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# The Impact of Tuition Fees on University Access: Evidence from a Large-scale Price Deregulation in Professional Programs

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## **Note of appreciation:**

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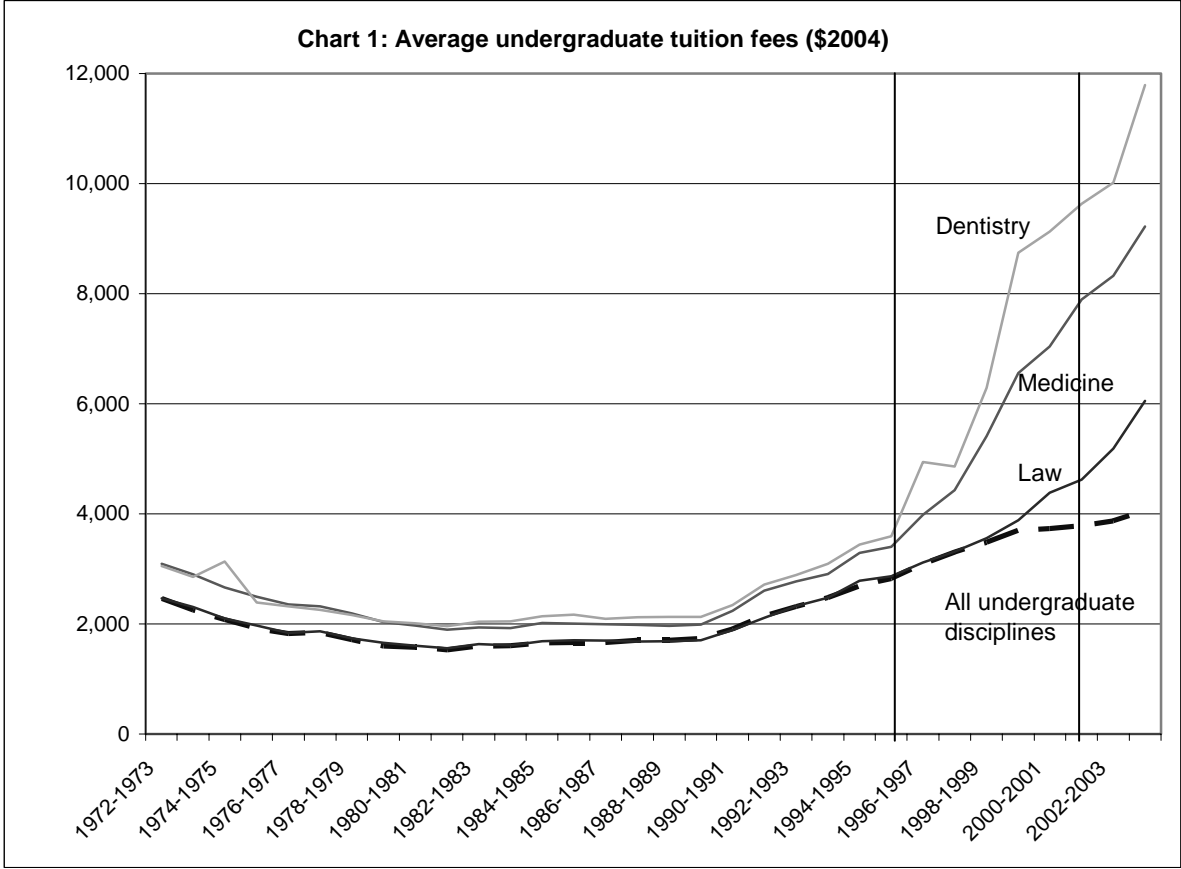
## **Abstract**

Previous studies investigating the role of rising tuition fees in university enrolment by socio-economic background have focused on the fee changes registered among undergraduate programs over the 1990s. Over this period, no changes in enrolment patterns were observed, possibly because the tuition fee increases were small in absolute terms and gradual. This study examines the impact of a very large and sudden deregulation of tuition fees in Ontario professional programs in the late 1990s. The findings suggest that enrolment patterns by socio-economic background changed substantially in Ontario, where the deregulation of professional programs was more prominent. In provinces like Quebec and British Columbia, where tuition fees remained stable, no change in enrolment patterns was registered.

**Keywords:** university access, tuition fees, price deregulation

# 1. Introduction

After several years of relative stability, tuition fees in Canadian undergraduate programs almost doubled over the last decade (Chart 1).<sup>1</sup> Given the possibility that students from disadvantaged backgrounds may no longer be able to afford the costs of a university education, this trend has been a source of concern among student groups and other advocates for access to university programs. As a result, many recent studies have investigated the evolution of the relationship between university access and various measures of socio-economic background (e.g., family income, parental education, etc.). In general, the balance of the evidence provided by these studies suggests that rising tuition fees are not associated with a decline in access among disadvantaged students (e.g., Corak et al. [2003] and Drolet [2005]).<sup>2</sup>



Source: Data from Culture, Tourism, and the Centre for Education Statistics, Statistics Canada.

Of course, the tuition fee increases were not evenly distributed. As shown in Chart 1, the increases were particularly large in professional programs (i.e., medicine, dentistry, and law).

1. All data on tuition fees used in this study were obtained from Culture, Tourism, and the Centre for Education Statistics at Statistics Canada.  
 2. Corak et al. (2003) examined enrolment patterns by parental income from 1980 to 1997, while Drolet (2005) examined enrolment by parental income and by parental education from 1993 to 2001.

From 1995–1996 to 2001–2002,<sup>3</sup> tuition fees rose by 160% in medicine, 200% in dentistry, and 80% in law, compared to only 50% in all undergraduate disciplines.<sup>4</sup> These increases were largely the result of the trends observed in Ontario, where tuition fees in professional programs were deregulated in 1998. In contrast, Quebec and British Columbia largely maintained their policy of regulating fees over the period of 1995–1996 to 2001–2002. Other provinces had already deregulated fees, or had experimented with deregulation to varying degrees.<sup>5</sup> The trends in tuition fees in medicine, dentistry, and law in the seven provinces where all of these programs were offered are shown in Charts A1 to A7 in the appendix.

In Ontario, tuition fees rose dramatically in all three professional programs over the period 1995–1996 to 2001–2002. In medicine and dentistry, the increases were particularly large (286% and 370%, respectively). In law, tuition fees also rose by a considerable amount (173%). In contrast, tuition fees fell moderately in British Columbia (between 3% and 5% in medicine/dentistry and law, respectively). In Quebec, tuition fees remained stable in law programs. In medicine and dentistry, the increase in tuition fees was relatively small, albeit not inconsequential (44% and 27%, respectively). In Nova Scotia, Manitoba, Saskatchewan, and Alberta, the increases in tuition fees were situated somewhere in between the two extremes of Ontario on the one end of the spectrum, and Quebec and British Columbia on the other.

Previous studies focused on the small and gradual increases in tuition fees registered among undergraduates programs in general. If the rising trend was evident for years, students and parents could have prepared well in advance for higher costs (thus dampening possible negative effects). In addition, student loan programs were altered to ease the financial burden on low-income families. This study will draw upon the large, sudden increases in tuition fees in professional programs in the late 1990s.<sup>6</sup> Since these increases coincided with deregulation for the most part, it is likely that they constituted exogenous shifts in fees. The different levels of deregulation across Canada provide the setting for a quasi-natural experiment. In most instances, the deregulation consisted of lifting a price ceiling, which is expected to result in an increase in both price and quantity. Of course, quantity may not increase if the supply curve is inelastic. In other words, universities may have a difficult time creating more spaces in the short-run. However, quantity may have increased since supply and/or demand in the market for professional programs may have increased over the period (e.g., pressure may have mounted to increase the

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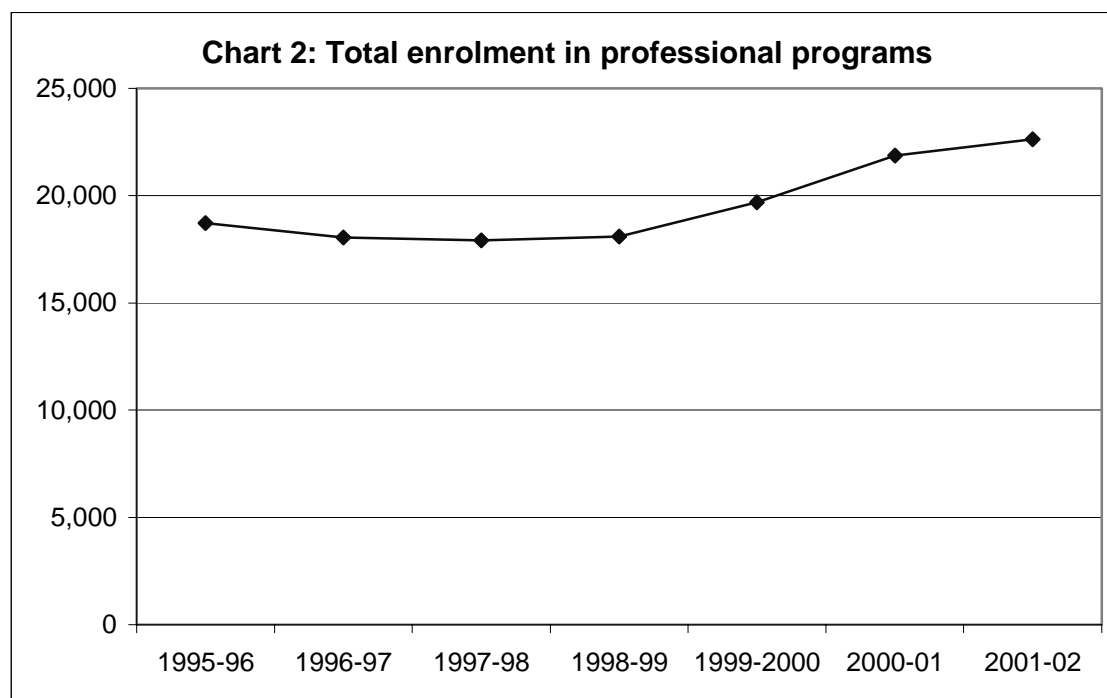
3. This period corresponds to the data available in this study (described in the methods and data sections) and lies within the vertical lines.

