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University Access Amid Tuition Fee Deregulation: Evidence from Ontario Professional Programs

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Par le passé, des études ont examiné la question de l'accès aux études universitaires face à l'augmentation des frais de scolarité. Ces études ont surtout mis l'accent sur les programmes de premier cycle dans les années 1990, et, en général, leurs résultats ont indiqué peu ou pas de changement dans les modèles de fréquentation universitaire, possiblement parce que les hausses de frais de scolarité étaient alors assez faibles en termes absolus et plutôt graduelles. Cette étude analyse l'impact d'une déréglementation des frais de scolarité, en Ontario à la fin des années 1990, qui a entraîné des hausses soudaines et importantes des frais à encourir pour accéder aux programmes universitaires de médecine, de dentisterie et de droit. Cette fois-ci, les résultats montrent que, en Ontario, où la déréglementation a été plus marquante, les modèles de fréquentation universitaire ont substantiellement changé, en fonction du milieu socioéconomique des étudiants. En comparaison, au Québec et en Colombie-Britannique, où il y a eu un gel des frais de scolarité, on n'a observé aucun changement.

Mots clés : accès à l'université, frais de scolarité, déréglementation des prix

Previous studies investigating university enrolment amid rising tuition fees have focused on undergraduate programs during the 1990s. Typically, little or no changes in enrolment patterns were observed, possibly because the fee increases were small in absolute terms and quite 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 socioeconomic background changed substantially in Ontario, where the deregulation of professional programs was most prominent. In Quebec and British Columbia, where fees remained stable, no change in enrolment patterns was registered.

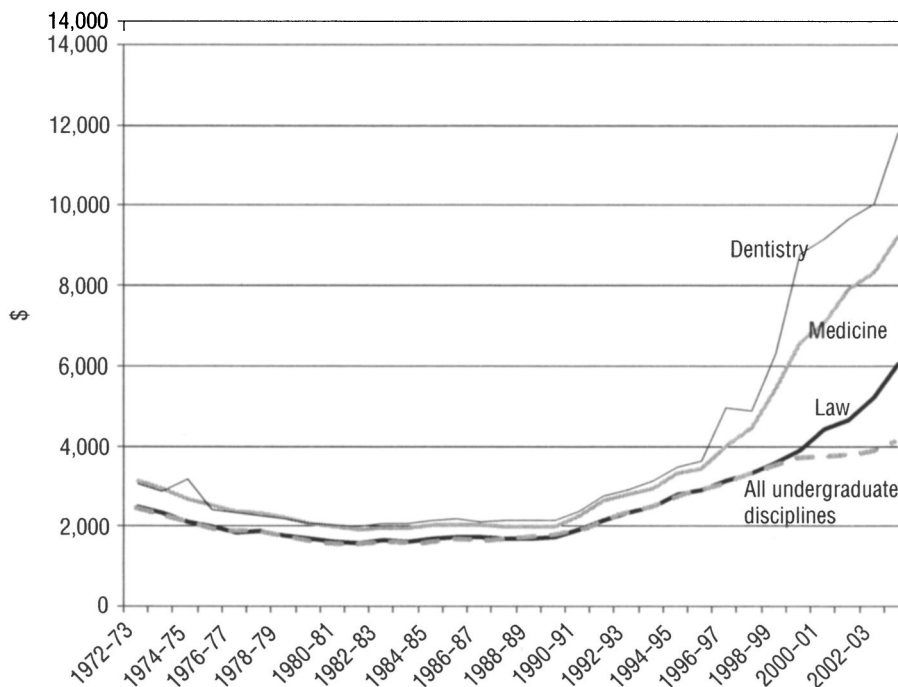
Keywords: university access, tuition fees, price deregulation

INTRODUCTION

After several years of relative stability, real tuition fees in Canadian undergraduate programs almost doubled over the last decade (see Figure 1).¹ 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 socioeconomic background (e.g., family income, parental education). In

FIGURE 1
Average Undergraduate Tuition Fees, Canada (\$2004)



Note: Professional programs in medicine, dentistry, and law are included in “all undergraduate disciplines” in Statistics Canada data. However, fewer than 2 percent of undergraduates pursue professional studies; thus, the figures are influenced almost entirely by non-professional undergraduate programs.

Source: Statistics Canada. 1972/73–2002/03. Tuition and Living Accommodation Costs for Full-Time Students at Canadian Degree-Granting Institutions (TLAC).

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, Lipps, and Zhao 2003; Drolet 2005).²

However, the tuition fee increases were not evenly distributed. As shown in Figure 1, the increases were particularly large in certain professional programs (i.e., medicine, dentistry, and law).³ From 1995/96 to 2001/02, the period for which data were available for this study, real tuition fees across Canada rose by 132 percent in medicine, 168 percent in den-

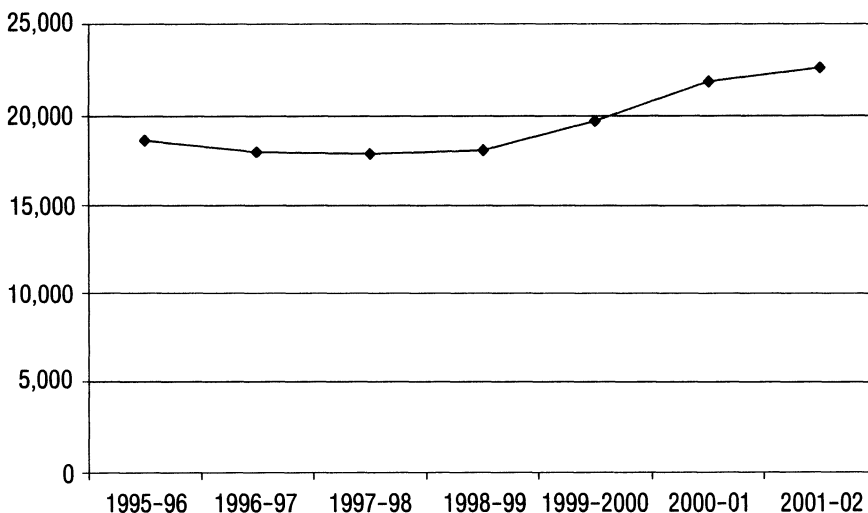
tistry, and 61 percent in law, compared to only 34 percent in all undergraduate disciplines. These increases were largely the result of the trends observed in Ontario, where tuition fees in professional programs were deregulated in 1998. In contrast, Quebec and British Columbia largely maintained their policy of regulating fees over the period 1995/96 to 2001/02. Other provinces had already deregulated fees, or had experimented with deregulation to varying degrees.⁴ The trends in tuition fees in medicine, dentistry, and law in the seven provinces where all of these programs were offered are shown in Figures A1 to A7 in the Appendix.

