-208). Montreal and Kingston: McGill-Queen's University Press.
- Frenette, M. (2004). Access to College and University: Does Distance to School Matter? *Canadian Public Policy*, 30(4), 427-443.
- Frenette, M. (2006). Too Far to Go On? Distance to School and University Participation. *Education Economics*, 14(1), 31-58.
- Frenette, M. (2008). Why are Youth from Lower-income Families Less Likely to Attend University? Evidence from Academic Abilities, Parental Influences, and Financial Constraints. In R. Finnie, R. E. Mueller, A. Sweetman, and A. Usher (Eds.), *Who Goes? Who Stays? What Matters? Accessing and Persisting in Post-secondary Education in Canada* (pp. 279-298). Montreal and Kingston: McGill-Queen's University Press.
- Gándara, P. (2001). Paving the Way to Post-secondary Education: K-12 Intervention Programs for Underrepresented Youth. Report of the National Post-secondary Education Cooperative Working Group on Access to Post-secondary Education. Washington, DC: National Center for Education Statistics.
- Heckman, J. J. (2000). Policies to Foster Human Capital. *Research in Economics*, 54(1), 3-56.
- Heckman, J. J. (2007). *The Economics, Technology and Neuroscience of Human Capability Formation*. NBER Working Paper, no. 13195.

- Heckman, J. J., & Masterov, D. V. (2007). *The Productivity Argument for Investing in Young Children*. NBER Working Paper, no. 13016.
- Johnson, D. (2008). How is Variation in Tuition across Canadian Provinces Related to University Participation in the Youth in Transition Survey. In R. Finnie, R. E. Mueller, A. Sweetman, and A. Usher (Eds.), *Who Goes? Who Stays? What Matters? Accessing and Persisting in Post-secondary Education in Canada* (pp. 299-326). Montreal and Kingston: McGill-Queen's University Press.
- Lefebvre, P., & Merrigan, P. M. (2010). The Impact of Family Background and Cognitive and Non-Cognitive Ability on Post-secondary Education. In R. Finnie, M. Frenette, R. E. Mueller, and A. Sweetman (Eds.), *Pursuing Higher Education in Canada. Economic, Social, and Policy Dimensions* (pp. 219-242). Montreal and Kingston: McGill-Queen's University Press.
- Looker, D. E. (2010). Can I Get There from Here? Canadian Rural-Urban Participation Rates in Post-secondary Education. In R. Finnie, M. Frenette, R. E. Mueller, and A. Sweetman (Eds.), *Pursuing Higher Education in Canada. Economic, Social, and Policy Dimensions* (pp. 269-292). Montreal and Kingston: McGill-Queen's University Press.
- Looker, D., & Thiessen, V. (2004). *Aspirations of Canadian Youth for Higher Education*. Ottawa: Human Resources and Skills Development Canada.
- Mueller, R. E. (2008a). *Access and Persistence of Students from Low income Backgrounds in Canadian Post-secondary Education: A Review of the Literature*. MESA Project Research Paper 2008-1. Toronto: Canadian Education Project.
- Mueller, R. E. (2008b). Access and Persistence of Students from Low income Backgrounds in Canadian Post-secondary Education: What We Know, What We Don't Know, and Why it Matters. In R. Finnie, R. E. Mueller, A. Sweetman, and A. Usher (Eds.), *Who Goes? Who Stays? What Matters? Accessing and Persisting in Post-secondary Education in Canada* (pp. 33-61). Montreal and Kingston: McGill-Queen's University Press.
- Neill, C. (2009). Tuition fees and the demand for university places. *Economics of Education Review*, 28, 561-570.
- Plug, E., & Vijverberg, W. (2003). Schooling, Family Background, and Adoption: Is it Nature or is it Nurture? *Journal of Political Economy*, 111(3), 611-641.
- Sacerdote, B. (2002). The Nature and Nurture of Economic Outcomes. *American Economic Review, Papers and Proceedings*, 92(2), 344-348.



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