4. Note that ‘all undergraduate disciplines’ include professional programs in medicine, dentistry, and law.

5. See Canadian Federation of Students (1998) for more details on the deregulation of tuition fees across Canada.

6. Graduate programs were also being deregulated at the same time, but student funding (through teaching assistantships and scholarships) is normally quite high for graduate students, implying that access (in a financial sense) is likely to be less of an issue. Of particular interest are MBA programs, where tuition in some Ontario schools rose quite rapidly. Unfortunately, Statistics Canada does not maintain any data on tuition fees in MBA programs. Nevertheless, all results in this study were regenerated with MBA programs included in the definition of professional programs. This exercise yielded no substantial changes to the results.

number of physicians available for the ageing population). In Chart 2, the total enrolment numbers in professional programs are shown.<sup>7</sup>



Source: Data from Culture, Tourism, and the Centre for Education Statistics, Statistics Canada.

From 1995–1996 to 2001–2002, total enrolment rose by 21%. It is worth noting that total enrolment refers to a *stock*. Unless the drop-out rate declined substantially over the period, the *flow* of enrolment (i.e., first-year enrolments) would have increased at a much faster pace. The main question asked in this study is: “Given the increase in tuition fees, which students filled these extra spaces?”<sup>8</sup>

To date, only two Canadian studies have examined the changing relationship between access to professional programs and socio-economic background. Kwong et al. (2002) examined the issue by conducting a survey of Canadian medical school enrollees and found that the proportion of students enrolled in their first year with less than \$40,000 in family income declined in Ontario between 1997 and 2000, but not in other provinces. Two limitations of this study include the omission of Quebec medical students in the control group and the student-reported nature of family income.

Similarly, King et al. (2004) found that in five Ontario law schools (University of Toronto excepted), there was an increase in the proportion of students from families in the top 40% of the income distribution and a decrease in the proportion of students from families in the middle 20%

7. Numbers were derived from Statistics Canada’s Enhanced Student Information System (ESIS). Unfortunately, it was impossible to isolate first-year enrolments.

8. Note that even if capacity had not increased (due to an inelastic supply curve and static supply and demand conditions), it is still possible for the mix of students entering professional to have changed as a result of rapidly rising tuition fees.

of the income distribution between 2000 and 2003. Aside from the issue of student-reported income, there was no control group in this study.

An issue of importance concerning both of these studies is the fact that only students who actually enrolled in professional programs were examined, which is contrary in spirit to traditional access studies (where groups of students ‘at risk’ of attending are examined). This could be problematic if the trends observed among enrollees is simply part of a broader trend observed in the general population. For example, Ontario saw considerable economic growth in the late 1990s, and this may be one of the reasons why family income was rising among students in professional programs. The current study will attempt to address this concern by focusing on recent university graduates and examining their probability of enrolling in professional programs as a function of their socio-economic background, as indicated by detailed information on parental education.

The results suggest that over the period of rapidly increasing tuition fees in professional programs, enrollment patterns by socioeconomic background changed substantially in Ontario, where tuition fees increased the most. Specifically, enrolment rose among Ontario students whose parents held a graduate or professional degree. However, enrolment also rose among Ontario students whose parents had no postsecondary qualifications. The only group that saw a decline in enrollment consisted of Ontario students whose parents had postsecondary qualifications below the graduate or professional level. In provinces such as Quebec and British Columbia, where tuition fees were frozen over the period, no changes in enrollment patterns by socioeconomic background were registered. Several possible reasons behind these findings are discussed.

## **2. Methods**

In a simple binary educational choice model, recent university graduates will choose to pursue a professional degree ( $PROF=1$ ) if the expected discounted value of the net returns (returns – costs, or  $R - C$ ) of doing so are greater than the expected returns of entering the labour force immediately ( $PROF=0$ ,  $OTHSTUD=0$ ) or pursuing other studies ( $PROF=0$ ,  $OTHSTUD =1$ ), or:

(1)  $PROF = 1$  if

$$E[R(PROF = 1 | B, A, X) - C(PROF = 1 | B, A, X)] > \text{MAX}\{E[R(PROF = 0, OTHSTUD = 0 | B, A, X)], E[R(PROF = 0, OTHSTUD = 1 | B, A, X) - C(PROF = 0, OTHSTUD = 1 | B, A, X)]\}$$

$PROF = 0$  otherwise

Since the returns and costs are functions of other covariates, which can be separated into background variables (B), abilities (A), and other variables (X) such as age and sex, one does not need to know the individual’s actual returns and costs to model the probability of pursuing a professional degree. Empirically, it is simpler to model this probability as a function of the covariates (B, A, and X), and interpret the coefficients within a cost-benefit framework. For example, older graduates may be less likely to pursue professional degrees since they have fewer



working years ahead of them to recover the costs of doing so. In this study, linear probability models of the following form will be estimated:<sup>9</sup>

$$(2) \text{PROF}_{it} = B_{it}\phi + A_{it}\delta + X_{it}\gamma + \varepsilon_{it}$$

Where the subscripts 'i', 'r', and 't' denote the individual, the region of residence, and time (respectively) and 'ε' is a random disturbance term. Separate models are estimated for region and time period. As described in the data section, regions will be broken down by the extent to which tuition fees increased over the late 1990s.

### **3. Data**

The data are drawn from the 1995 and 2000 classes of the National Graduates Survey (NGS), which is a survey of graduates from publicly funded post-secondary institutions in Canada. Respondents are interviewed two years following graduation (i.e., 1997 and 2002).<sup>10</sup> This time frame spans the period before and after the introduction of the price deregulation in Ontario professional programs. Detailed information is available for the program of study completed in the reference year (i.e., 1995 or 2000), as well as for any further studies pursued by the graduate in the following two years as part of a program normally lasting at least three months and leading to a postsecondary certificate, diploma, or degree.

For the purposes of this study, professional programs are defined as first professional degree programs in medicine, dentistry, and law. Students who have recently completed a bachelor's degree,<sup>11</sup> a master's degree, or a doctorate without previously completing a professional degree are examined in this study.<sup>12, 13</sup>

Although the NGS contains no information on family income, it is the only available data source allowing researchers to link the pursuit of professional studies to one's socio-economic

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9. Logit and probit models were also estimated and showed qualitatively similar results. The linear probability model was chosen in the end since the coefficients are interpreted as marginal probability effects, which in this case are invariant to the vector of explanatory variables (unlike the case in non-linear models). The main drawback of the linear probability model is that predictions may lie outside [0,1], which is more likely when the predictions are generated for specific sub-groups of the sample; however, all predictions in this study are averaged across the entire sample and they always lie within [0,1]. See Moffitt (1999) for a more complete discussion of the validity of using linear probability models.

10. Data from previous graduation classes can not be used in this study because of an important break in the parental education variable.

11. Included in this definition are university certificate programs above a bachelor's degree.

12. Master's and doctoral graduates are combined in the analysis since the latter is too small a group to analyze separately. Descriptive statistics suggested that students in both groups have about the same likelihood of pursuing a professional degree.

13. Some students may enter medicine, dentistry, or law programs prior to completing an undergraduate degree. Nevertheless, Dhalla et al. (2002) note that only 6.7% of first year medical students did not already possess a degree. However, the authors did not have any information on Quebec medical schools. In the current study, all results were re-estimated by omitting Quebec students, which yielded no qualitative change in the results.

background over the period when Ontario professional programs were being deregulated (i.e., the late 1990s). Specifically, the highest level of education of the father and mother is available at a detailed level. In this study, these two pieces of information are combined by looking at the highest level of education achieved by either parent, categorized as follows: no postsecondary education, a non-university postsecondary certificate, a bachelor's degree, and an 'advanced' degree (i.e., a master's degree, a doctorate, or a professional degree).<sup>14</sup> The use of parental education is not so limiting since two recent studies conclude that it is more strongly associated with university access than family income (Knighton and Mirza [2002] and Drolet [2005]).

The identification of the relationship between tuition fee increases in professional programs and socio-economic background is drawn from the substantial level of provincial variation in tuition increases observed in the late 1990s, as shown in Charts A1 to A7 in the appendix. The specific period of interest corresponds to the available NGS data and lies within the vertical lines (1995–1996 to 2001–2002). In Ontario and, to a lesser extent, several other provinces, fees in professional programs were being deregulated, while Quebec and British Columbia largely maintained their policy of regulating tuition fees. This provides a possible source of exogenous variation in tuition fee changes over the time period.

To capture this variation, recent graduates are grouped into three categories, according to the extent of tuition fee increases in their province:<sup>15</sup>

- No substantial increases (Quebec and British Columbia),
- Moderate increases (Nova Scotia, Manitoba, Saskatchewan, Alberta),
- Large increases (Ontario).

In the language of natural experiments, Ontario consists of the 'treatment' group, while Quebec and British Columbia consist of the 'control' group. Nova Scotia, Manitoba, Saskatchewan, Alberta, can be thought of as a group that received a smaller amount of the treatment (i.e., deregulation). The samples exclude students living outside of these provinces (i.e., those living in Newfoundland, Prince Edward Island, and New Brunswick).