In Ontario, tuition fees rose dramatically in these three professional programs between 1995/96 and 2001/02. In medicine and dentistry, the increases were particularly large (241 percent and 315 percent, respectively). In law, tuition fees also rose by a considerable amount (141 percent). In contrast, tuition fees fell moderately in all three programs in British Columbia (by between 10 and 12 percent). In Quebec, tuition fees fell by 9 percent in law programs. In medicine and dentistry, tuition fees saw relatively small but not inconsequential increases (29 percent and 14 percent, respectively). In Nova Scotia, Manitoba, Saskatchewan, and Alberta, the increases in tuition fees were situated somewhere in between the two extremes of Ontario on one end of the spectrum, and Quebec and British Columbia on the other.

Previous studies such as Corak, Lipps, and Zhao (2003) and Drolet (2005) focused on the small and gradual increases in tuition fees registered among

undergraduate programs in general. In contrast, this study focuses on the large, sudden increases in tuition fees in professional programs in the late 1990s.⁵ 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, deregulation consisted of lifting a price ceiling, which is expected to result in an increase in both price and quantity. In other words, universities may be willing to expand their enrolment capacity if they receive more revenue per student. Of course, in the short run, quantity may not increase if the universities have a difficult time creating more spaces (i.e., if supply is inelastic). Nevertheless, overall enrolment did increase, as evidenced by Figure 2. From 1995/96 to 2001/02, total enrolment rose by 21 percent. Unfortunately, it was not possible to isolate first-year enrolments.

FIGURE 2
Enrolment in Professional Programs, Canada



Note: Only professional programs in medicine, dentistry, and law are included.

Source: Statistics Canada. 1995/96–2001/02. Enhanced Student Information System (ESIS).

A more central question in this study is, "Given the increase in tuition fees, which students filled these extra spaces?" It is possible that most new spaces were taken by students from well-to-do families, or that richer students took up spaces that would have otherwise been filled by poorer youth.

To date, only two Canadian studies have examined the changing relationship between access to professional programs and socioeconomic background. King, Warren, and Miklas (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 percent of the income distribution and a decrease in the proportion of students from families in the middle 20 percent of the income distribution between 2000 and 2003. Aside from the issue of student-reported income, there was no comparison group in this study (i.e., students from other provinces).

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. The control group consisted of medical students in all other English-speaking provinces. As in the study by King, Warren, and Miklas (2004), students reported their family's income. A second issue of importance concerning Kwong et al.'s study 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 methodology could be problematic if the trends observed among enrollees are 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 sheds new light on the topic by addressing these limitations. Specifically, it will

include data on a comparison group (i.e., students in Quebec and British Columbia, where tuition fees were stable). It will also bypass the difficulties of asking students to report parental income. Instead, parental education (as reported by the student) will be used to classify socioeconomic status. Arguably, students are better informed about their parents' education than their income.

The results suggest that over the period of rapidly increasing tuition fees in professional programs, enrolment 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 post-secondary qualifications. The only group that saw a decline in enrolment consisted of Ontario students whose parents had post-secondary 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 enrolment patterns by socioeconomic background were registered.

These findings have important implications for the literature on the impact of tuition fees on university access. Corak, Lipps, and Zhao (2003) and Drolet (2005) find large differences in enrolment rates across the socioeconomic spectrum. However, they find that this relationship was unaltered over a period of rising tuition fees. This finding might relate to the fact that the rise in tuition fees was small in absolute terms (about \$2,000) and gradual (over ten years). If the rising trend was evident for years, students and parents could have prepared well in advance for the anticipated higher costs. Furthermore, student loan 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).

METHODS

The ultimate goal of this paper is to assess the relationship between the probability of pursuing professional studies and socioeconomic background, as measured by parental education. The approach is a difference-in-difference estimation: essentially, I will compare the change in the magnitude of this relationship before and after tuition fee deregulation and between regions that underwent deregulation and those that did not.

In a simple educational choice model, recent university graduates will choose to pursue a professional degree if the expected discounted value of the net returns of doing so is greater than the expected returns of entering the labour force immediately or pursuing other studies. Since the returns and costs are not known for every individual, it is standard practice to rely on observable characteristics that are associated with the costs and benefits of going on. To model this relationship, I estimate a simple linear probability model where the dependent variable is dichotomous and indicates whether the graduate pursued a professional degree or not, and the explanatory variables include a host of socioeconomic background and demographic characteristics.⁶ Separate models are estimated for each region and time period.

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).⁷ 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 post-secondary 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 (or a university certificate program above a bachelor's degree), a master's degree, or a doctorate without previously completing a professional degree are examined in this study since they are all "at risk" of pursuing degrees in medicine, dentistry, and law.⁸ Master's and doctoral graduates are combined in the analysis since the latter group is too small to analyze separately. Descriptive statistics suggested that students in both groups have about the same likelihood of pursuing a professional degree.

Although the NGS contains no information on family income, it specifies in detail the highest level of education obtained by the father and mother, thus allowing researchers to link the pursuit of professional studies to socioeconomic background. This study examines the highest level of education achieved by either parent, categorized as follows: no post-secondary education, a non-university post-secondary certificate, a bachelor's degree, and an "advanced" degree (i.e., a master's, doctorate, or professional degree). Two recent studies conclude that parental education is more strongly associated with university access than family income (Knighton and Mirza 2002; Drolet 2005).

