Postsecondary Education and the Labour Market in Ontario

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ABSTRACT

Educational attainment in Ontario has increased significantly over the last two decades and public policy continues to promote increased participation in the province's colleges and universities. Using the National Graduates Surveys and Census data, this report examines the evolution of labour market outcomes for postsecondary graduates from 1986 through 2005 to determine whether the number of graduates and their field of study choices match the general needs of the province's labour market. Although there is some evidence that there are not enough college and university graduates from the technologically oriented programs, growing earnings premia to higher education provide strong evidence to suggest that there is a continued need for the increasing supply of college and university graduates in the province.

EXECUTIVE SUMMARY

- From 1986 to 2005, the number of male and female university graduates in Ontario increased by 43 and 91 per cent, respectively. The number of college graduates increased by 50 per cent for men and 61 per cent for women.

- To determine whether these large increases in the supply of highly educated labour exceed (or fall short of) the needs of Ontario's labour market, the labour market outcomes of various National Graduates Survey (NGS) cohorts are examined from the graduating class of 1986 to the class of 2005. The organizing principle is that gaps between growth in supply and demand should be reflected in the usual labour market signals of changing relative earnings and unemployment experiences. As well, the NGS data will tell us if these graduates have experienced any changes in the degree of over-qualification.

- Some results are now available from the 2006 Census and research has shown that, at the national level, those with higher education continue to enjoy earnings advantages over those with less and these advantages have continued to grow from the 2005 to the 2006 Census.

- The National Graduates Surveys have very detailed information on programs of study and labour market outcomes two and five years after graduation. The sample sizes for Ontario, however, become too small to support detailed analysis by gender and by field of study. The NGS data have therefore been augmented with information from Statistics Canada's Enhanced Student Information System and the series of public use microdata files from the Censuses.

- There has been significant growth in overall graduation from Ontario's PSE system, as was mentioned above. There is also some movement between fields of study in Ontario. The share of education, humanities, social and behavioural sciences graduates from university Bachelor's programs has fallen from 1992 to 2007 while the shares of business and management and health have risen. There has been no change in the combined share of physical sciences and mathematics and computer sciences. Among college graduates, the share of diplomas granted in Ontario to those in the humanities and social sciences has increased. Again, there has been no real change in the combined share of physical sciences and mathematics and computer sciences.

- The National Graduates Surveys were used to examine annualized real earnings of graduates two years after graduation, relative to the earnings of young Ontario workers. While there is some growth in the relative earnings of women with Bachelor's degrees between the 1986 and the 2005 cohorts, the patterns for men (both college and university) show more variability in growth over the period.

- More robust estimates of the earnings advantages to those with diplomas or degrees were made using Census data. These estimates show a monotonic increase in the earnings premia to a degree or diploma (compared to high school completion only) for both genders. This is the most compelling evidence in favour of the proposition that the supply of highly educated labour in Ontario is not exceeding the market's demand for such labour.

- Earnings differences by field of study shed light on the quality of the match between enrolment patterns and labour market needs. There are persistent differences in earnings by field of study and the variability across fields appears to have increased among university graduates. Engineering, mathematics and computer science fields saw significant increases in relative earnings which, when coupled with the constant share of university graduates represented by these students, suggest a growing excess demand for them.

- There is no increase in the variability of earnings across fields of study among Ontario's community college graduates, suggesting that colleges (and their students) have reacted more quickly to changes in the mix of demand for skills over the period.

- Unemployment rates among the province's graduates, two years after graduation, fell relative to the unemployment rates of other young Ontario workers from the 1986 to the 1991 cohort but then rose during the rest of the period. It is difficult to reconcile this with growing earnings premia to higher education over the same period.

- To examine the match between the skills acquired by graduates and the skills needed by their jobs, the NGS data were used to estimate the incidence of self-reported over-qualification. The proportion of university graduates who reported that their skills exceeded the requirements of their jobs fell significantly among both males and females

through the cohorts. There was only a slight reduction in the proportion among college graduates.

- The latter finding, coupled with the growing earnings advantage among college and university graduates in Ontario, suggests that there is not a general over-education of Ontario's young labour force despite the large increase in the supply of highly educated labour. The field of study effects do suggest that there may not be enough students emerging from the technologically oriented programs in mathematics, computer sciences, and engineering.

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I. INTRODUCTION

From 1993 to 2006, the proportion of Ontario's population aged 25 to 64 with college certificates grew from 23 to 31 per cent while the proportion with university degrees grew from 19 to 29 per cent.[1] The general presumption is that in the new economy where knowledge is replacing physical resources as the driver of economic growth, prosperity depends on a highly skilled labour force. Indeed, government policy with respect to higher education has been focussed on increasing access to postsecondary education (PSE), a focus that is justified by the connection between higher education and prosperity (as well as the potential for increased access to equalize economic opportunity across individuals). The extraordinary increase in the educational attainment in the province's labour force must therefore be welcome.

Although more is generally regarded as better when it comes to higher education, an expansion in higher education of the magnitude and of the speed witnessed in Ontario does raise a legitimate question of whether there has been too much growth in educational attainment. Are there now too many college and university graduates in Ontario? Of course, the term "too many" needs definition and there are two that may apply. The first is based on the notion that there is an imbalance of supply in the labour market in the sense that the supply of college and university graduates relative to, say, skilled tradespeople exceeds the relative demands of the labour market. The second concept of "too many" sometimes heard in higher education debates is that the so-called "massification" of higher education has extended the reach of PSE too far down the ability distribution. Today's crop of PSE students might then be, on average, less able. Under either concept of what constitutes too many college and university students, this broad *over-education* of the labour force would represent a misallocation of social resources and an unnecessary strain on the provincial budget.

A slightly different but related issue might be termed the *skills mismatch* problem. Whether or not the correct number of graduates is emerging from Ontario's PSE system, we can ask if

[1] Canadian Council on Learning Datawarehouse.

those students studied the right subjects. Concerns have been raised by industry that the pattern of enrolments does not match the pattern of skill needs in the labour market and, more specifically, there is a suspicion that undergraduate degrees in fields such as the Arts and Humanities have little currency in the labour market. An on-going concern among policy makers and an issue that has been a perennial subject of labour market analysis since at least the 1950s is a perceived shortage of PSE graduates in the sciences and technology. Matters are not quite so clear-cut, however. Prominent information technology business leaders in Canada have gone so far as to issue a public statement reaffirming the need for liberal arts graduates in their own enterprises, arguing that a shift in programs of study from the liberal arts to more vocational fields is not warranted.[2]

In the face of these kinds of contradictions, assessing the state of the PSE sector in Ontario and its fit with labour market needs is appropriate and useful. It is important to note at the outset that undertaking this research should not be taken to mean that supplying the labour market with skilled labour in the correct proportions is the primary purpose of Ontario's PSE sector. The province's universities and colleges have a much broader mandate of innovation, research, and social development.

The purpose of the proposed research is to address two principal questions about the province's university and college sectors:

- Is there any evidence of a general over-supply of university and/or college graduates?
- How do the fields of study among graduates of Ontario's PSE system line up with labour market needs for specific bundles of skills?

[2] Rushowy, "The CEO's Artfully Intervene", *The Toronto Star*, 8 April 2000, A1.

II. CONCEPTUAL FRAMEWORK

If the policy question is whether Ontario's current social investments in higher education are at the correct levels and allocated properly between fields of study then, in principle, the answer is very simply provided by computing the marginal social internal rate of return at current enrolments, either generally or by field of study. This would be the key metric in determining whether the resources expended warrant the increased productivity, improved health status, lower crime rates and other social benefits known to accrue from higher education. Unfortunately, the true causal effect of PSE is unlikely to be found with any great confidence with currently available data. The proposed research will therefore examine labour market outcomes of PSE graduates in Ontario using the National Graduates Surveys (NGS), supplemented with data from the Canadian Censuses and Statistic Canada's Enhanced Student Information System. Unlike the internal rate of return, an outcome at a point in time such as the level of earnings of university graduates will not reveal whether PSE enrolments are currently too high or too low since there is no reference point for what the socially optimal levels of such outcomes ought to be. Nevertheless, the very significant increases in PSE participation over the past 25 years provide something of an experiment and observing the labour market outcomes of Ontario college and university graduates should be informative about the issue of general over-education. Labour market outcomes by field of study will inform us about the relative demands in the labour market for different skill sets and the ability to observe enrolment patterns through time in the face of these outcomes will indicate whether or not students and institutions respond to changing skill requirements.