The sample means of the variables used in the analysis to follow are shown in Table 1. All samples to follow exclude cases with missing information on any of the variables appearing in this table, which accounted for less than 3% of the original samples.

A larger proportion of graduates from the class of 2000 pursued a professional degree within the following two years (1.6%) compared to the class of 1995 (1.2%). Most students who pursue a professional degree choose to study medicine or law, rather than dentistry.

The main covariate used in the analysis is parental education, which rose moderately over the period. This is not surprising given that most parents in the sample likely completed their

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14. Note that for parental education, the 'professional degree' category includes degrees in medicine, dentistry, law, optometry, veterinary medicine, and theology, and cannot be further disaggregated.

15. Note that the residence at the time of the interview is used in this classification. Since the interviews were conducted in the summer months (i.e., from May to July 1997 for class of 1995, and from May to August 2002 for the class of 2000), this likely consists of the student's usual place of residence.

education about 30 years prior, when postsecondary education underwent considerable expansion. In addition to indicating ability to pay, parental education may also be indicative of student abilities. A novel approach used in this study consists of partially accounting for these ability differences with information available in the NGS on monetary amounts of scholarships, awards, fellowships or prizes, *based on student achievements*.<sup>16</sup> The proportion of recipients rose over the late 1990s, which meant rising average dollar amounts of awards.<sup>17</sup>

The other explanatory variables consist of the most recent degree completed by the graduate, the main discipline chosen during those studies, a female dummy variable, age at graduation, and some family composition variables (dummy variables indicating that the graduate was married or had a dependent child at the time of the first interview). Not surprisingly, these attributes were relatively unchanged over the short time period examined here, but the models to follow will nonetheless account for these differences. As noted earlier, the attempt to identify the role of tuition fee increases will involve estimating separate models by region. In the population examined here, almost one-half of students lived in Ontario, while about a third lived in Quebec or British Columbia. The remainder (about one-fifth) lived in Nova Scotia, Manitoba, Saskatchewan, or Alberta.

In the appendix, the empirical probability of pursuing a professional degree by selected characteristics is shown along with the sample cell sizes (Table A1). These probabilities will be analyzed more formally in a regression framework in the section, but Table A1 can serve as a useful reference.

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16. To reduce the likelihood that grants or bursaries based on financial needs would be included, respondents were asked about these prior to being asked about scholarships based on academic achievements.

17. The *rise* in the dollar amounts of these scholarships may have been precipitated by the small rise in tuition fees in undergraduate programs across the country. Nevertheless, the differences among students observed *at any point in time* are likely to be more strongly correlated with differences in academic achievements.

**Table 1: Sample means of the variables used in the analysis**

	<u>1995-1997</u>	<u>2000-2002</u>
Pursued a professional degree...	0.012	0.016
in medicine	0.004	0.005
in dentistry	0.001	0.002
in law	0.007	0.009
Parents have...		
No PS qualification	0.460	0.389
Non-university PS certificate	0.178	0.189
Bachelor's degree	0.204	0.241
Master's degree	0.088	0.107
Doctorate	0.041	0.046
Professional degree <sup>a</sup>	0.029	0.027
Received a scholarship <sup>e</sup>	0.286	0.384
Scholarship amount (\$2004)	2,575	4,116
Master's degree	0.134	0.153
Doctorate	0.018	0.024
Engineering	0.081	0.074
Physical and mathematical sciences <sup>b</sup>	0.062	0.071
Commerce and related <sup>c</sup>	0.159	0.194
Arts and related <sup>d</sup>	0.596	0.539
Health and biological sciences	0.101	0.123
Female	0.581	0.600
Age at graduation	26.7	27.0
Married <sup>f</sup>	0.373	0.364
Dependent child <sup>f</sup>	0.175	0.174
Quebec and British Columbia	0.350	0.363
Ontario	0.446	0.450
N	15,798	16,300

<sup>a</sup> Includes professional degrees in medicine, dentistry, law, veterinary medicine, optometry, and theological studies.

<sup>b</sup> Includes physical sciences, mathematics, and computer science.

<sup>c</sup> Includes commerce, non-professional law programs, and economics.

<sup>d</sup> Includes arts, humanities, education, and social sciences (excluding economics).

<sup>e</sup> Refers to the most recently completed degree.

<sup>f</sup> As of the interview date.

Source: National Graduates Survey.

## **4. Results**

A series of ordinary least squares (linear probability) models were estimated in order to account for observable differences among students along the socio-economic spectrum. We begin with national level results (Table 2). For each period, two models are estimated: one with all graduate and professional degrees held by the parents combined into one category and the other with separate categories for a master's degree, a doctorate, and a professional degree.

Students whose parents possess a graduate or professional degree are more likely to pursue a professional degree than students with less educated parents. For example, students from the class of 1995 with a parent who had a professional degree held a 3.5 percentage point advantage in pursuing a professional degree of their own over students whose parents had no postsecondary qualifications (the reference group). This is a large difference, considering that fewer than 2% of students pursued a professional degree (Table 1). Furthermore, the advantage appears to have risen with the class of 2000 (7.6 percentage points). There was also an increase in the advantage held by students with a parent who held a doctorate: no advantage in 1995–1997, compared to a statistically significant 2.7 percentage point advantage in 2000–2002. For students with a parent who held a master’s degree, the advantage is smaller yet still significant in both periods; however, it only increased moderately over the period.

Interestingly, students with a parent who holds a bachelor’s degree have little or no advantage over students whose parents hold no postsecondary qualifications. Recent studies that have examined access to undergraduate university studies have found that students with a university-educated parent (primarily at the undergraduate level) are far more likely to go on to university than other students (e.g., Finnie et al. [2004] and Drolet [2005]).

Students with higher scholarship amounts at the bachelor’s degree level are more likely to pursue a professional degree. No such relationship holds at the master’s degree level, however, perhaps because many graduate students receive substantial merit-based scholarships.

The student’s discipline in their most recently completed degree is strongly associated with the pursuit of a professional degree. Students from health and biological sciences are the most likely ones to go on, followed by students from commerce, arts, and related disciplines. Engineering and (non-biological) science students are the least likely to pursue a professional degree.

Females are less likely to go on than males, but this gap declined in the second cohort (and was no longer statistically significant). Consistent with the notion that students consider lifetime earnings, older graduates are less likely to go on to professional studies (even after controlling for their level of education). Also, married students are less likely to go on, as are students with dependent children (although the latter results are not statistically significant).

**Table 2: Ordinary least squares results - probability of pursuing a professional degree**

	1995-1997				2000-2002			
	(1)		(2)		(1)		(2)	
	$\beta$	t	$\beta$	t	$\beta$	t	$\beta$	t
Parents have...								
No PS qualification (reference)	0.000		0.000		0.000		0.000	
Non-university PS certificate	0.003	1.28	0.003	1.28	-0.001	-0.31	-0.001	-0.34
Bachelor's degree	0.005	2.23	0.005	2.22	-0.001	-0.39	-0.001	-0.44
Graduate or professional degree	0.012	4.58			0.025	8.61		
Master's degree			0.009	2.90			0.011	3.12
Doctorate			0.000	0.08			0.027	5.45
Professional degree			0.034	6.64			0.076	12.27
Scholarship amount/10,000	0.015	7.68	0.015	7.81	0.008	5.27	0.008	5.20
(Schol. amount/10,000)*graduate degree	-0.014	-6.60	-0.015	-6.69	-0.007	-4.12	-0.008	-4.15
Bachelor's degree (reference)	0.000		0.000		0.000		0.000	
Graduate degree	0.004	1.44	0.004	1.44	-0.002	-0.71	-0.002	-0.66
Engineering (reference)	0.000		0.000		0.000		0.000	
Physical and mathematical sciences	0.008	1.68	0.008	1.71	0.002	0.41	0.002	0.45
Commerce and related	0.008	2.24	0.008	2.24	0.014	3.24	0.014	3.19
Arts and related	0.016	4.76	0.016	4.77	0.018	4.42	0.017	4.32
Health and biological sciences	0.035	8.47	0.034	8.39	0.037	7.83	0.036	7.66
Male (reference)	0.000		0.000		0.000		0.000	
Female	-0.004	-2.29	-0.004	-2.29	-0.003	-1.33	-0.003	-1.46
Age	0.000	-1.27	0.000	-1.40	-0.001	-4.44	-0.001	-4.73
Not married (reference)	0.000		0.000		0.000		0.000	
Married	-0.011	-5.59	-0.011	-5.57	-0.004	-1.85	-0.004	-1.88
No dependent child (reference)	0.000		0.000		0.000		0.000	
Dependent child	-0.004	-1.44	-0.004	-1.40	-0.003	-0.83	-0.002	-0.63
Constant	0.003	0.71	0.004	0.81	0.018	3.03	0.020	3.36
Adjusted R <sup>2</sup>	0.015		0.017		0.017		0.023	
N	15,798				16,300			

Source: National Graduates Survey and author's calculations.

Once students decide to pursue a professional degree, their decision of whether to become a doctor, a dentist, or a lawyer may depend on several factors. To shed light on this issue, similar regressions were estimated on the group of students who pursued a professional degree. In this case, the dependent variable indicates whether the student chose to pursue a law degree, or not (i.e., medicine or dentistry combined, since there are too few dentistry students to form separate categories).

First, family background appears to matter less in this case. On the other hand, the educational background of the student matters quite a lot. Students with higher scholarship amounts at the bachelor's degree level are far more likely to pursue medicine or dentistry. This may or may not

relate to differences in the level of competitiveness in the programs. As with the general pursuit of professional degrees (Table 2), there are no differences by scholarship amounts at the master's degree level.