As previously mentioned, the identification of the relationship between tuition fee increases in professional programs and socioeconomic background is drawn from the substantial level of provincial variation in tuition increases observed in the late 1990s. To capture this variation, recent graduates are grouped into three categories, according to the extent of tuition fee increases in their province:⁹

- no substantial increases (Quebec and British Columbia),
- moderate increases (Nova Scotia, Manitoba, Saskatchewan, Alberta), and

- large increases (Ontario).

Ontario students comprise the group of interest, while Quebec and British Columbia students are the comparison group. Students in Nova Scotia, Manitoba, Saskatchewan, and Alberta can be thought of as the intermediate group.¹⁰ The samples exclude students living outside of these provinces (i.e., those living in Newfoundland, Prince Edward Island, and New Brunswick).

As shown in Table 1, a larger proportion of graduates from the class of 2000 pursued a professional degree within two years (1.6 percent) compared to the class of 1995 (1.2 percent). Most students who pursued a professional degree chose 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 education about 30 years prior, when post-secondary 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*.¹¹ The proportion of recipients rose over the late 1990s, which meant rising average dollar amounts of awards.¹²

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. 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 one-third lived in Quebec or British Columbia. The remainder (about one-fifth) lived in Nova Scotia, Manitoba, Saskatchewan, or Alberta.

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

RESULTS

A series of linear probability models were estimated in order to account for observable differences among students along the socioeconomic spectrum. We begin with national level results (Table 2). The models are not estimated separately by region yet, since the focus here is simply to begin understanding the process of pursuing professional studies in general, which may be quite different than the process underlying the pursuit of regular undergraduate studies (a topic we know far more about).

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 3.4 percentage point advantage in pursuing a professional degree of their own over students whose parents had no post-secondary qualifications (the reference group). This is a large difference, considering that fewer than 2 percent 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, from no advantage in 1995/97 to a statistically significant 2.7 percentage

TABLE 1
Sample Means of the Variables Used in the Analysis

<i>Variables</i>	<i>1995–1997</i>	<i>2000–2002</i>
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 post-secondary (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 ^a	0.029	0.027
Received a scholarship ^b	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 ^c	0.062	0.071
Commerce and related ^d	0.159	0.194
Arts and related ^e	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 ^f	0.373	0.364
Dependent child ^f	0.175	0.174
Quebec and British Columbia	0.350	0.363
Nova Scotia, Manitoba, Saskatchewan, and Alberta	0.204	0.187
Ontario	0.446	0.450
<i>N</i>	15,798	16,300

Note: Samples with missing information on any of these variables were excluded, which accounted for less than 3 percent of the original samples.

^aIncludes professional degrees in medicine, dentistry, law, veterinary medicine, optometry, and theological studies.

^bRefers to the most recently completed degree.

^cIncludes physical sciences, mathematics, and computer science.

^dIncludes commerce, non-professional law programs, and economics.

^eIncludes arts, humanities, education, and social sciences (excluding economics).

^fAs of the interview date.

Source: Statistics Canada. 1997, 2002. National Graduates Survey (NGS).

TABLE 2
Ordinary Least Squares Results – Probability of Pursuing a Professional Degree

Variables	1995–1997		2000–2002	
	Coefficient	t-statistic	Coefficient	t-statistic
Parents have ...				
non-university post-secondary certificate	0.003	1.33	-0.001	-0.32
bachelor's degree	0.005	2.20	-0.001	-0.45
master's degree	0.009	2.89	0.011	3.18
doctorate	0.001	0.12	0.027	5.50
professional degree	0.034	6.65	0.076	12.25
Scholarship amount/\$10,000	0.015	7.87	0.008	5.08
(Schol. amount/\$10,000)*graduate degree	-0.015	-6.75	-0.007	-4.08
Graduate degree	0.004	1.46	-0.002	-0.59
Physical and mathematical sciences	0.007	1.60	0.002	0.44
Commerce and related	0.008	2.25	0.014	3.22
Arts and related	0.015	4.58	0.017	4.16
Health and biological sciences	0.034	8.31	0.036	7.62
Female	-0.004	-2.21	-0.003	-1.46
Age at graduation	0.000	-1.21	-0.001	-4.44
Married	-0.011	-5.45	-0.004	-1.69
Dependent child	-0.004	-1.39	-0.002	-0.78
Quebec and British Columbia	-0.006	-2.43	-0.012	-4.31
Ontario	0.000	-0.20	-0.005	-1.90
Constant	0.006	1.09	0.025	4.09
Adjusted R ²		0.017		0.024
N		15,798		16,300

Note: *The variable "(Scholarship amount/\$10,000)" is interacted with the variable "graduate degree."

Source: Statistics Canada. 1997, 2002. National Graduates Survey (NGS).

point advantage in 2000/02. For students with a parent who held a master's degree, the advantage was smaller yet still significant in both periods; however, it increased only moderately.

Interestingly, students of parents who hold bachelor's degrees have little or no advantage over students whose parents hold no post-secondary qualifications. Recent studies that have examined access to undergraduate university programs 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, Laporte, and Lascelles 2004; Drolet 2005). Evidently, this is not the case for professional studies.

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

There is weak evidence that females, older students, married students, as well as those with dependent children are less likely to pursue a professional degree than their reference groups. In short, the coefficients on these variables are negative, but not always statistically significant even at

10 percent. Students in Quebec and British Columbia, where tuition fees are lowest, are the least likely group to pursue professional studies.

Which factors influence the *type* of professional degree pursued? To shed light on this issue, similar regressions were estimated on the group of students who pursued a professional degree (Table 3). In this case, the dependent variable indicates whether the student chose to pursue a law degree or not (medicine and dentistry were combined, since there were too few dentistry students to form separate categories).¹³ Note that graduate and professional degrees are grouped together for the remainder of the study due to lower sample sizes.