The research questions can be approached from a wide and disparate variety of approaches. The principal difficulty is that there is no direct, one-to-one correspondence between field of study and occupations or between level of study and occupations. We would have little difficulty in determining whether there are too many (or too few) students graduating from teachers education programs in the province because it is fairly straightforward to match the number of students graduating and the number of teachers hired by provincial school boards each year. Alternatively, a survey based approach could simply look at individuals reporting teacher education as their qualification but who do not work as teachers. Engineering graduates could

be similarly handled. But what about Geography majors? In what occupation do we expect to see them working if the skills they acquired in university are being utilized appropriately? Many fields of study produce both occupation-specific skills and general skills that can be usefully applied, and therefore rewarded by employers, across a range of occupations.

If we cannot map the numbers of graduates to the numbers of job openings, how then can one determine whether there are too many college and university graduates and whether they were in the "wrong" fields of study? What are the symptoms of a general excess supply of postsecondary graduates in general and a relative excess of certain kinds of graduates in particular?

To provide an organizing framework for the empirical work to follow, the research will begin with a fairly loose theoretical conceptualization. The overall labour market will be conceptualized as a set of labour markets, each subject to the normal supply and demand forces. For example, there may be a market for higher educated labour and lower educated labour. If the supply of higher educated labour is growing at a higher rate than the demand for such labour, then one of two things may happen. If the flow of higher educated labour is restricted to its own market, one should observe relative wages in that market fall or unemployment increase (if there is wage rigidity). Alternatively, if faced with weak demand for their services, higher educated individuals may flow into the market for lower educated workers where they take jobs for which they are over-qualified. The same conceptualization can be disaggregated when looking at the issue of skills mismatch, considering an individual market as one in which graduates from certain fields of study participate in a labour market where demand may originate with employers from many different sectors.

The symptoms of a general over-supply of higher educated labour are, therefore, declining relative wages among PSE graduates or increased probabilities of unemployment, and increased likelihoods of over-qualification. The symptoms of skills mismatch take the form of persistent differences by field of study in the same phenomena.

III. EXISTING LITERATURE

III.1 Over Supply

There has been an extensive American research effort focussed on the evolution of the returns to education over the past two decades, driven by concerns about widening wage inequality[3]. Since the top of the income distribution is characterized by high educational attainment and the bottom end by low attainment, any increases in the returns to schooling exacerbate earnings inequality. Interestingly, the literature takes as a starting point the stylized fact that, at least in the 1980s and 1990s, this return was increasing and focuses more on why the relative demand for highly educated labour has grown to such an extent that the large influx of labour with university degrees has not depressed their relative earnings, i.e., why relative demand has increased by more than the relative supply of highly educated labour. Thus, the American literature begins with the observation that there is no widespread over-qualification in the labour force and does not concern itself with the question of whether "too many" Americans are attending PSE. Indeed, Goldin and Katz (2007) argue that a widening of the American wage structure after 1980 can be explained by a slowdown in the growth in educational attainment of U.S. workers.

Great Britain has witnessed an increase in postsecondary education at least as dramatic as that which has occurred in Canada. In 1988, 15 per cent of men and 12 per cent of women of school attending age in Great Britain were undertaking higher education. By 1994, the participation rates were 30 per cent for both genders.[4] Walker and Zhu estimate the earnings premium to university using the UK Labour Force Surveys from 1996 to 2003 and find no significant evidence that the mean return dropped in response to that increase in the supply of university graduates. They do, however, find that cohorts of graduates after the increase in participation did poorly relative to cohorts who graduated prior to the expansion of higher education in that country. These results are consistent across fields of study with the exception

[3] See Katz and Autor (1999) for a survey of this literature.
[4] Walker and Zhu (2008), p. 2. See also Chevalier and Lindley (2007) who also conclude that over-education has not been an issue in the UK.

of mathematics and engineering where, conditional on obtaining employment in jobs requiring university skills, the earnings premium increased.

Machin and McNally (2007) examine the issue of a potential "over-supply" of graduates across the many OECD countries where tertiary education has expanded over the past two decades. In terms of both the wage premia and lower unemployment rates associated with higher education, they conclude that there is no evidence of over-supply and, indeed, there is a case for promoting continued expansion of participation in higher education.

The evolution of the Canadian educational premium in recent years has been quite different from that in the U.S. where the growing premium has been linked to increased earnings disparity, as discussed above. Unlike the 1970's, when Dooley (1986) found a compression in the wage differential by education similar to that in the U.S., as reported by Freeman (1976), the educational earnings premium in Canada has not grown by nearly the same amount. Instead, from 1980 through 2000, the Canadian education premium, as measured by the earnings of those with higher education relative to high school graduates, has been constant or even fallen (Burbidge et al., 2002). This is confirmed by Boothby and Drewes (2006) for women using Census data, although the earnings premium to a university education grew for men. The Canadian PSE system as a whole appears to have been more responsive to the growth in demand for highly educated labour and has provided the supply needed to prevent significant relative wage increases. Since the growth in PSE enrolments has been particularly strong for women, a decline in their educational premium relative to men is expected in a demand and supply model.

Boudarbat et al. (2010) extend the analysis of earnings premia to the 2006 Census and find that the premium for men with a Bachelor's degree continued to grow between 2000 and 2005. Compared to a premium of about 32 percentage points in 1980, the 2005 earnings gap increased to 40 points and most of this growth occurred in the decade from 1995 to 2005.[5] The

[5] An earnings premium of, say, 32 percentage points, suggests that the mean earnings of individuals with a Bachelor's degree is 32 per cent higher than the mean earnings of those whose highest level of education is high school completion.

earnings premium for university educated women also grew during the period from 1980 to 2005 but the increase was smaller than was the case for men and almost all of it occurred in the last five year intercensal period.

The Canadian and international literature on the earnings premium associated with higher education then suggests that the demand for the skills of postsecondary graduates has grown at a rate at least large enough to absorb the large increase in supply. There is not a complete consensus on the reasons underlying the increase in demand, although the predominant view is one in which skill-biased technological change is driving the increase. Why demand has increased is, however, immaterial in an approach that uses observed earnings premia to education as proof of its value. The most remarkable observation is the consistent finding that large increases in the supply of graduates from higher education have not resulted in a general over-supply.

Walters (2004) uses National Graduates Survey data to examine temporal changes in the earnings of PSE graduates in the classes of 1980, 1986, 1990, and 1995. Since the NGS data do not allow observations on non-PSE graduates, the educational earnings premium cannot be estimated. Nevertheless, it is informative to observe the pattern of earnings through time. Walters' estimates of constant dollar earnings of university undergraduates and college graduates show a very modest increase from 1982 to 1986, followed by a decline in the following two cohorts.[6] The relative relationship between trades, college and university graduates remained fairly constant over the fifteen years. In looking at earnings by field of study, a fairly typical pattern is found in which health professions generate the highest earnings, followed by engineering and applied sciences and commerce programs. Humanities and the fine arts are at the bottom of the earnings distribution, but the field of study effects are fairly constant over the period suggesting that "... there does not appear to be solid evidence that the

[6] Walters presents his findings graphically and does not report the actual statistics. An inspection of his Figure 1 (p. 12) suggests that undergraduate earnings were approximately $31,000 (1992$) in 1982, rising by less than $1,000 in 1986 and then declining to c. $28,000 and $27,000 in 1990 and 1995, respectively. The values for college graduates were about $25,000, $25,500, $23,000, and $22,000.

new economy has increasingly favoured graduates with technical and applied skills" (Walters, 2004, pp. 12-13).

In terms of skills mismatch at a given level of participation in PSE, a number of papers look at the differences in the educational premium by field of study, including Boothby and Drewes (2006) and Finnie and Frenette (2003) among others. The typical findings are that earnings premia differ substantially by field, with Arts and Humanities graduates achieving the lowest returns and medical, engineering and business graduates the highest.

III.2 Over-qualification

The literature more specifically examining the incidence and impacts of over-qualification defined as the difference between years of schooling completed and the years of schooling required for jobs is also very large, with results available for the U.S., Europe, Australia, and Canada. Groot et al. (2000) offer a recent meta-analysis of the literature. The incidence of over-qualification depends on the way in which that term is defined, but the authors suggest that the overall incidence of over-qualification among postsecondary education graduates is 26 per cent in the 50 studies they examined. They also report that the return to a year of education required in a job averages about 12 per cent in the studies reviewed while the return to a year of over-education was only 2.6 per cent.