Master's degree graduates are more likely to pursue medicine or dentistry, which may also indicate a higher degree of competition to get into those programs.

Not surprisingly, students in non-science disciplines (commerce, arts, and related) are more likely to pursue a law degree than other students. Similarly, students from health and biological sciences are more likely to pursue a professional degree in medicine or dentistry than students from other disciplines, although the results are not statistically significant.

Factors such as sex, age, marital status, and the presence of dependent children are generally not associated with the choice made between law and medicine/dentistry.

**Table 3: Ordinary least squares results - probability of selecting law as opposed to medicine/dentistry, conditional on pursuing a professional degree**

	1995-1997		2000-2002	
	$\beta$	t	$\beta$	t
Parents have...				
No PS qualification (reference)	0.000		0.000	
Non-university PS certificate	0.063	0.85	-0.151	-1.84
Bachelor's degree	-0.016	-0.23	-0.040	-0.52
Graduate or professional degree	0.015	0.22	-0.091	-1.42
Scholarship amount/10,000	-0.164	-5.10	-0.133	-3.78
(Schol. amount/10,000)*graduate degree	0.137	2.98	0.145	3.45
Bachelor's degree (reference)	0.000		0.000	
Graduate degree	-0.145	-1.51	-0.157	-1.42
Eng., phys. sc., and math. sc. (ref.)	0.000		0.000	
Commerce, arts and related	0.567	4.78	0.402	3.02
Health and biological sciences	-0.100	-0.84	-0.186	-1.40
Male (reference)	0.000		0.000	
Female	-0.026	-0.51	0.134	2.49
Age	0.006	0.96	0.030	3.19
Not married (reference)	0.000		0.000	
Married	0.023	0.25	0.041	0.62
No dependent child (reference)	0.000		0.000	
Dependent child	0.097	0.50	-0.063	-0.47
Constant	0.176	0.91	-0.317	-1.21
Adjusted R <sup>2</sup>	0.611		0.5264	
N	175		209	

Source: National Graduates Survey and author's calculations.

In Table 4, the sample is divided into three regions based on the extent of the tuition fee increases in professional programs. In Quebec and British Columbia, the marginal effect associated with a parent's graduate or professional degree changed very little over the period (from 0.2 percentage points in 1995–1997 to 0.5 percentage points in 2000–2002, both of which are not statistically significant). In the provinces that saw moderate increases in tuition fees (Nova Scotia, Manitoba, Saskatchewan, and Alberta), a more solid increase was registered (from 1.2 percentage points in 1995–1997 to 2.7 percentage points in 2000–2002). In Ontario, where tuition fees in professional programs increased the most, the marginal effect associated with a parent's graduate or professional degree also increased the most (from 1.9 percentage points in 1995–1997 to 4.0 percentage points in 2000–2002).

**Table 4: Ordinary least squares results - probability of pursuing a professional degree by region**

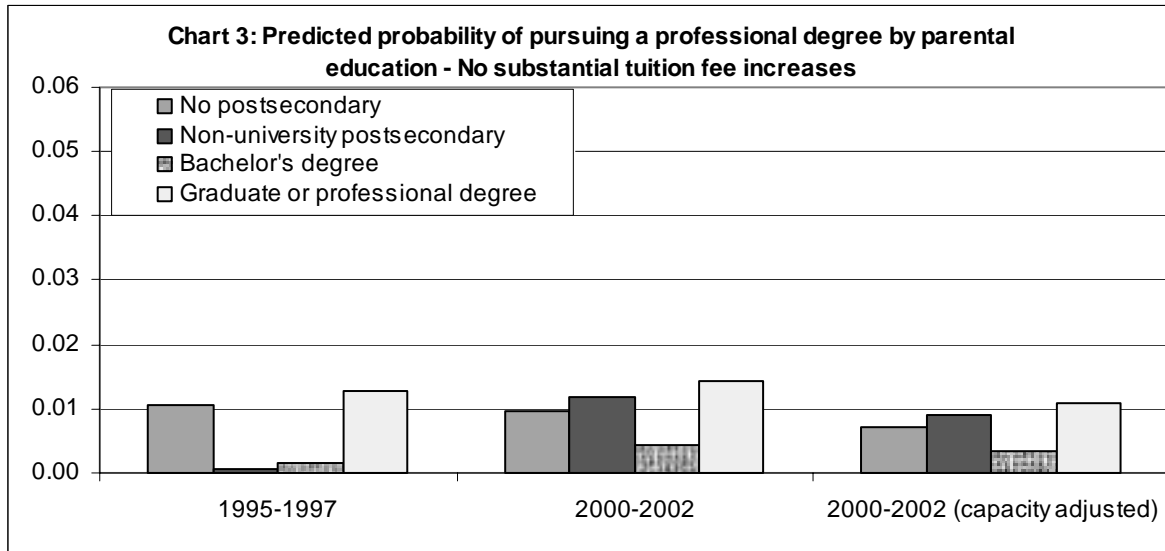
	No substantial increases (Quebec and British Columbia)				Moderate increases (Nova Scotia, Manitoba, Saskatchewan, and Alberta)				Large increases (Ontario)			
	1995-1997		2000-2002		1995-1997		2000-2002		1995-1997		2000-2002	
	$\beta$	t	$\beta$	t	$\beta$	t	$\beta$	t	$\beta$	t	$\beta$	t
Parents have...												
No PS qualification (reference)	0.000		0.000		0.000		0.000		0.000		0.000	
Non-university PS certificate	-0.010	-3.01	0.002	0.72	-0.001	-0.13	0.002	0.34	0.017	3.22	-0.005	-0.89
Bachelor's degree	-0.009	-2.66	-0.005	-1.67	0.009	2.25	0.003	0.50	0.013	2.80	0.000	0.05
Graduate or professional degree	0.002	0.68	0.005	1.46	0.012	2.71	0.027	4.18	0.019	3.66	0.040	6.53
Scholarship amount/10,000	0.000	-0.10	0.007	3.34	0.023	7.85	0.017	5.19	0.036	6.69	0.005	1.47
(Schol. amount/10,000)*graduate degree	0.000	0.12	-0.006	-2.83	-0.021	-6.18	-0.016	-4.40	-0.035	-6.07	-0.003	-0.86
Bachelor's degree (reference)	0.000		0.000		0.000		0.000		0.000		0.000	
Graduate degree	-0.001	-0.39	-0.003	-0.88	0.004	0.88	0.003	0.42	0.008	1.35	-0.004	-0.53
Eng., phys. sc., and math. sc. (ref.)	0.000		0.000		0.000		0.000		0.000		0.000	
Commerce, arts and related	0.008	2.13	0.009	2.59	0.007	1.60	0.026	4.09	0.015	2.70	0.018	2.77
Health and biological sciences	0.019	3.81	0.010	2.22	0.036	6.04	0.057	6.89	0.038	4.84	0.051	5.85
Male (reference)	0.000		0.000		0.000		0.000		0.000		0.000	
Female	-0.002	-0.91	0.002	0.93	-0.011	-3.54	-0.016	-3.63	0.001	0.17	-0.001	-0.29
Age	0.000	-1.78	0.000	-2.45	-0.001	-2.16	-0.001	-4.04	0.000	1.12	-0.001	-1.77
Not married (reference)	0.000		0.000		0.000		0.000		0.000		0.000	
Married	-0.009	-3.43	-0.008	-3.08	-0.009	-2.63	-0.012	-2.34	-0.016	-3.55	0.004	0.79
No dependent child (reference)	0.000		0.000		0.000		0.000		0.000		0.000	
Dependent child	-0.002	-0.62	0.002	0.52	-0.005	-1.25	0.006	0.94	-0.004	-0.71	-0.012	-1.57
Constant	0.018	3.04	0.015	2.58	0.022	2.96	0.040	3.48	-0.019	-1.89	0.012	1.03
Adjusted R <sup>2</sup>	0.0086		0.0066		0.024		0.0256		0.0247		0.0258	
N	4996		7232		6673		5094		4129		3974	

Source: National Graduates Survey and author's calculations.

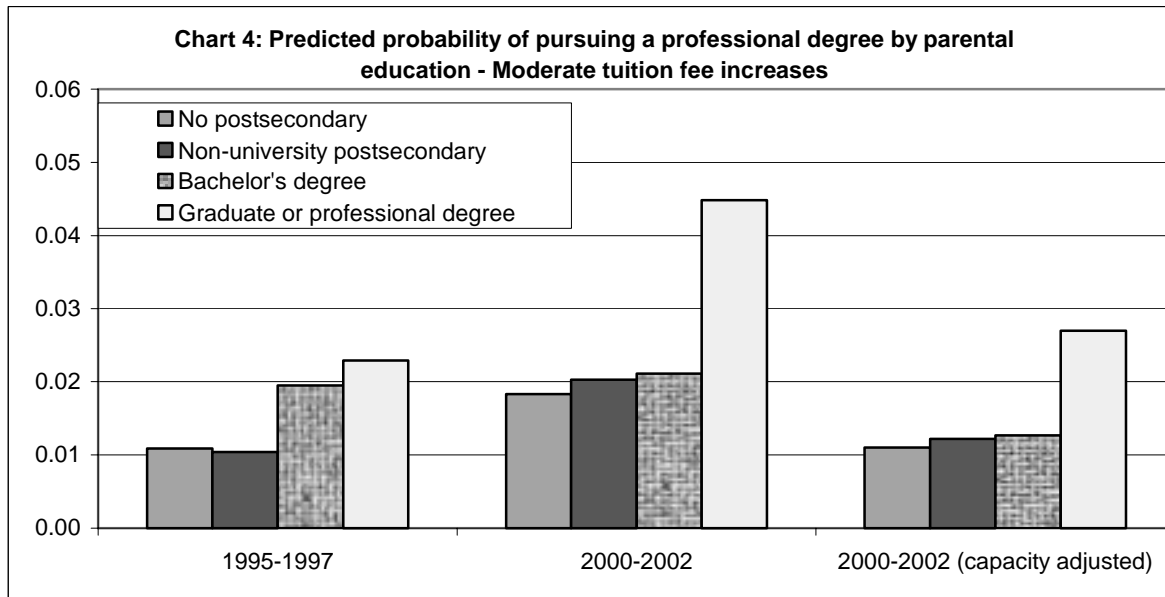
It is very difficult to gauge the entire story from this table. In order to better appreciate these trends, the predicted probabilities of pursuing a professional degree by parental education appear separately by region in Charts 3 to 5. Overall, enrollment patterns by socioeconomic background tended to change more substantially in provinces that saw larger increases in tuition fees. In fact, very little change is observed in Quebec and British Columbia, where tuition fees were frozen