TABLE 3
Ordinary Least Squares Results – Probability of Selecting Law as Opposed to Medicine/Dentistry, Conditional on Pursuing a Professional Degree

Variables	1995–1997		2000–2002	
	Coefficient	t-statistic	Coefficient	t-statistic
Parents have ...				
non-university post-secondary certificate	0.054	0.65	-0.159	-1.92
bachelor's degree	-0.025	-0.33	-0.041	-0.54
graduate or professional degree	0.010	0.14	-0.077	-1.17
Scholarship amount/\$10,000	-0.165	-5.06	-0.138	-3.91
(Schol. amount/\$10,000)*graduate degree	0.138	2.96	0.150	3.56
Graduate degree	-0.145	-1.49	-0.160	-1.44
Commerce, arts, and related	0.573	4.69	0.398	2.99
Health and biological sciences	-0.094	-0.78	-0.182	-1.37
Female	-0.024	-0.46	0.141	2.59
Age at graduation	0.006	0.90	0.032	3.36
Married	0.018	0.19	0.050	0.75
Dependent child	0.096	0.49	-0.108	-0.78
Quebec and British Columbia	-0.027	-0.36	-0.032	-0.46
Ontario	-0.009	-0.14	-0.086	-1.43
Constant	0.190	0.93	-0.319	-1.22
Adjusted R ²	0.606		0.527	
N	175		209	

Note: *The variable "(Scholarship amount/\$10,000)" is interacted with the variable "graduate degree."

Source: Statistics Canada. 1997, 2002. National Graduates Survey (NGS).

First, family background matters less when it comes to the type of professional degree chosen. On the other hand, the student's educational background matters quite a lot. Students with higher scholarships at the bachelor's degree level are far more likely to pursue medicine or dentistry. This preference 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, the presence of dependent children, and region are generally not associated with the choice made between law and medicine/dentistry.

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 on enrolment 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, neither of which are statistically significant). In the provinces that saw moderate increases in tuition fees (Nova Scotia, Manitoba, Saskatchewan, and Alberta), a more solid increase in enrolment 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). There was also a substantial decline in the advantage held by Ontario students whose parents had a non-university post-secondary certificate or a regular undergraduate degree over students whose parents held no post-secondary certificate at all. Such was not the case in the other regions.¹⁴

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 are shown separately by region in Figures 3, 4, and 5. The results suggest that enrolment 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 (Figure 3). Provinces that saw moderate tuition fee increases also saw moderate changes in enrolment patterns by socioeconomic background (Figure 4).

Changes in enrolment patterns by socioeconomic background were most prominent in Ontario (Figure 5). First, students whose parents held a graduate or professional degree saw their probability of enrolment rise from 2.4 percent to 5.2 percent over the period. However, students whose parents had no post-secondary qualifications also saw an increase, from 0.5 percent to 1.2 percent. 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 gap 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 gap may matter most to them. Although institutions and policy-makers may also strive to achieve equity, the cost of achieving it may be a consideration. In this sense, the size of the absolute gap may also be important for institutions

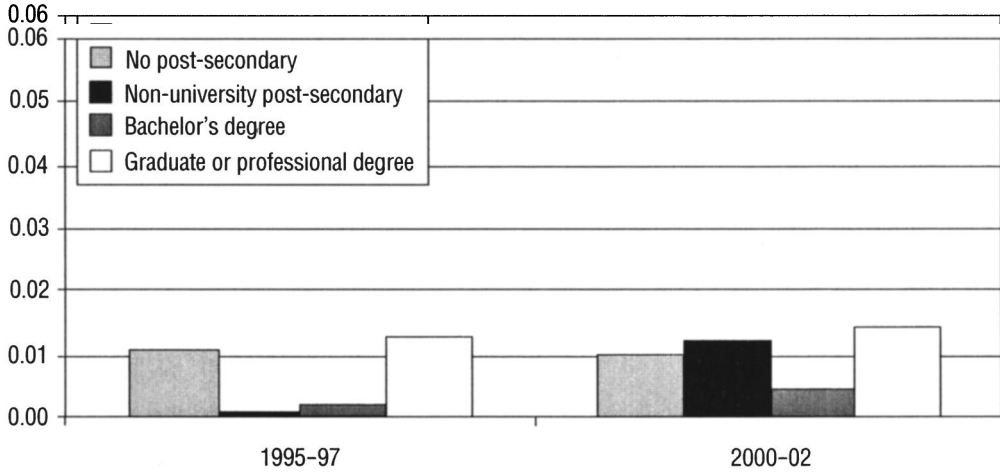
TABLE 4
Ordinary Least Squares Results – Probability of Pursuing a Professional Degree by Region

Variables	No Substantial Increases (Quebec and British Columbia)		Moderate Increases (Nova Scotia, Manitoba, Saskatchewan, and Alberta)		Large Increases (Ontario)	
	1995–1997 Coefficient	2000–2002 t-statistic	1995–1997 Coefficient	2000–2002 t-statistic	1995–1997 Coefficient	2000–2002 t-statistic
Parents have ...						
non-university post-secondary certificate	-0.010	-3.01	0.002	0.72	-0.001	-0.13
bachelor's degree	-0.009	-2.66	-0.005	-1.67	0.009	2.25
graduate or professional degree	0.002	0.68	0.005	1.46	0.012	2.71
Scholarship amount/\$10,000	0.000	-0.10	0.007	3.34	0.023	7.85
(Schol. amount/\$10,000)* graduate degree	0.000	0.12	-0.006	-2.83	-0.021	-6.18
Graduate degree	-0.001	-0.39	-0.003	-0.88	0.004	0.88
Commerce, arts, and related	0.008	2.13	0.009	2.59	0.007	1.60
Health and biological sciences	0.019	3.81	0.010	2.22	0.036	6.04
Female	-0.002	-0.91	0.002	0.93	-0.011	-3.54
Age at graduation	0.000	-1.78	0.000	-2.45	-0.001	-2.16
Married	-0.009	-3.43	-0.008	-3.08	-0.009	-2.63
Dependent child	-0.002	-0.62	0.002	0.52	-0.005	-1.25
Constant	0.018	3.04	0.015	2.58	0.022	2.96
Adjusted R ²	0.009		0.007		0.024	
N	4,996		7,232		6,673	
					0.025	0.026
					4,129	3,974

Note: *The variable "(Scholarship amount/\$10,000)" is interacted with the variable "graduate degree."