There is some Canadian literature on the subject of over-qualification. Picot et al. (1990) argue that the incidence of over-qualification was increasing in Canada, and Vahey (2000), using the 1982 National Survey of Class Structure and Labour Process in Canada, estimates the incidence to be in the order of 30 per cent. Frenette (2004) provides a more recent study of the degree of over-qualification in the Canadian labour market using the National Graduates Surveys. Incidence of over-qualification is in the order of one-third among recent Canadian graduates, although incidence varies considerably by program. Interestingly, this incidence is estimated to have fallen between the 1980s and the 1990s. Li et al. (2006) use the Survey of Labour and Income Dynamics (SLID) to estimate the incidence of over-qualification, finding that nearly 20 per cent of the workforce with a university education had worked in a job that required at most high school education in 2001.

Several researchers pay particular attention to the issue of persistence of over-qualification and the possibility that workers who are over-qualified for their current position may move up to more suitable jobs relatively quickly compared to individuals just qualified. Frenette (2004) estimates the probability of over-qualification of National Graduates Survey respondents in the five year follow-up survey conditional on over-qualification in the initial survey and finds that about 75 per cent of initially over-qualified respondents remain so.

The literature mentioned so far is concerned with general levels of education in the workforce. There is an additional literature that considers the match between schooling and the labour market not only in terms of years of schooling and schooling required for the job, but also in terms of the relationship between PSE fields of study and labour market needs. Even if the level of schooling is appropriate in terms of the number of years of schooling, workers may be mismatched if type of schooling is not. Robst (2007) makes this point and, using American data, finds that graduates from majors that emphasize general skills have a higher likelihood of mismatch but relatively low costs of being so, where "costs" take the form of earnings that are lower than graduates with the same majors but in jobs where skills needs better match the qualifications produced by the field of study. Mismatched graduates with majors that emphasize occupation specific skills suffer substantially higher costs. Presumably, this latter group graduates with skills that are not as transferable to alternative occupations and therefore suffer greater wage losses when unable to work in the occupations linked specifically to their studies.[7]

[7] Drewes and Giles (1996) find a similar phenomenon over time. The more generic skills of liberal arts university graduates maintain their labour market value better than those who graduated from more vocationally oriented university programs. In a sense, generic skills are more transferable through time as skill needs change.

IV. DATA

The empirical research in this report is based on data from the National Graduates Surveys of university and college students graduating in the years 1986, 1990, 1995, 2000 and 2005.[8] The NGS's were designed to examine the labour market outcomes of graduates from public universities, colleges, and trade schools during the reference year by interviewing large, nationally representative samples from the target populations two and five years after graduation (except, of course, for the 2005 graduates). A wide range of information is available about employment, income, further education, and so on that can be linked to detailed information about programs of study.

The NGS's provide the most comprehensive data on Canada's PSE graduates but, since the target population is restricted to only those who have undertaken studies after high school, the data do not permit the normal estimation of returns to, or earnings premia associated with, postsecondary education. Such estimates would relate the earnings of those with higher educational credentials to the earnings of those without. The NGS data do have the advantage, however, of reporting earnings among recent graduates whose labour market outcomes would be the first to be affected by market imbalances. They also contain the information necessary to examine the incidence and impacts of over-qualification. To overcome the missing information on earnings among those not undertaking PSE, Census data has been used to estimate earnings premia.

Another difficulty with the NGS data is that changes in questions and classifications can make comparisons through time problematic. In the 1986 and 1990 NGS's, earnings information was derived by asking respondents to estimate what their pre-tax annual earnings would have been had they worked their usual hours at the job held during the reference week. In subsequent NGS's, annual earnings were derived by Statistics Canada using information on reported

[8] The NGS was also administered to graduates in 1976 and 1982 but fields of study were difficult to match to later versions of the NGS and these data were not used. The early surveys pre-date the significant PSE enrolment growth that is the subject of this report. Note also that trades graduates are not considered in this report.

salaries, how they were paid, and usual hours worked. As well, although national sample sizes are large, the number of respondents from Ontario has fallen considerably in some of the survey years. While almost 9,000 Ontario graduates were surveyed in the 1986 NGS, the Ontario sample size fell to about 3,300 in the 2000 NGS. Once this sample is categorized by gender, type of PSE and field of study, some cell sizes become so small that population estimates become very imprecise. For this reason, much of the reporting on fields of study uses supplementary data on degrees and diplomas granted in Ontario drawn from Statistics Canada's Enhanced Student Information System (ESIS), extracted through the CANSIM system.

In early NGS's, fields of study were based on University Student Information System (USIS) and College Student Information System (CSIS) codes. Those codes were replaced by the Classification of Instructional Program codes in the last two NGS's.[9] Concordance files supplied by Human Resources and Skills Development Canada were used to convert the older USIS/CSIS codes to the broad Classification of Instructional Programs (CIP) 2000 categories used in the estimates below. Since such conversions can introduce spurious changes in field of study distributions between the 1995 and 2000 NGS, some caution must be exercised in interpretation.

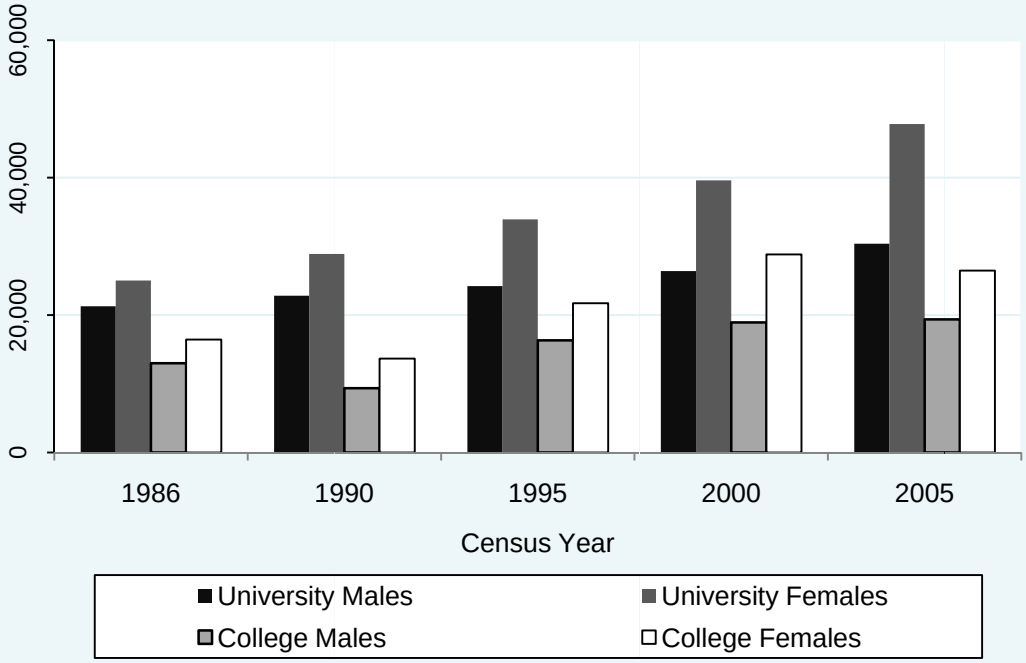
[9] A more detailed description of the CIP codes is included in the appendix, Table A9.

V. RESULTS

V.1. Overall Growth in Ontario Graduates

Figure 1 describes the growth in graduates from Ontario's universities and colleges, as estimated using the NGS data. The most dramatic change has been the growth in the number of women graduating with university degrees, increasing from 25,000 in 1986 to almost 48,000 in 2005, or by 91 per cent. Figure 1 combines all levels of university degrees, but Bachelor's level studies account for over 80 per cent of graduates among university women and slightly under 80 per cent for males. Increases in the number of male university graduates have not been as large but have been steady through the cohorts and have produced an overall increase of approximately 43 per cent from 1986 to 2005.