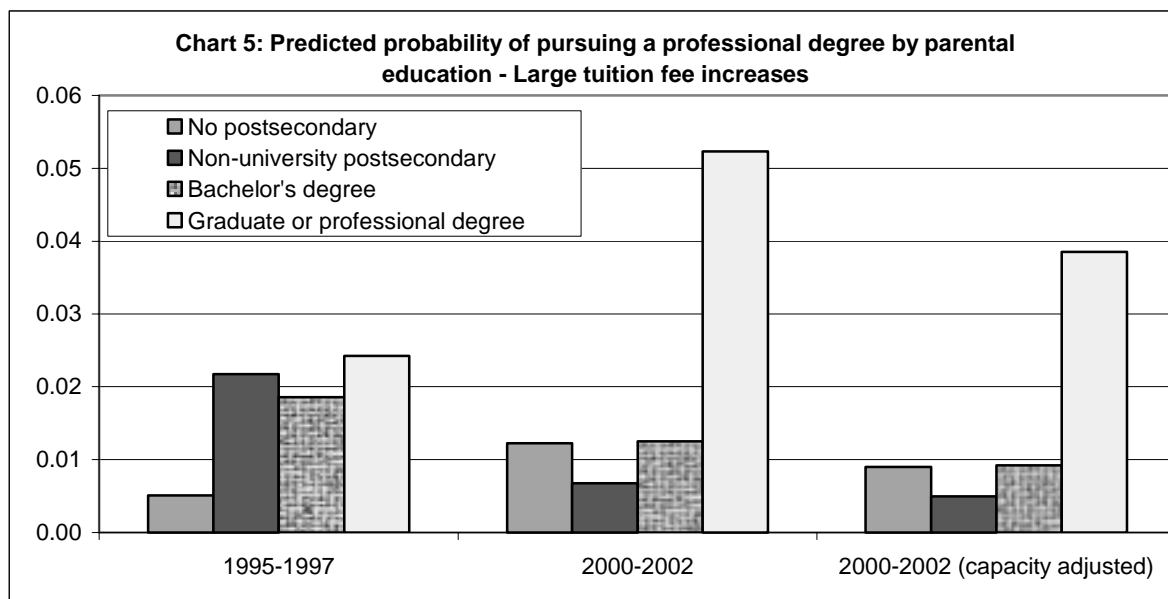
over the period (Chart 3). Provinces that saw moderate tuition fee increases also saw moderate changes in enrollment patterns by socioeconomic background (Chart 4).



Source: National Graduates Survey and author's calculations.



Source: National Graduates Survey and author's calculations.



Source: National Graduates Survey and author's calculations.

Enrollment patterns by socioeconomic background where most prominent in Ontario (Chart 5). First, students whose parents held a graduate or professional degree saw their probability of enrollment rise from 2.4% to 5.2% over the period. However, students whose parents had no postsecondary qualifications also saw an increase (from 0.5% to 1.2%). Although this increase is smaller in absolute terms than the increase registered among students from very well educated parents, it is nevertheless as large an increase in relative terms.

Whether the stability in the relative should be viewed in a positive light or not is an important question. From a student's point of view, equity or fairness may be of the utmost importance. This suggests that the relative is what matters the most. From an institution's or a policy maker's point a few, however, the cost of achieving equity in enrollment depends largely on the size of the absolute gap.

Three factors may have prevented a decline from being registered among students from disadvantaged backgrounds. First, in provinces where deregulation was most prominent, student aid was adjusted to ease the burden for qualifying students. For example, Ontario had a special arrangement whereby 30% of the tuition fee increases following deregulation had to be returned to students in the form of student aid for those in need. Second, students living in provinces where tuition fees increased rapidly could have applied to programs in provinces with more stable tuition fees.<sup>18</sup> Third, capacity in professional programs across Canada was increasing substantially at the time. This may have been the result of changing supply and demand conditions in the market for professional graduates or it could have been a direct result of price deregulation.

What if capacity had remained constant among students in each region? In Charts 3 to 5, the rightmost set of columns shows the predicted enrolment probabilities in 2000–2002 assuming

18. Unfortunately, the province of the institution attended after the undergraduate program is only available for the class of 2000.

that the overall probability within each region remained constant at the 1995–1997 level. Under this hypothetical case, Ontario students from disadvantaged backgrounds still saw no decline in enrollment.

Finally, Ontario students whose parents had post secondary qualifications below a graduate or professional degree saw their probability of enrollment decline quite substantially. It is possible that many students in this group could not afford the increased tuition fees, yet did not qualify for the increased assistance dedicated to low-income students.

## **5. Conclusion**

This study examined the changing relationship between enrolment in professional programs in medicine, dentistry, and law among recent bachelor's degree graduates and one's socio-economic background in a period when tuition fees were undergoing deregulation (the late 1990s). Since deregulation did not occur to the same extent in every province, it is likely that the differences in the tuition fee increases were exogenous factors in the enrolment decisions of students.

The findings suggest that enrollment patterns by socioeconomic background changed substantially in Ontario, where tuition fees increases were largest. Specifically, enrolment rose among Ontario students whose parents held a graduate or professional degree. However, enrolment also rose among Ontario students whose parents had no postsecondary qualifications. The only group that saw a decline in enrollment consisted of Ontario students whose parents had postsecondary qualifications below the graduate or professional level. In provinces such as Quebec and British Columbia, where tuition fees were frozen over the period, no changes in enrollment patterns by socioeconomic background were registered.

Three factors may have prevented a decline from being registered among students from disadvantaged backgrounds. First, where deregulation was most prominent (Ontario), student aid was adjusted to ease the burden for students in need. Interestingly, enrollment fell among Ontario students whose parents had postsecondary qualifications below a graduate degree, possibly because they may not have qualified for this assistance.

Second, students living in provinces where tuition fees increased rapidly could have applied for programs in provinces with more stable tuition fees. If these options were not available to students, it is possible that some disadvantaged students may have been further deterred from pursuing a professional degree. By the same token, one might wonder about the effects of a nationwide price deregulation in professional programs. Given that the alternative of studying abroad would be as costly as remaining in Canada to study, would disadvantaged students be even more deterred from pursuing professional degrees?

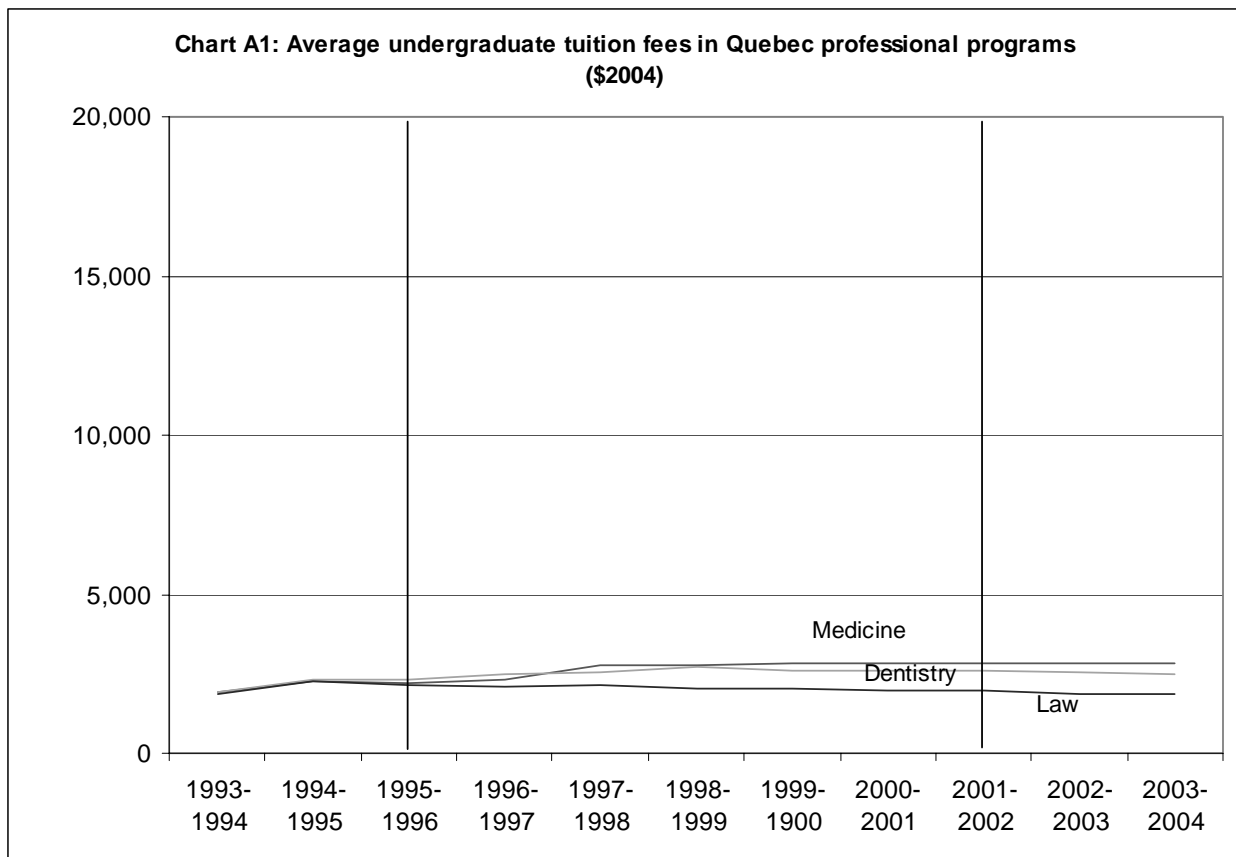
Third, capacity in professional programs across Canada was increasing substantially at the time (perhaps as a result of changing supply and demand conditions in the market for professional graduates, or as a direct result of price deregulation). Under a constant capacity assumption, enrollment would still not have fallen for disadvantaged students in Ontario.