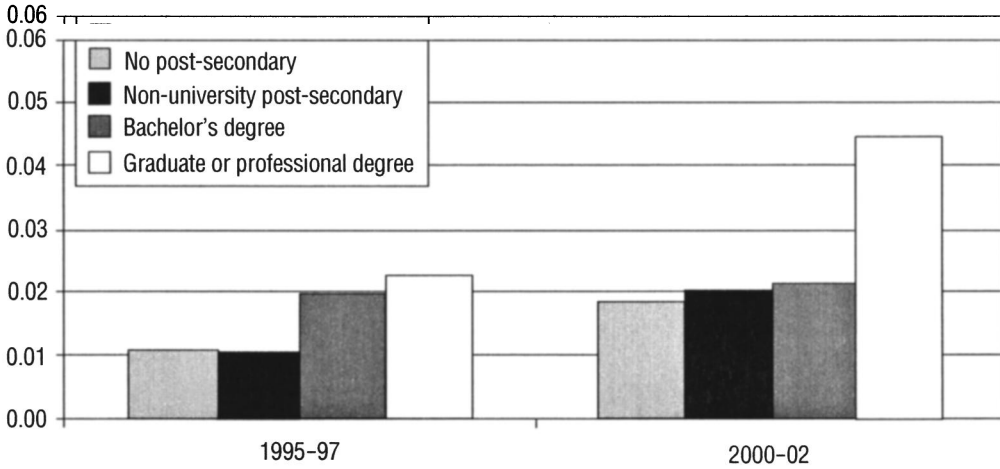
Source: Statistics Canada, 1997, 2002. National Graduates Survey (NGS).

FIGURE 3
 Predicted Probability of Pursuing a Professional Degree by Parental Education – No Substantial Tuition Fee Increases



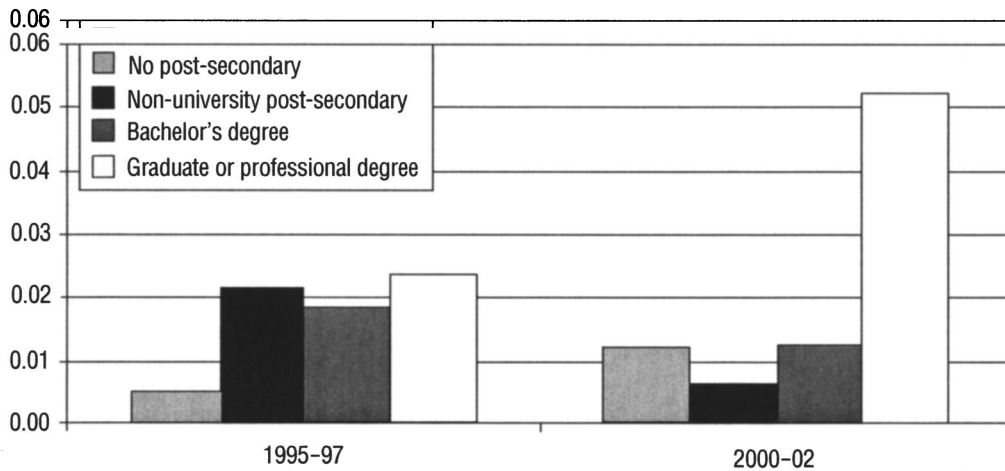
Source: Statistics Canada. 1997, 2002. National Graduates Survey (NGS).

FIGURE 4
 Predicted Probability of Pursuing a Professional Degree by Parental Education – Moderate Tuition Fee Increases



Source: Statistics Canada. 1997, 2002. National Graduates Survey (NGS).

FIGURE 5
 Predicted Probability of Pursuing a Professional Degree by Parental Education – Large Tuition Fee Increases



Source: Statistics Canada. 1997, 2002. National Graduates Survey (NGS).

and policy-makers since it is related to the cost of achieving equity.

Three factors may have prevented a decline in enrolment 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 percent of the tuition fee increases following deregulation had been returned to students in the form of student aid for those in need.¹⁵ Second, students living in provinces where tuition fees increased rapidly could have applied to programs in provinces with more stable tuition fees.¹⁶ Third, capacity in professional programs across Canada was increasing substantially at the time. This may have been the result of price deregulation or changing supply and demand conditions in the market for professional graduates.

The situation was markedly different for Ontario's "middle-class" students whose parents had post-secondary qualifications below a graduate or

professional degree. These students saw their probability of enrolment 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.

CONCLUSION

This study examined the changing relationship between enrolment in professional programs in medicine, dentistry, and law among recent bachelor's degree graduates and their socioeconomic 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 enrolment patterns by socioeconomic background changed substantially in

Ontario, where tuition fee 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 post-secondary qualifications. The only group that saw a decline in enrolment consisted of Ontario students whose parents had post-secondary qualifications below the graduate or professional level. In Quebec and British Columbia, where tuition fees were frozen over the period, no substantial changes in enrolment patterns by socioeconomic background were registered.

Three factors may have prevented a decline in enrolment among students from disadvantaged backgrounds. First, in Ontario, where deregulation was most prominent, student aid was adjusted to ease the burden for students in need. Interestingly, enrolment fell among Ontario students whose parents had post-secondary 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. Had this option not been available, it is possible that some disadvantaged students would have been further deterred from pursuing a professional degree. By the same token, one might wonder about the effects of nationwide price deregulation in professional programs. Given that the alternative of studying abroad would then 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 price deregulation, but perhaps also as a result of changing supply and demand conditions in the market for professional graduates).