Figure 1: PSE Graduates in Ontario
Numbers of Graduates in Each Reference Year



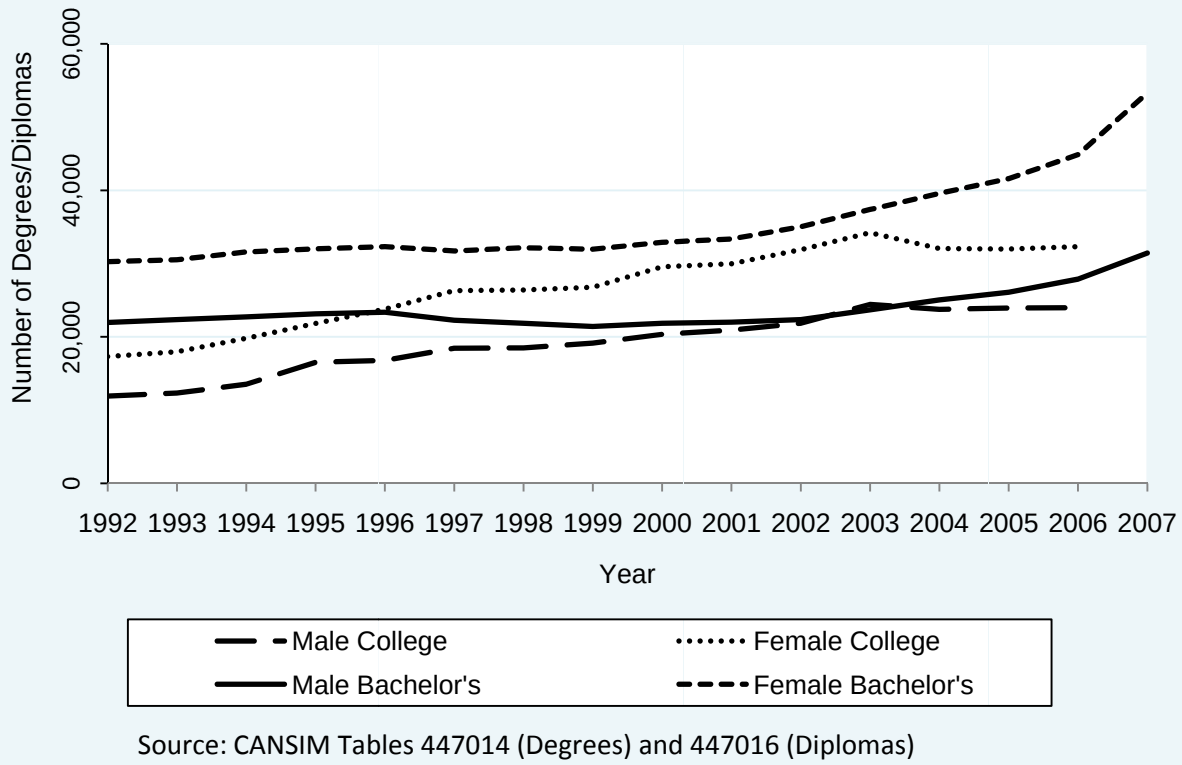
Author's estimates from the National Graduates Surveys

The flow of college graduates has not grown consistently through the five NGS cohorts. The number of female college graduates fell from the previous level in both the 1990 and the 2005 cohorts as did the number of male college graduates in the 1990 cohort.[10] Nevertheless, the overall increases from 1986 to 2005 were substantial at 61 per cent for women and 50 per cent for men. To put these growth rates in perspective, the increase in the number of 20 year olds in Ontario over the same time period was about 8 per cent.

The NGS sample sizes for Ontario are too small for reasonably robust population estimates when the data are disaggregated by fields of study. For this reason, data from Statistics Canada's ESIS were used to look at changes in enrolment patterns over time since these data are not subject to sampling error (although there will inevitably be non-sampling error involved). Since the population frames for the NGS's are developed from the same data, we can expect both to yield the same overall picture of numbers of graduates from Ontario's universities and colleges, which is confirmed in Figure 2.

[10] The college numbers for 2005 are affected by an under-coverage of Ontario college graduates, estimated by Statistics Canada to be as much as 10,000.

Figure 2: Number of Degrees and Diplomas Granted in Ontario



Source: CANSIM Tables 447014 (Degrees) and 447016 (Diplomas)

Data on degrees and diplomas granted in the province are only available since 1992 to 2007 for degrees and 2006 for diplomas but do provide annual data as opposed to the quinquennial values from the NGS's. Note that Figure 2 is restricted to Bachelor's level degrees only and that the surge in the number of these graduates in 2006 and 2007 partly reflects the double cohort phenomenon. Note also that the levelling off in the latest numbers for college diplomas may be due to the under-reporting of college graduates in Ontario.

V.2 Fields of Study Patterns

As discussed above, disaggregation of the NGS data to the level of field of study by gender and by PSE type produces very small sample sizes. Nevertheless, the distribution of graduates across the major Classification of Instructional Programs categories was estimated using the

NGS data with results reported in the Appendix, Table A1. Survey to survey fluctuations in shares for any particular field of study may reflect a large degree of sampling variability so that conclusions about the choices students make between fields of study can only be tentative. To overcome the sampling variability problem, ESIS-based data on bachelor's degrees and college diplomas granted by Ontario universities and colleges are used to develop field of study shares. The raw data are provided in the appendix in Tables A2 and A3 for universities and colleges, respectively, with share calculations provided in Tables 1 and 2.[11]

Table 1
Fields of Study Shares: Bachelor's Degrees Granted in Ontario, Both Genders

	Classification of Instructional Program											
Year	1	2	3	4	5	6	7	8	9	10	11	Total
1992	13.0	3.3	16.1	30.9	10.5	6.7	4.2	6.7	0.8	7.6	0.0	100
1993	12.5	3.3	16.2	30.9	11.1	6.8	4.2	6.5	0.7	7.7	0.0	"
1994	10.5	3.3	16.1	31.8	11.0	7.3	4.1	6.8	0.9	8.0	0.0	"
1995	10.7	3.3	15.1	31.4	10.7	7.9	4.3	7.1	1.3	8.3	0.0	"
1996	10.7	3.4	15.1	30.5	10.6	8.3	4.2	7.3	1.5	8.3	0.1	"
1997	11.2	3.4	14.1	29.7	11.1	9.1	4.2	7.1	1.6	8.3	0.1	"
1998	11.1	3.4	13.4	29.8	10.9	9.3	4.3	7.3	1.5	8.9	0.0	"
1999	11.3	3.4	12.9	28.9	11.5	9.4	4.7	7.2	1.6	9.1	0.1	"
2000	12.5	3.4	12.8	27.3	11.3	9.3	5.3	7.5	1.5	8.9	0.1	"
2001	13.0	.3.4	12.9	26.0	11.8	9.1	5.8	7.8	1.4	8.6	0.1	"
2002	13.3	3.5	12.4	25.8	11.9	8.3	6.5	8.3	1.2	8.5	0.1	"
2003	12.9	3.5	13.0	25.2	12.2	8.4	6.5	8.5	1.2	8.4	0.1	"
2004	12.8	3.8	13.0	25.0	12.9	8.0	6.6	8.1	1.1	8.5	0.1	"
2005	12.5	4.1	14.3	23.9	13.2	8.2	5.3	7.7	1.0	9.6	0.1	"
2006	12.0	4.2	14.4	24.9	13.3	8.2	4.8	7.5	1.1	9.5	0.1	"
2007	10.8	4.1	14.2	25.7	14.0	9.2	3.7	7.1	1.1	9.9	0.1	"

CIP Codes
1: Education
2: Visual & Performing Arts, and Communications Technologies
3: Humanities
4: Social and Behavioural Sciences
5: Business, Management and Public Administration
6: Physical and Life Sciences and Technologies
7: Mathematics, Computer and Information Sciences
8: Architecture, Engineering and Related Technologies
9: Agriculture, Natural Resources and Conservation
10: Health, Parks, Recreation and Fitness
11: Protective and Transportation Services, Other

Source: CANSIM Table 477014

[11] Changes in enrolment by field of study indexed to 1992 are reported in the Appendix, Tables A4 through A7 for university and college diplomas, by gender. Again, see Table A9 for detail on the CIP categories.