The findings in this study have important implications for the literature on the impact of tuition fees on university access. Corak et al. (2003) and Drolet (2005) find large differences in

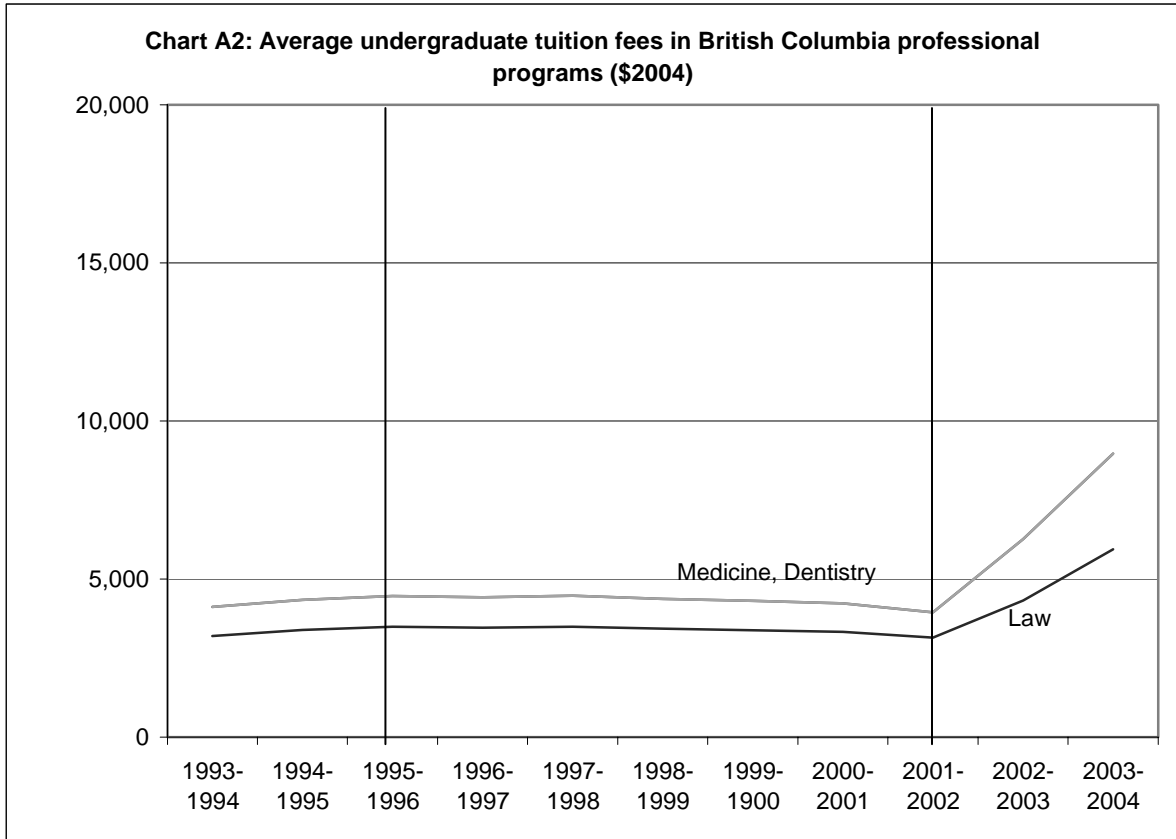
enrolment rates across the socio-economic spectrum. However, they find that this relationship was unaltered over a period of rising tuition fees. This might relate to the fact that the rise in tuition fees was small in absolute terms (about \$2,000) and gradual (over 10 years). If the rising trend was evident for years, students and parents could have prepared well in advance for the anticipated higher costs. Furthermore, the student loans programs were altered during this period to further help students in need. In contrast, the rise in tuition fees registered in professional programs was much larger (often over \$10,000) and more sudden (usually over a period of one or two years), which associated with a lower probability of enrollment among some students (i.e. Ontario students from middle educated families). This finding is not entirely without precedent. Another example of a study examining a large variation in costs is Frenette (2005), which looks at university (and college) enrolment rates by household income in Canada and the United States. The study finds a much stronger relationship between household income and enrolment in the United States, where one-third of universities are privately funded (leaving fewer affordable options available to low-income students).

Finally, policies regarding the price of a university education are difficult to separate from policies relating to the quantity of education available to students. As noted, deregulating tuition fees may itself lead to increased capacity, which may prevent declining enrolment among the most disadvantaged groups of students (even though the gap in enrolment may rise substantially). In other words, rising tuition may discourage some disadvantaged students from going on, but this may be counterbalanced by other disadvantaged students who are willing to bear the brunt of the extra costs to try to fill up the additional spaces (if any). A clearer understanding of the supply elasticity of university educational programs would be a useful next step for policy purposes.