In terms of further research, a clearer understanding of the supply elasticity of university educational

programs would be a useful next step, because 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 in the Introduction, 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 between more and less affluent students 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).

Finally, this study will no doubt inform policy-makers on the potential implications of tuition fee deregulation. However, it is important to appreciate the scope of the Ontario experience: these increases were implemented in a sudden and dramatic fashion. It may be potentially misleading to assume that the outcomes in Ontario would hold under *any* tuition fee deregulation scheme, regardless of depth or speed. What this study does show is that the composition of students can *potentially* change following tuition fee deregulation, especially if the increases are large and sudden, as was the case in Ontario.

NOTES

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, Lipps, and Zhao (2003) examined enrolment patterns by parental income from 1980 to 1997, while Drolet (2005) examined enrolment by parental income and education from 1993 to 2001.

³ Professional degrees, such as engineering and architecture, are excluded from this study since they are typically first degrees following high school. Studying access to such programs would thus require data on students at risk of pursuing these degrees (i.e., recent high school graduates). Other professional degrees that

normally follow a first undergraduate degree (e.g., optometry, veterinary medicine) are also excluded since Statistics Canada does not maintain any data on tuition fees for these programs.

⁴ See Canadian Federation of Students (1998, Fact Sheet 5) for more details on the deregulation of tuition fees across Canada.

⁵ 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. In MBA programs, however, students are expected to pay for most or all of their education. 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.

⁶ A well-known 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 subgroups 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 thorough discussion of the validity of using linear probability models. Note that logit and probit models were also estimated and yielded qualitatively similar results.

⁷ Data from previous graduation classes cannot be used in this study because of an important break in the parental education variable.

⁸ 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 percent 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.

⁹ Note that the residence at the time of the interview is used in this classification since the province of the institution attended after the undergraduate program is only available for the class of 2000. Since the interviews were conducted in the summer months (i.e., from May to July 1997 for the class of 1995, and from May to August 2002

for the class of 2000), the classification is likely based on the student's usual place of residence. Note that the results were invariant to using the province of the institution for the post-deregulation period (i.e., 2000).

¹⁰ The one exception is Saskatchewan dentistry, which saw massive increases in tuition fees. However, very few students chose dentistry. In fact, I dropped Saskatchewan from the analysis altogether, and the results remained stable.

¹¹ To reduce the likelihood that grants or bursaries based on financial needs would be included (and to better identify merit-based awards), respondents were asked about grants and bursaries prior to being asked about scholarships based on academic achievements.

¹² 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 models in this study are estimated for each time period, and the differences among students observed *at any point in time* are likely to be more strongly correlated with differences in academic achievements.

¹³ Among the 1995–1997 cohort, the sample of graduates who pursued medicine, dentistry, and law was 94, 14, and 67, respectively. Among the 2000–2002 cohort, the sample sizes were 100, 28, and 83 (in the same order).

¹⁴ Results from a pooled model including all three regions and both periods suggest that these two trends observed in Ontario were also significantly different than in the other regions from a statistical point of view.

¹⁵ The student's "unmet needs" (i.e., after government loans and other sources) were taken into account when assessing the size of the grant. Since many university graduates are not considered dependent on their parents, parental socioeconomic background was not directly used, although some factors that may be linked to the parents' income were often taken into consideration, such as income from a Registered Education Savings Plan (RESP), ownership of a vehicle, and the gross value of investments. Similar information is collected on the Ontario Student Assistance Program (OSAP) form. In fact, King, Warren, and Miklas (2004) report that law students whose fathers had no post-secondary qualifications expected to incur greater debt throughout their law program than students of better educated parents: as of 2003, 38 percent of them expected to incur \$50,000 or more in debt, compared to

29 percent for the middle-educated group (college/trade certificate or a bachelor's degree), and 23 percent for graduate or professional degree holders. Although no evidence exists for medical programs, recall that tuition hikes were much larger in these programs.

¹⁶ Recall that the province of the institution attended after the undergraduate program is available only for the class of 2000.

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APPENDIX

FIGURE A1
Average Undergraduate Tuition Fees for Professional Programs in Quebec (\$2004)

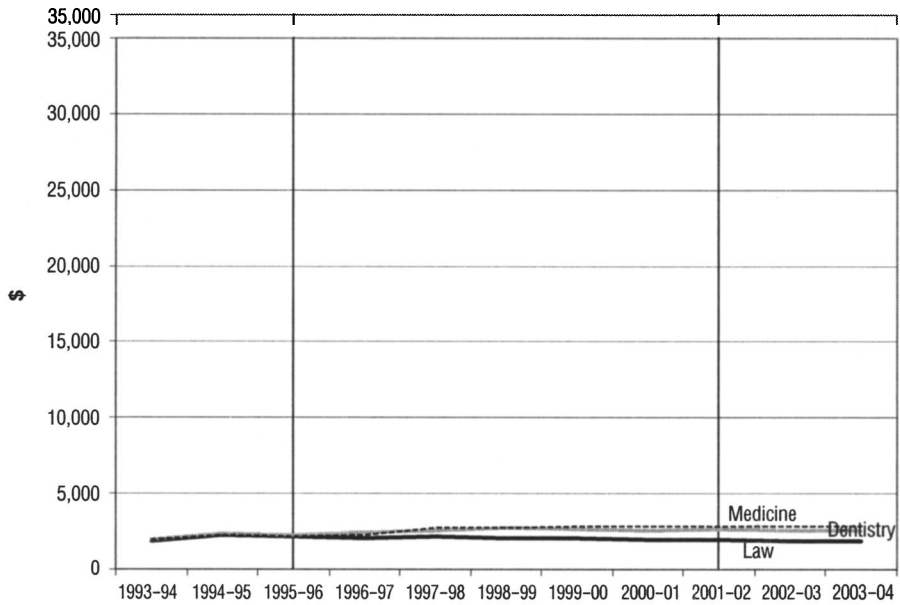


FIGURE A2
Average Undergraduate Tuition Fees for Professional Programs in British Columbia (\$2004)