Table 2
Fields of Study Shares: College Diplomas Granted in Ontario, Both Genders

	Classification of Instructional Program											
Year	1	2	3	4	5	6	7	8	9	10	11	Total
1992	6.0	8.7	1.1	8.3	25.0	1.4	4.0	13.6	1.9	21.3	8.7	100
1993	6.1	8.9	1.2	8.4	25.2	1.3	4.0	13.3	1.8	21.1	8.7	"
1994	5.9	8.4	1.3	8.6	26.5	1.2	3.7	13.4	1.9	20.3	8.8	"
1995	5.0	7.4	1.9	7.7	27.7	1.1	3.9	15.6	1.9	19.1	8.7	"
1996	4.8	7.7	2.0	8.8	27.5	1.5	4.0	16.3	1.9	17.4	8.0	"
1997	4.6	7.0	1.9	8.1	28.3	1.4	4.4	17.0	1.9	17.0	8.6	"
1998	4.2	7.9	1.7	9.1	27.6	1.4	5.6	16.2	1.7	16.2	8.4	"
1999	4.1	7.9	2.4	8.7	27.6	1.2	6.8	16.1	1.6	14.9	8.7	"
2000	4.2	7.8	2.4	8.7	25.2	1.1	7.4	15.6	1.5	16.5	9.6	"
2001	4.0	7.8	2.7	8.9	24.9	0.9	7.4	15.3	1.8	16.3	9.9	"
2002	4.0	7.3	3.9	8.6	25.1	0.9	6.8	15.0	1.7	16.2	8.4	"
2003	3.1	7.2	5.2	9.8	25.1	0.9	5.7	14.7	2.0	17.3	8.9	"
2004	3.3	8.0	5.2	10.1	25.2	0.9	5.4	15.0	2.0	15.4	9.7	"
2005	2.6	7.0	4.9	10.8	25.7	0.8	5.0	15.4	1.9	16.3	9.7	"
2006	2.1	6.6	5.6	11.5	26.0	0.6	3.7	14.8	1.8	17.0	10.3	"

CIP Codes
1: Education
2: Visual and Performing Arts, and Communications Technologies
3: Humanities
4: Social and Behavioural Sciences
5: Business, Management and Public Administration
6: Physical and Life Sciences and Technologies
7: Mathematics, Computer and Information Sciences
8: Architecture, Engineering and Related Technologies
9: Agriculture, Natural Resources and Conservation
10: Health, Parks, Recreation and Fitness
11: Personal, Protective and Transportation Services, Other

Source: CANSIM Table 477016

In 1992, the humanities and the social and behavioural sciences accounted for 47 per cent of Bachelor's degrees granted in the province. Fourteen years later, these fields accounted for slightly less than 40 per cent of Bachelor's graduates. If labour markets in Ontario are demanding more technological content in the skill sets of university graduates, and if university students respond to such changes, we should observe increasing shares of fields that produce such content. In fact, although the physical and life sciences fields did increase their share of graduates, the mathematical and computer sciences fields share was stagnant and the share of graduates in the engineering related fields increased only marginally. The largest proportional increases in shares occurred in business-related and health-related fields of study.

Among college graduates, the most notable changes in shares include a continual erosion of education's share and a very significant growth in the humanities. The latter change suggests that enrolment patterns reflect both student choices and changes in institutional objectives as community colleges begin to position themselves to provide baccalaureate level certificates. Business, Management and Public Administration fields remain strong in terms of shares and, like university graduates, college graduates have not streamed into those fields (Mathematics, Computer, and Engineering) one would associate with technology biased growth in labour demand in the province.

V.3 The Pattern of Real Wages

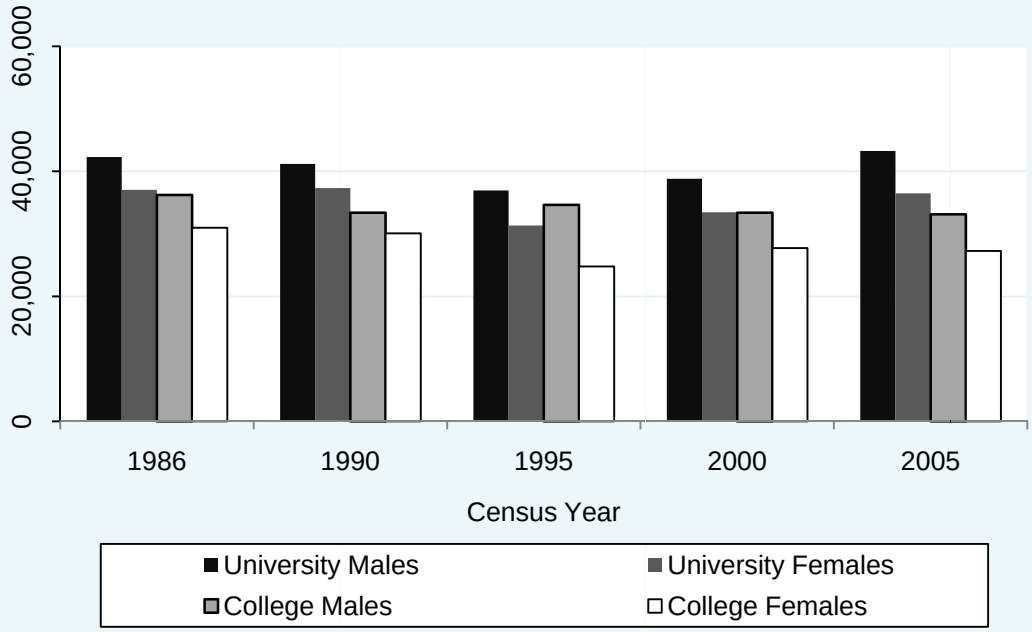
In a demand and supply paradigm, an oversupply of PSE graduates should be reflected in a reduction in the real wages of these graduates relative to other workers. As previously discussed, the NGS's do not permit the normal estimation of these relative earnings (or earnings premia). Nevertheless, with the behaviour of real wages in the larger economy as a reference point, the pattern of real wages for NGS respondents can provide evidence of excess supply of higher educated labour through the period. The NGS provides annual earnings in reference jobs held two and five years after graduation.[12] Given that respondents in the NGS's tend to be homogeneous in levels of labour market experience and geographic location, there is little to be gained from regression based control approaches and raw means of annual income are computed separately by gender.

Figure 3 documents the pattern of mean earnings (in 2002$) by gender for university bachelor's and college graduates. There is a notable decline in real earnings in all cases from the 1986 to the 1995 graduates, especially among female college graduates. By the last cohort in 2005, real annual earnings have been restored to at least their 1986 levels for university graduates but college earnings fail to recover at all. The decline in real earnings from 1986 to 1995[13] was also

[12] Recall that these are hypothetical annual earnings in the sense that they represent what the respondent would have earned on an annual basis working his/her current usual hours for the year in the current job. This can differ from actual annual earnings.
[13] Recall that these are earnings in 1988, 1992, 1997 and so on, two years after graduation.

found by Walters (2004) in the national sample, although he did not distinguish earnings patterns by gender.

Figure 3 : Earnings of PSE Graduates in Ontario
Real Annual Earnings of Full-Time Workers