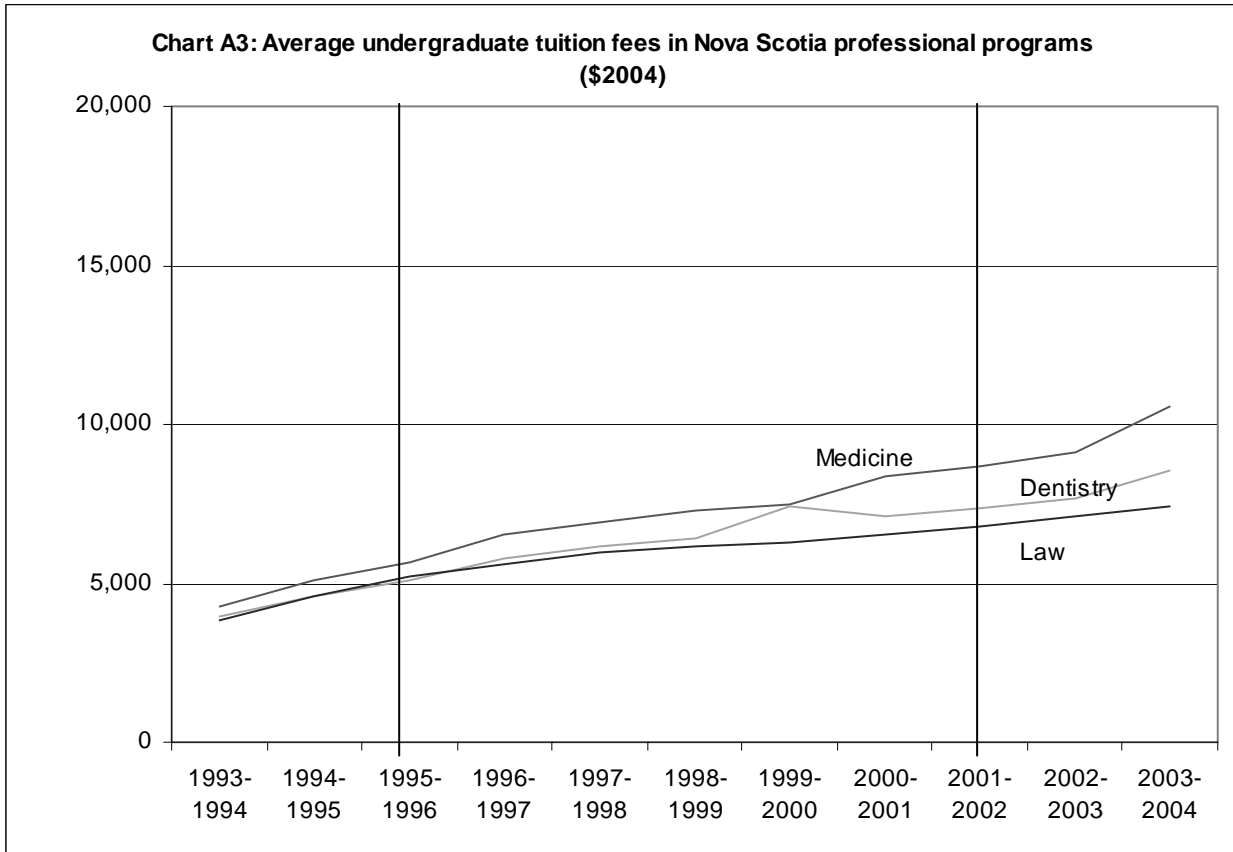
## Appendix



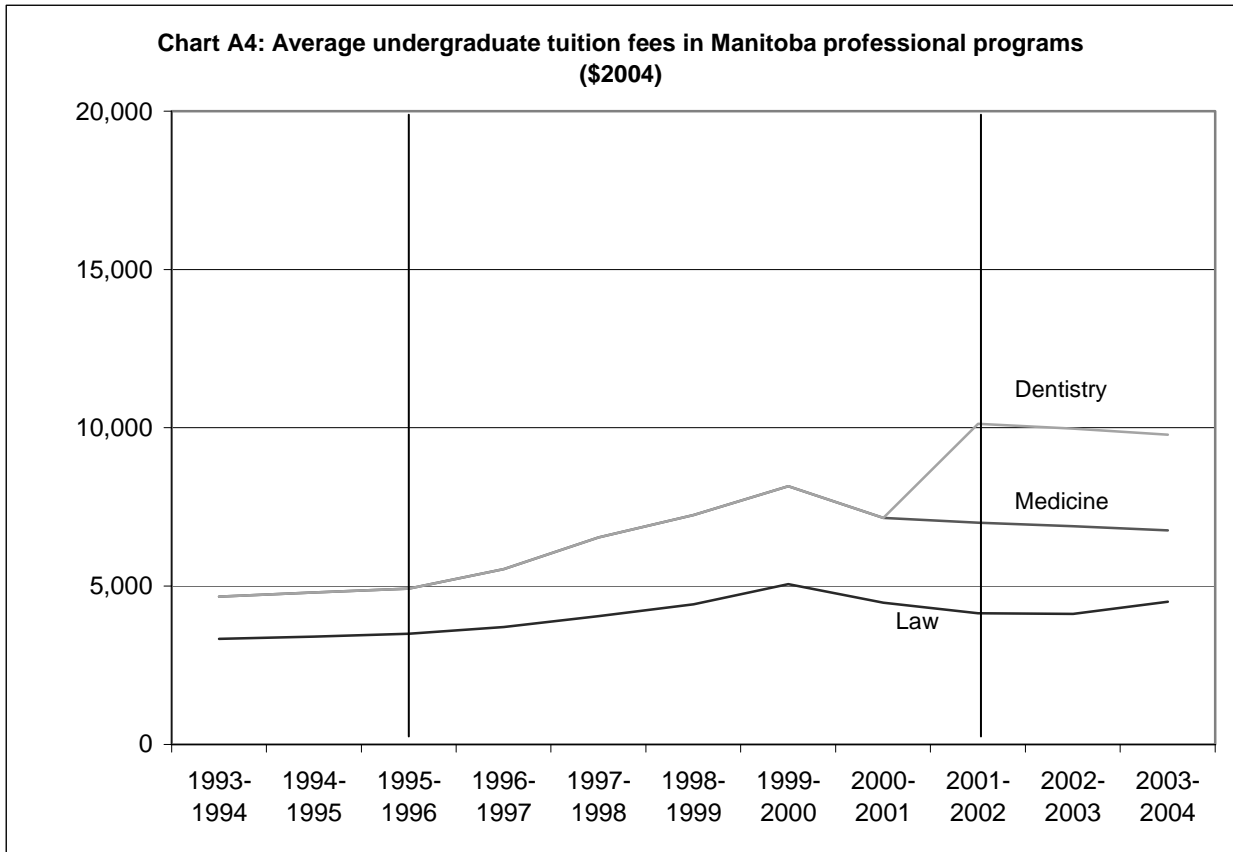
Source: Data from Culture, Tourism, and the Centre for Education Statistics, Statistics Canada.



Source: Data from Culture, Tourism, and the Centre for Education Statistics, Statistics Canada.

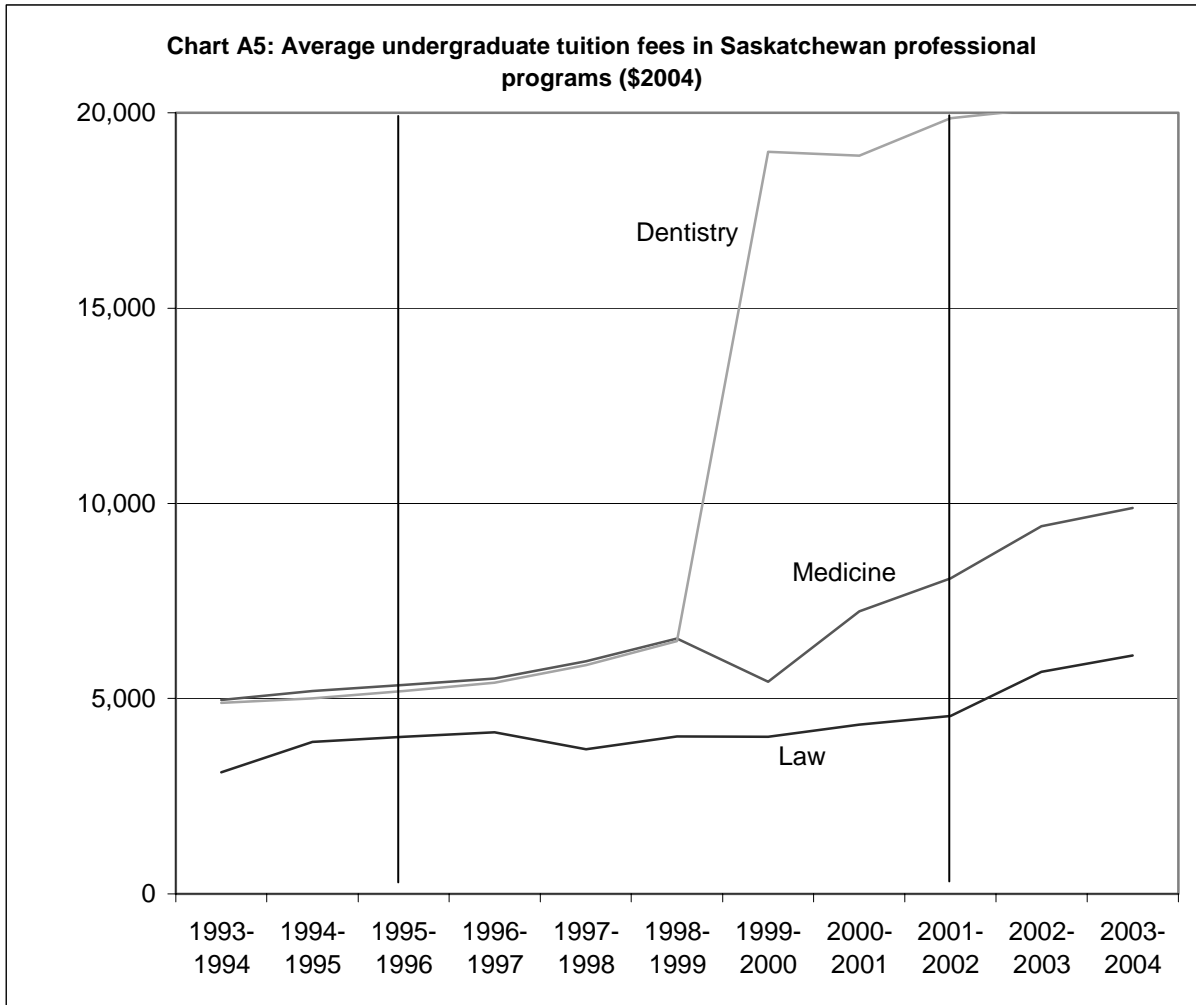


Source: Data from Culture, Tourism, and the Centre for Education Statistics, Statistics Canada.