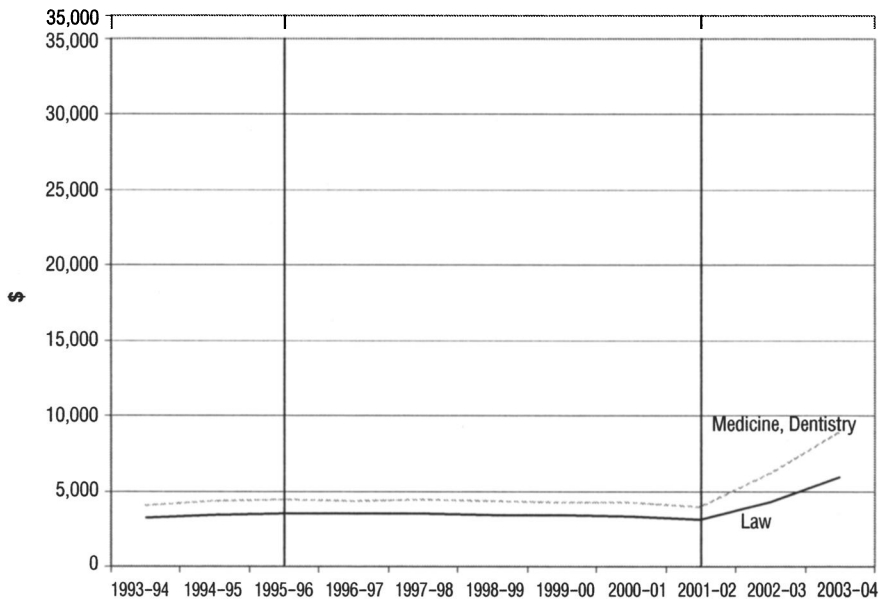


FIGURE A3
Average Undergraduate Tuition Fees for Professional Programs in Nova Scotia (\$2004)

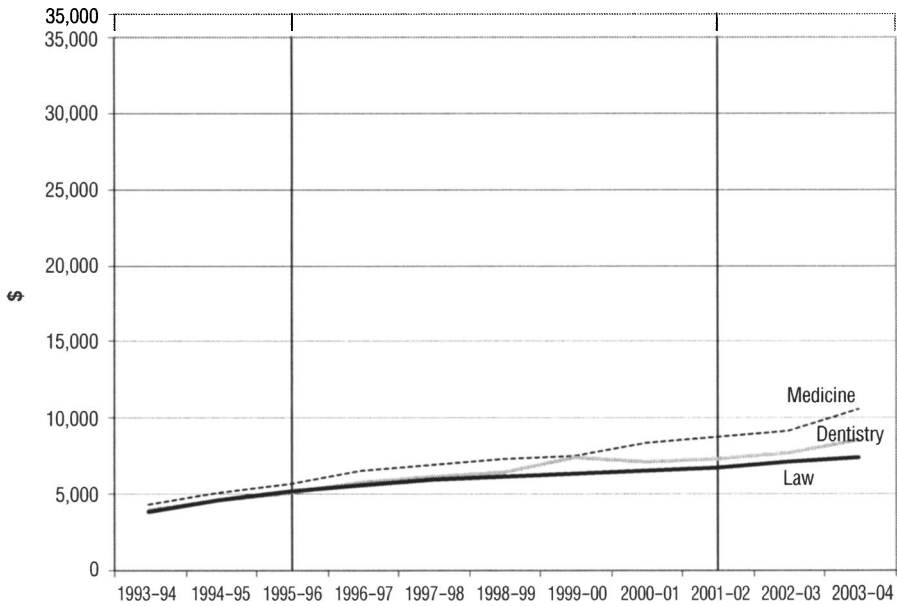


FIGURE A4
Average Undergraduate Tuition Fees for Professional Programs in Manitoba (\$2004)

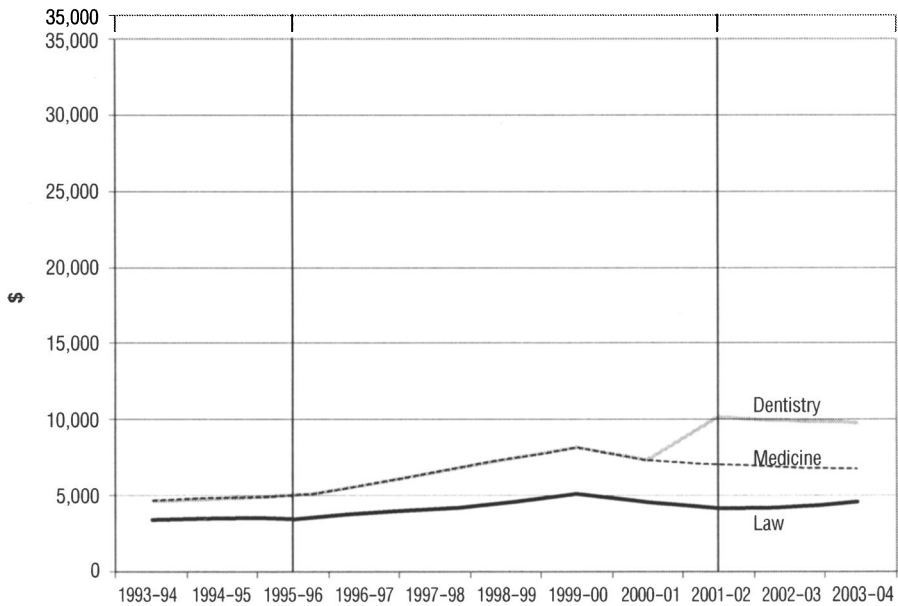


FIGURE A5

Average Undergraduate Tuition Fees for Professional Programs in Saskatchewan (\$2004)