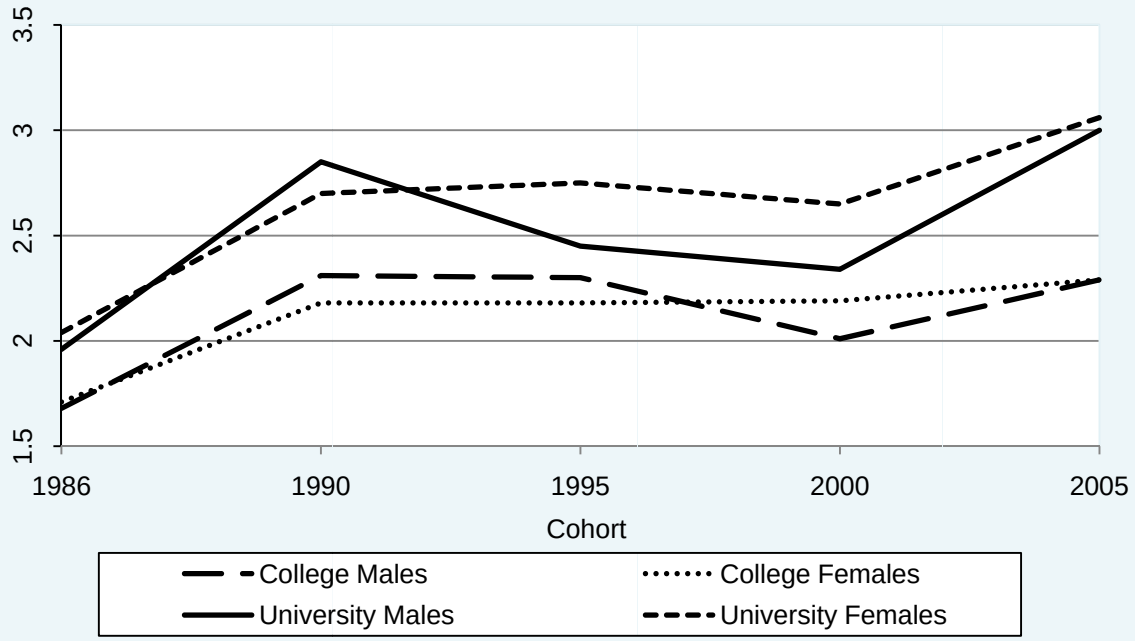


Author's estimates from the National Graduates Surveys

At first glance, Figure 3 suggests that there was an increasing over-supply of university and college graduates through the first three cohorts that has remained for college graduates but has been eliminated among university graduates. The wage patterns cannot be treated in isolation, however, since over-supply is measured by changes in the earnings of graduates relative to other workers. The earnings premium estimates by Boudarbat et al. (2010) discussed in the literature review make that comparison and, as was indicated in that review, do not show the declines evidenced in Figure 3. There are two possible reasons for the contradictory evidence. First, Boudarbat et al. (2010) estimated earnings premia for the entire population and it is possible that the pattern of earnings among young PSE graduates, as

captured by the NGS's, is different than that of all PSE graduates. Secondly, the earnings of non-PSE graduates may have shown a similar pattern as that shown in Figure 3.[14]

Figure 4: Relative Earnings of PSE Graduates in Ontario
Annual Earnings of Graduates Relative to All Workers Ages 20-24



Author's estimates using the National Graduates Surveys

Real annual earnings of Ontario workers aged 20-24 as reported by Statistics Canada for the NGS survey years were used to determine relative earnings.[15] The results are shown in Figure 4 and provide a much different picture of the behaviour of earnings among Ontario graduates. For both male and female Bachelor's graduates, relative earnings rise by 50 per cent, from 2 to 3 for both genders. Among college graduates, the ratio of NGS mean income to that derived from the Survey of Consumer Finances (SCF) and SLID rises from 1.7 to 2.3. Some caution

[14] There is a third possibility. The National Graduates Surveys may produce different earnings measures than the Census data used by Boudarbat et al (2010), although why this should be so is not evident.
[15] These earnings are based on the Survey of Consumer Finances and the Survey of Labour and Income Dynamics and were extracted through the CANSIM service, Tables v25665352 and v25665832.

should be exercised in interpreting these outcomes. The SCF and SLID earnings are used simply as references for the NGS income outcomes and not as the earnings that NGS graduates would otherwise face had they not undertaken PSE. There is no control, for example, to ensure that the reference SCF and SLID earnings apply to full-year, full-time workers. Thus, the values in Figure 3 are not earnings premia in the normal sense and it is certainly not the argument that a Bachelor's degree raised annual earnings by over 300 per cent among males in 2005. The interpretation is simply that the real earnings of university and college graduates shortly after leaving schooling in Ontario have generally been rising relative to earnings in the provincial economy as a whole. This suggests that there has not been an over-supply of these graduates.

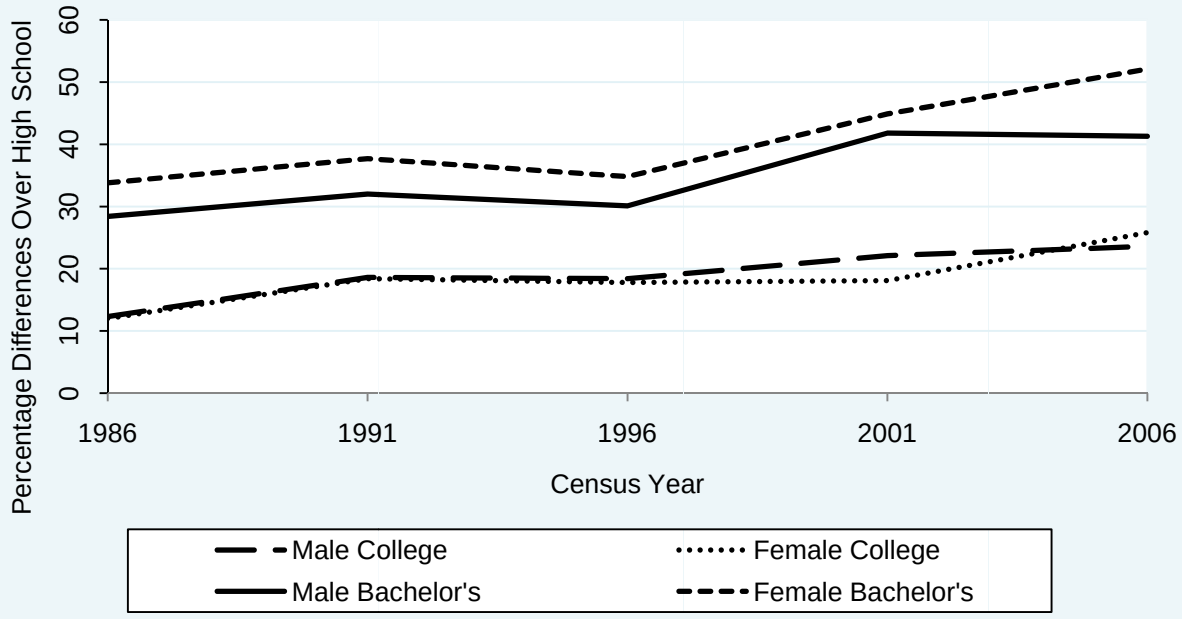
Earnings premia attached to higher educational attainment are the key pieces of evidence for or against the argument that an economy's postsecondary education system is supplying more graduates than the labour market requires. It is therefore worthwhile stepping outside the empirical bounds of the National Graduates Surveys to examine direct evidence of these premia. With the recent release of the 2006 Census of Canada public use microdata files, the earnings of young Ontario workers with university or college credentials can be compared in a consistent fashion to the earnings of those whose highest level of education is completion of high school.[16] Figure 5 illustrates the proportional differences between the mean annual earnings of university and college graduates, respectively, over the earnings of high school graduates in Ontario.[17] The comparison is restricted to young workers between the ages of 21 and 30 and to full-year, full-time workers.

The Census results show a steady increase in the earnings premia attached to higher education in Ontario, with the exception of the intercensal period between 1991 and 1996 for university graduates. Both male and female college graduates between the ages of 21 and 30 benefited from an earnings advantage of approximately 12 per cent in the 1986 Census. By the 2006 Census, this advantage had grown to almost 25 per cent. For young males with a Bachelor's

[16] Use of high school completers as the reference case is somewhat arbitrary but is the convention in the literature on educational earnings premia.
[17] Source data for Figure 5 are reported in the Appendix, Table A8.

degree, the proportional difference in earnings relative to high school graduates has grown from less than 30 per cent in 1986 to over 40 per cent in 2006, although the premium appears to have levelled off in the last intercensal period. The earnings premium for women with a Bachelor's degree has grown from about 35 per cent to over 50 per cent, with strong growth from the 2001 to the 2006 Census.[18] These findings corroborate the results of the NGS earnings estimates, suggesting that there continues to be a strong demand for the human capital produced by Ontario's PSE system.

Figure 5: Earnings Premia over High Shcool: Ontario
Full-time Full-year Workers, ages 21 to 30



Author's estimates using Census Public Use Microdata Files

[18] Sample sizes for these estimates vary by Census year and educational group but never fall below 2,650 observations.

V.4 Field of Study Effects on Earnings

Field of study differences in earnings are examined to investigate the issue of a misalignment of enrolment patterns across fields of study and the specific skill needs of the Ontario labour market. These differences were examined using a regression model in which the natural logarithm of earnings was estimated as a function of a set of 0,1 indicator variables for each field. With a constrained regression, the coefficient on each field indicator estimates the (approximate) percentage difference between the mean earnings of individuals in that field and the mean earnings of all individuals. As shown in Tables A2 and A3 in the Appendix, the population sizes for some fields are small and some aggregation of the Classification of Instructional Program fields was required to produce robust estimates of field of study effects. As well, estimates are provided only for both genders combined. The results are reported in Table 3.