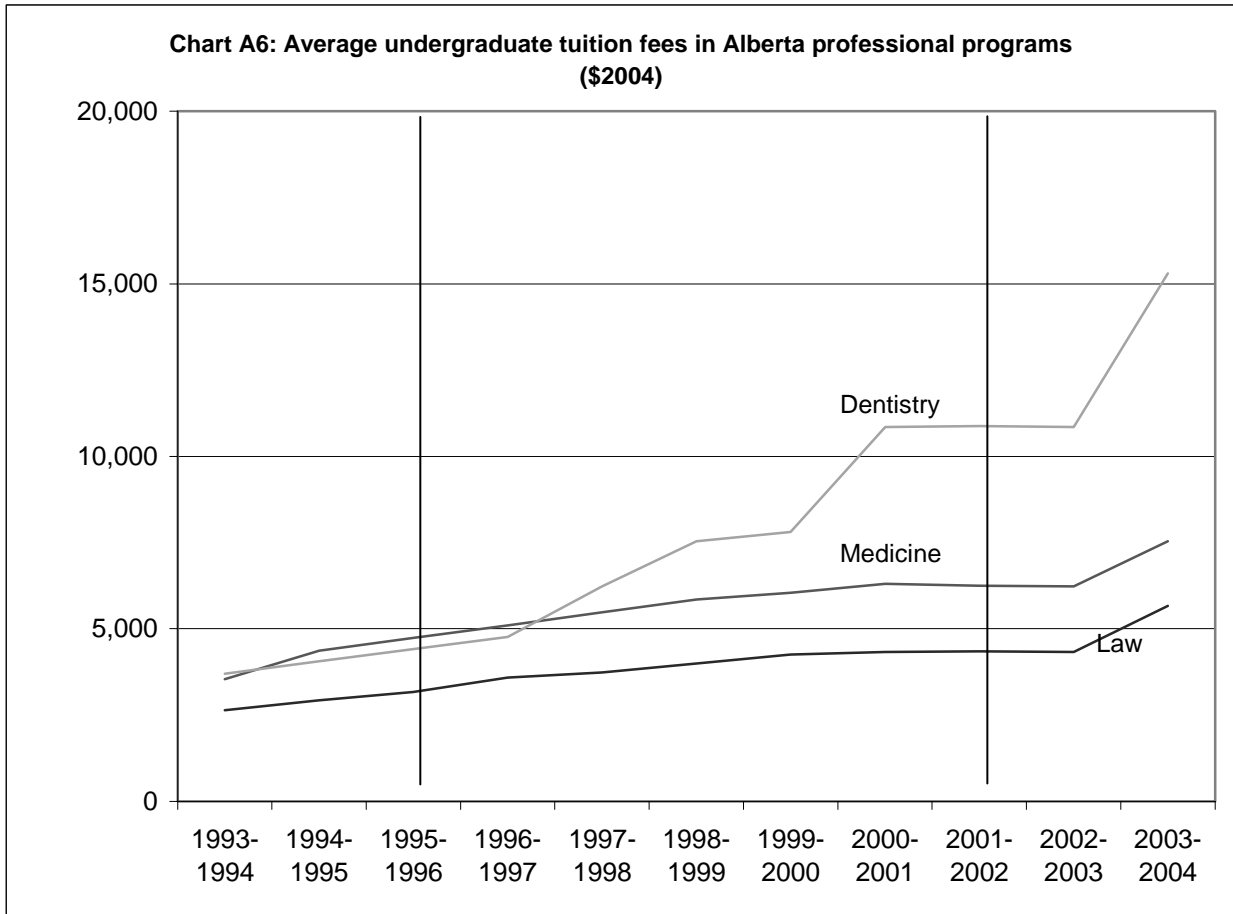


Source: Data from Culture, Tourism, and the Centre for Education Statistics, Statistics Canada.

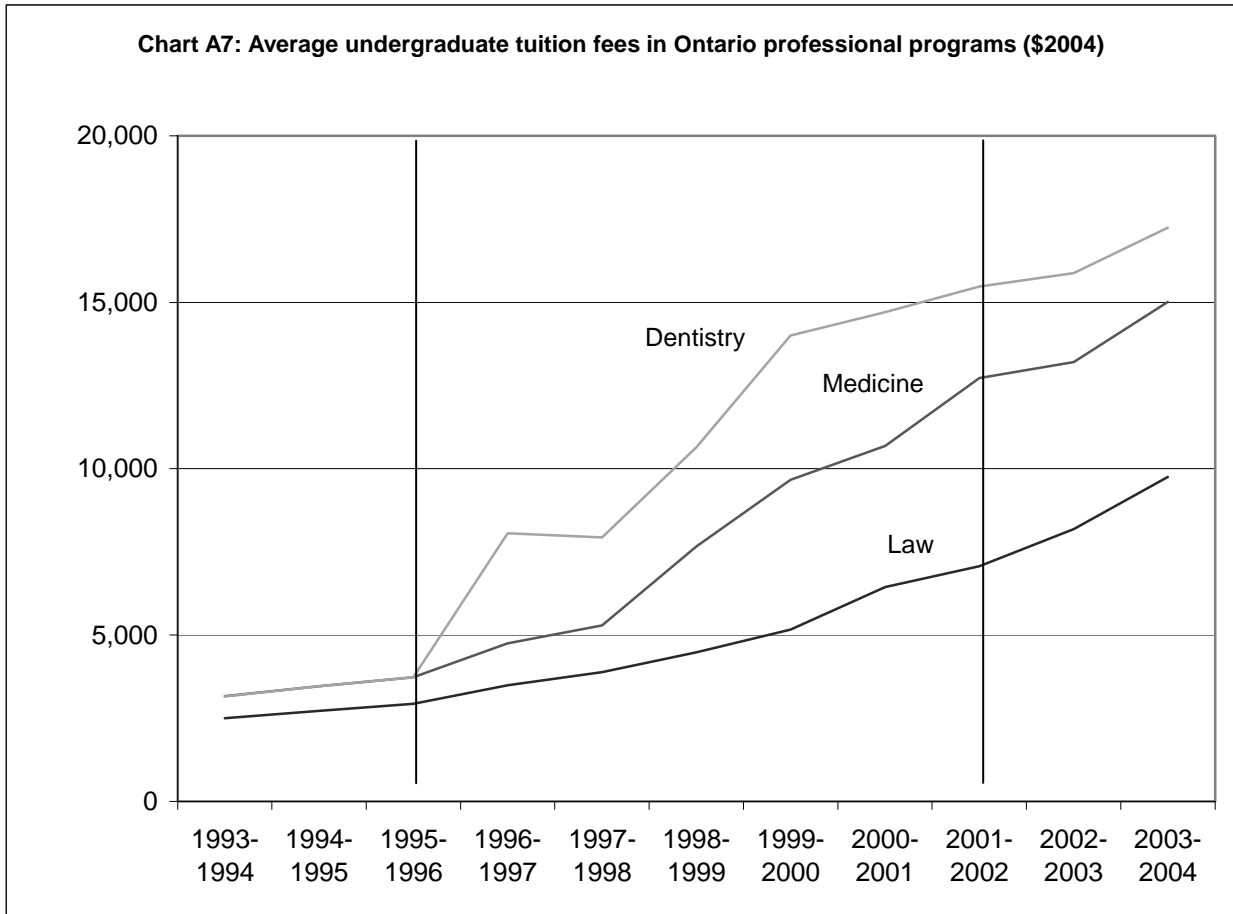




Source: Data from Culture, Tourism, and the Centre for Education Statistics, Statistics Canada.



Source: Data from Culture, Tourism, and the Centre for Education Statistics, Statistics Canada.



Source: Data from Culture, Tourism, and the Centre for Education Statistics, Statistics Canada.

**Table A1: Empirical probability of pursuing a professional degree by selected characteristics**

	<u>1995-1997</u>		<u>2000-2002</u>	
	N	Probability	N	Probability
Parents have...				
No PS qualification	7,145	0.007	6,275	0.010
Non-university PS certificate	2,628	0.011	2,957	0.013
Bachelor's degree	3,352	0.015	4,029	0.012
Master's degree	1,373	0.019	1,729	0.025
Doctorate	763	0.013	836	0.043
Professional degree	537	0.046	469	0.091
Did not receive a scholarship	9,205	0.006	8,998	0.010
Received a scholarship	6,593	0.026	7,302	0.027
Bachelor's degree	9,004	0.012	10,087	0.018
Master's degree	5,136	0.009	4,468	0.009
Doctorate	1,658	0.009	1,745	0.007
Engineering	1,894	0.000	2,342	0.003
Physical and mathematical sciences	1,597	0.008	1,673	0.005
Commerce and related	2,146	0.006	2,107	0.012
Arts and related	8,021	0.011	7,528	0.016
Health and biological sciences	2,140	0.033	2,650	0.038
Male	7,661	0.012	7,322	0.016
Female	8,137	0.011	8,978	0.017
<25 years old at graduation	6,375	0.013	7,057	0.024
25-29 years old at graduation	3,945	0.014	4,100	0.008
>29 years old at graduation	5,478	0.005	5,143	0.006
Not married	8,423	0.017	8,889	0.021
Married	7,375	0.003	7,411	0.009
No dependent children	11,912	0.014	12,595	0.019
Dependent child	3,886	0.001	3,705	0.005
Quebec and British Columbia	4,996	0.007	7,232	0.010
Nova Scotia, Manitoba, Saskatchewan, and Alberta	6,673	0.014	5,094	0.024
Ontario	4,129	0.014	3,974	0.019

Source: National Graduates Survey and author's calculations.

## **References**

- Canadian Federation of Students. 1998. Fact sheet, Vol. 5, No. 5, November 1998. Deregulation of tuition fees.
- Corak, M., G. Lipps and J. Zhao. 2003. *Family income and participation in postsecondary education*. Analytical Studies Research Paper Series. Catalogue No. 11F0019MIE2003210. Ottawa: Statistics Canada.
- Dhalla, I.A., J.C. Kwong, D.L. Steiner, R.E. Baddour, A.E. Waddell and I.L. Johnson. 2002. "Characteristics of first-year students in Canadian medical school." *Canadian Medical Association Journal*. 166, 8: 1029-1035.
- Drolet, M. 2005. *Participation in post-secondary education in Canada: Has the role of parental income and education changed over the 1990s?* Analytical Studies Research Paper. Catalogue No. 11F0019MIE2003243. Ottawa: Statistics Canada.
- Finnie, R., C. Laporte and E. Lascelles. 2004. *Family background and access to post-secondary education: What happened over the 1990s?* Analytical Studies Research Paper Series. Catalogue No. 11F0019MIE2004226. Ottawa: Statistics Canada.
- Frenette, M. 2005. *Is post-secondary access more equitable in Canada or the United States?* Analytical Studies Research Paper Series. Catalogue No. 11F0019MIE2005244. Ottawa: Statistics Canada.
- King, A.J.C., W.K. Warren and S.R. Miklas. 2004. "Study of accessibility of Ontario law schools". Social Program Evaluation Group, Queen's University.
- Knighton, T. and S. Mirza. 2002. "Postsecondary participation: The effects of parents' education and household income." *Education Quarterly Review*. 8, 3: 25-32.
- Kwong, J.C., I.A. Dhalla, D.L. Steiner, R.E. Baddour, A.E. Waddell and I.L. Johnson. 2002. "Effects of rising tuition fees on medical school class composition and financial outlook." *Canadian Medical Association Journal*. 166, 8: 1023-1028.
- Moffitt, R.A. 1999. "New Developments in Econometric Methods for Labor Market Analysis." In *Handbook of Labor Economics 3A*, Chapter 24. O. Ashenfelter and D. Card (eds.). New York: Elsevier.