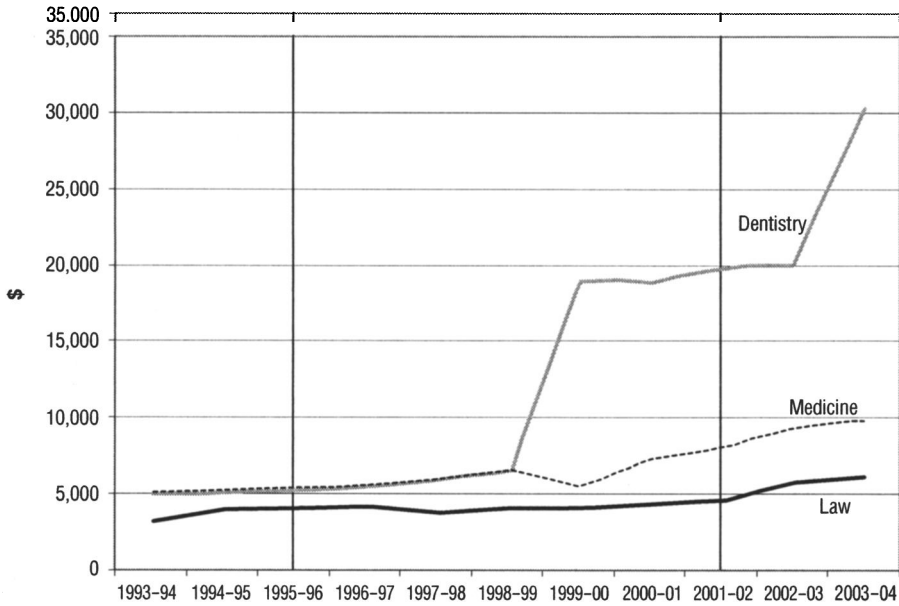


FIGURE A6

Average Undergraduate Tuition Fees for Professional Programs in Alberta (\$2004)

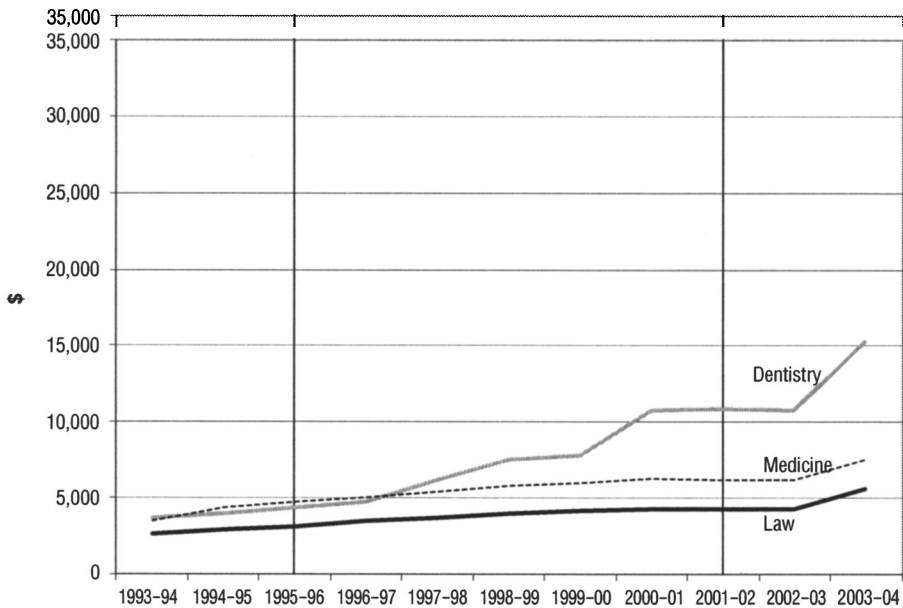
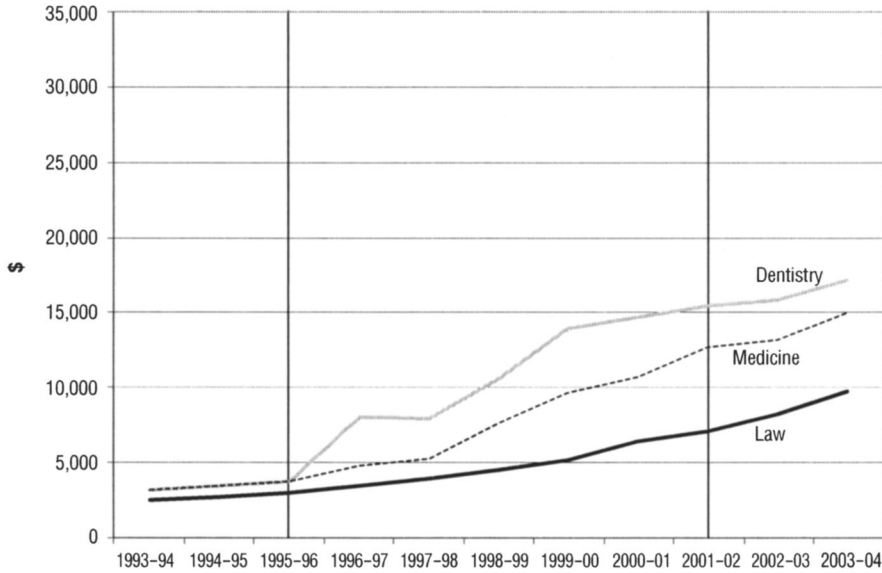


FIGURE A7
FIGURE A7

Average Undergraduate Tuition Fees for Professional Programs in Ontario (\$2004)



Note: The period of study corresponds with the availability of data and lies within the vertical lines.

Source: Statistics Canada. 1972/73–2002/03. Tuition and Living Accommodation Costs for Full-Time Students at Canadian Degree-Granting Institutions (TLAC).

TABLE A1
Empirical Probability of Pursuing a Professional Degree by Selected Characteristics

	1995-1997		2000-2002	
	<i>N</i>	<i>Probability</i>	<i>N</i>	<i>Probability</i>
Parents have ...				
no post-secondary (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: Statistics Canada. 1997, 2002. National Graduates Survey (NGS).