Table 3
Field of Study Effects on Annual Earnings (% deviation from overall mean)

	1986	1990	1995	2000	2005
			Bachelor's Graduates, both genders		
Education	0.05	0.12**	-0.05	0.04	0.12**
Humanities	-0.10**	-0.10**	-0.22**	-0.32**	-0.24**
Social/Behavioural Sciences, Law	-0.09**	-0.06**	-0.16**	-0.08	-0.10**
Business, Mgt. and Public Admin.	0.06	-0.01	0.24**	0.17*	0.13**
Physical/Life Sciences & Technologies	-0.29**	-0.23**	-0.25**	-0.27**	-0.33**
Math, Computer & Info. Sciences	0.09**	0.12**	0.15**	0.26**	0.15**
Architecture, Engineering	0.12**	0.17**	0.31**	0.34**	0.26**
Health, Parks, Recreation & Fitness	0.26**	0.31**	0.27**	0.16**	0.21**
Other	-0.11**	-0.31**	-0.29**	-0.30**	-0.19**
			College Graduates, both genders		
Visual/Performing Arts & Communications	-0.17**	-0.29**	-0.19**	-0.01	-0.13**
Social/Behavioural Sciences, Law	-0.02	-0.01	0.01	-0.14*	-0.06
Business, Mgt. and Public Admin.	-0.06**	-0.01	-0.06	0.08*	0.10**
Math, Computer & Info. Sciences	0.12**	0.15**	0.28**	0.22**	0.10*
Architecture, Engineering	0.05**	0.09**	0.16**	0.19**	0.18**
Health, Parks, Recreation & Fitness	-0.05	-0.20**	0.03	-0.12	0.13**
Agric., Natural Resources	0.15**	0.21**	-0.01	0.00	-0.03
Personal, Protective Services, Transport	0.00	0.05	-0.02	-0.09	-0.08*
Other	-0.02	0.00	-0.20**	-0.14**	-0.21**

** indicates significance at the 5% level, * indicates significance at the 10% level.
Source: NGS, calculations by author

The interpretation of the estimates in Table 3 is as follows. In the 1986 cohort, the average annual earnings of bachelor's graduates in the humanities was 10 per cent below the overall average earnings for all bachelor's graduates. In that cohort, those who graduated with a major in the health, parks, recreation, and fitness CIP field earned about 26 per cent more than the overall average. Note that in the university sector, this classification is dominated by the health professions.

Where anticipated earnings were the sole criterion for selecting a program of study, student program choices should equalize those earnings across fields of study and price signals would elicit the appropriate shifts in enrolment patterns as labour market needs for different skill sets change. Clearly, Table 3 shows that this has not happened and the persistent differences across majors suggest that enrolment patterns also reflect the distribution of interests and aptitudes across the population of PSE participants. Indeed, among university graduates in Ontario, the distribution of earnings across fields of study appears to have become more variable between the first and the last cohorts which is consistent with a model in which those enrolment patterns are slow to reflect changes in the labour market. Referring to the dynamics of enrolment patterns in Table 1, however, there is some evidence of a sensitivity of program choice to price signals. For example, it was noted above that the share of humanities degrees granted at the Bachelor's level in Ontario has fallen from 16.1 per cent in 1992 to 14.2 per cent in 2007. During that period, the earnings of humanities graduates lost considerable ground relative to all Bachelor's graduates in the province. Earnings of business and management graduates, on the other hand, rose considerably beginning with the 1995 NGS cohort and, as shown in Table 1, their share of degrees granted from 10.7 per cent in 1995 to 14 per cent in 2007. Engineering and mathematics/computer science fields also saw significant increases in earnings but, according to Table 1, saw no real growth in the share of degrees granted. Contrary to Walters' (2004) conclusion, this is evidence of an increasing excess demand in these technologically driven fields.

The general impression of field of study effects in the province's college sector is one of less growth in earnings variability across fields of study, which would be consistent with the model of community colleges as more direct responders to Ontario's labour market needs. Once again, it

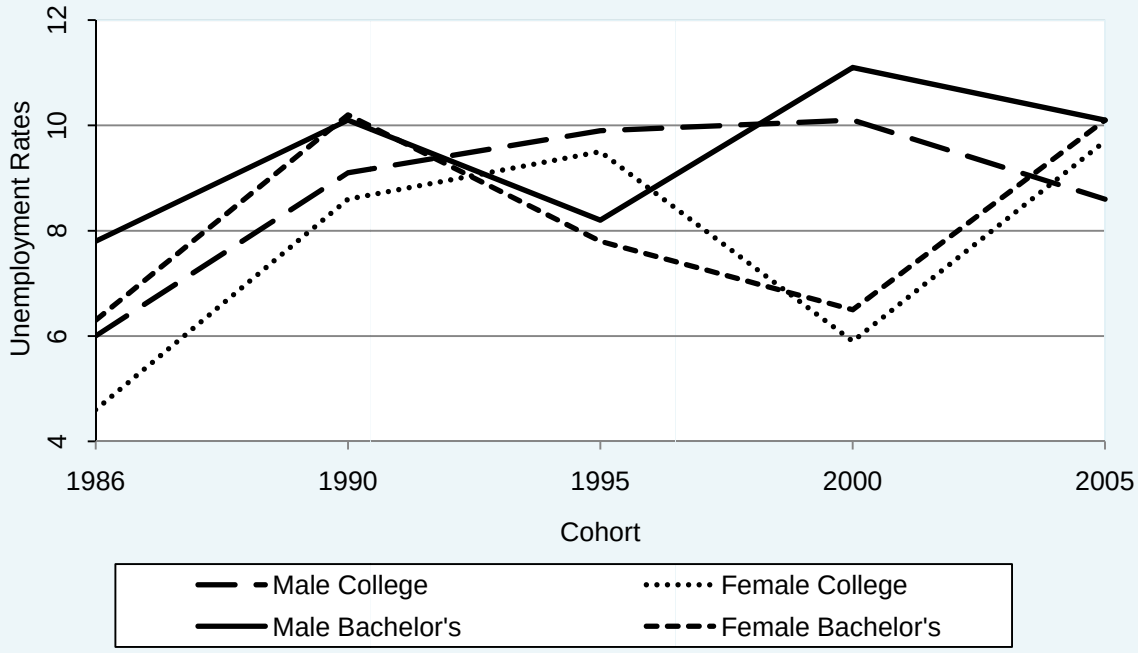
is the engineering technologies and the mathematics/computer science fields that have seen the largest increases in relative earnings. Taken together with the evidence on field of study effects among university graduates, there is then evidence of the labour supply shoe pinching in the sectors of the provincial economy most in need of technological education.

V.5 Unemployment Rates

Unemployment rates are an alternative symptom of over-supply. Graduates unable to find work in a job related to their studies may seek employment in other sectors in which case an exploration of over-qualification may be a more appropriate way of determining whether the labour market is fully integrating new graduates. We return to this point later but, for now, examine the trends in unemployment rates. Figure 6 illustrates the unemployment rates of male and female graduates from university Bachelor's and college programs as estimated from the NGS's.[19] All four groups show evidence of the 1990-91 recession with substantial increases in unemployment rates from 1988 to 1992 (recall that the survey is administered two years after graduation). This is followed by some recovery among Bachelor's graduates but not college graduates to 1997. The patterns of unemployment rates show puzzling behaviour from the 1995 cohort to the 2000 cohort when both female unemployment rates fall but rates rise for both of the male groups. The situation then reverses with the 2005 cohort when rates for female university and college graduates rise but unemployment falls for both male groups.

[19] NGS respondents are classified as being in one of three states during the survey reference week: employed, unemployed, or not in the labour force. The unemployment rate is therefore conceptually equivalent to our usual Labour Force Survey based measure.

Figure 6: Unemployment Rates Among Ontario Graduates



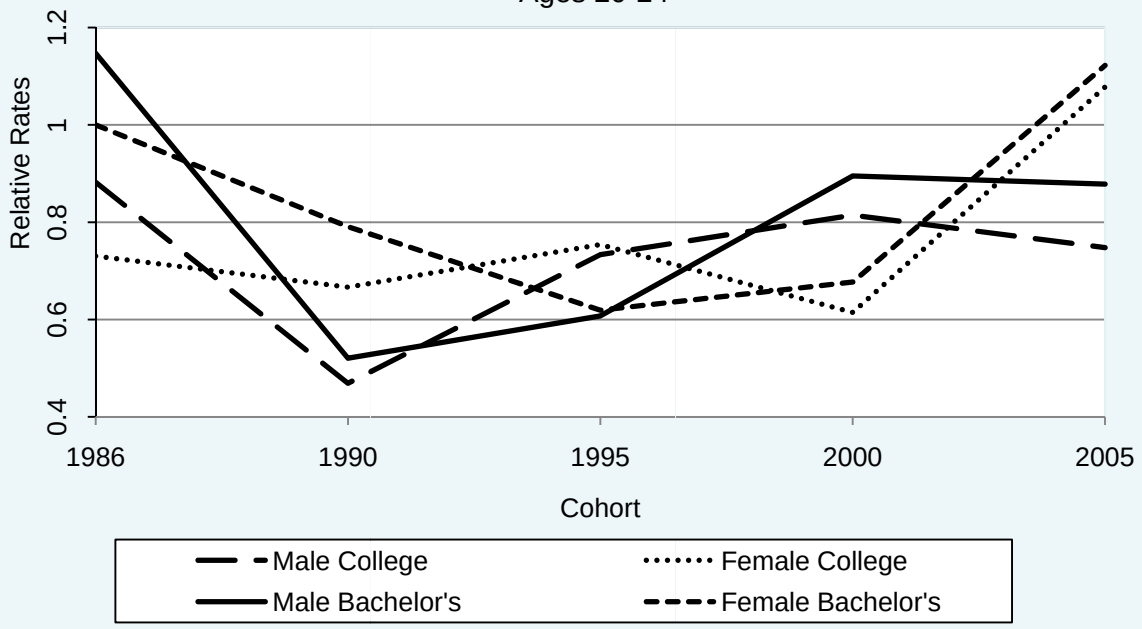
Author's estimates using the National Graduates Surveys

Given the large macroeconomic swings through this time period, it is especially important in the case of unemployment rates to provide a context. Figure 7 illustrates the unemployment rates of the four graduate groups relative to the overall male and female unemployment rates for 20 to 24 year olds in Ontario. The large increases in unemployment from the 1986 to 1990 cohort now appear as fairly dramatic reductions in relative unemployment rates. In the case of male Bachelor's, for example, unemployment rates in 1988 were 15 per cent higher than the overall rate for 20-24 year old males in Ontario but fell to about one half of the overall rate in 1992. After that cohort, relative male university rates show an upward trend to the 2000 cohort at which point the rates stabilize. Among female university graduates, falling relative rates to the 1995 cohort are more than offset in the last cohorts to result in unemployment rates that are actually above the average for 20-24 year olds Ontario females as a whole. Female college graduates witnessed a similarly dramatic increase in the last two cohorts. Male college graduates in 2005 were essentially in the same position as the 1986 cohort.

What is one to make of the evidence in Figure 7? Although end of period relative unemployment rates were similar to those experienced by the first cohort, there has been a general upward rise in unemployment for all groups, but especially for women. According to the NGS's, growth in the number of female graduates from universities and colleges in Ontario was 91 per cent and 61 per cent, respectively. For men, the growth was 43 per cent and 50 per cent, respectively. While the data in Figure 7 is not quite enough to establish a general over-supply of all graduates, it is certainly consistent with a demand and supply framework in which the supply of female graduates has grown at an appreciably faster rate than the supply of males.

Figure 7: Relative Unemployment Among Ontario Graduates

Unemployment Rates of Graduates Relative to those of Ont. Workers, Ages 20-24



Author's estimates using the National Graduates Surveys, Labour Force Survey Estimates

To address the issue of skills mismatch across fields, Table 4 reports the results of estimating a model of the probability of unemployment in the survey reference week against a set of

indicators for fields of study. Without any controls for personal characteristics, this probit regression model simply picks up mean differences between the probability of observing unemployment in the indicated field relative to a set of reference fields.[20] To increase sample sizes, both genders are combined and the coefficients are interpreted as marginal effect. For example, in the 1986 cohort, a Bachelor's graduate with a degree in education had, on average, an unemployment probability that was 7 percentage points lower than the graduates in the excluded (or reference) categories.

Among university graduates, no strong pattern emerges from Table 4. Education graduates appear to have lost their advantage as have those with majors in the mathematics, computing and engineering fields. The first phenomenon may reflect the cyclical nature of the teachers' labour market but the second appears to be inconsistent with a growing need for those with education in the technological fields. In the latest cohort, graduates from both social and physical science fields show above average unemployment rates while business graduates have the largest advantage in terms of unemployment probabilities. The general lack of differences across fields through the cohorts at the same time that there are differences in levels of earnings may possibly be due to a factor mentioned above. University graduates who fail to find employment related to their field of study may migrate to another labour market, a point to which we return to below.

[20] The reference fields of study include all those not explicitly listed in the table. For universities, these are the visual arts, agriculture, protective and personal services, and "other" CIP fields. For colleges, they are the education, humanities, physical sciences, and "other" CIP fields.

Table 4
Field of Study Effects on Unemployment Probabilities (marginal effect on pb. of being unemployed)

	1986	1990	1995	2000	2005
	Bachelor's Graduates, both genders				
Education	-0.07**	-0.07**	-0.06	-0.05*	-0.001
Humanities	-0.03	-0.02	-0.00	-0.04	0.03
Social/Behavioural Sciences, Law	-0.01	-0.03	-0.00	-0.03	0.06**
Business, Mgt. and Public Admin.	-0.05**	-0.03	-0.04	-0.04	-0.06**
Physical/Life Sciences & Technologies	-0.01	-0.03	0.02	-0.00	0.09**
Math, Computer & Info. Sciences	-0.05**	-0.05	-0.06	-0.03	0.03
Architecture, Engineering	-0.05**	-0.05*	-0.03	-0.03	0.03
Health, Parks, Recreation & Fitness	-0.05**	-0.06**	-0.04	-0.06**	0.01
	College Graduates, both genders				
Visual/Performing Arts & Communications	-0.03	0.02	-0.06	0.05	-0.04*
Social/Behavioural Sciences, Law	-0.04**	-0.05*	-0.03	0.01	-0.02
Business, Mgt. and Public Admin.	-0.04**	-0.02	0.00	-0.02	0.01
Math, Computer & Info. Sciences	-0.04**	-0.07**	-0.03	-0.03	-0.02
Architecture, Engineering	-0.04**	-0.00	-0.04	0.02	-0.00
Health, Parks, Recreation & Fitness	-0.02	-0.02	-0.05	-0.02	-0.02
Agric., Natural Resources	-0.05**	-0.05**	-0.05*	-0.06*	-0.03
Personal, Protective Services, Transport	-0.04**	-0.08**	-0.06*	-0.06	-0.06**

** indicates significance at the 5% level, * indicates significance at the 10% level.
Source: NGS, calculations by author

The pattern of unemployment probability differences across college programs also shows a tendency to equalize through the cohorts. With the exception of personal and protective services, there is no field of study that shows a persistent difference through time. As was the case for university graduates, there is no evidence in these field of study effects that would support the argument that enrolment patterns in Ontario's PSE sector is increasingly mismatched to the province's labour market needs.

V.6 Over-Qualification

Further evidence of an over-supply of college and university graduates would be found if graduates had increasingly been found in jobs for which they were over-qualified, a point that has previously been made in the discussion of the ability of unemployment rates to measure over-supply or skills mismatches. While there may be issues with the self-reported nature of the

over-qualification question in the NGS's, those issues should difference out as we look at changes in the proportion of graduates who report themselves has being over-qualified for their jobs, given their education, experience, and training.

Table 5
Incidence of Self-Reported Over-Qualification

	Cohort				
	1986	1990	1995	2000	2005
Male Bachelor's	27.3%	20.0%	16.1%	23.4%	19.2%
Females Bachelor's	31.1	19.3	18.8	25.8	21.9
Male College	41.2	23.6	26.4	36.8	39.8
Female College	33.8	22.8	21.5	31.6	32.9

Source: NGS, calculations by author

Table 5 reports the incidence of over-qualification through the five cohorts. Generally speaking, the values are consistent with the results reported in the literature review but there are quite significant differences between the groups and across cohorts. Male Bachelor's graduates are least likely to report themselves as being over-qualified and male college graduates most likely. An interesting outcome is that university graduates of both genders are less likely than their college counterparts to report over-qualification despite the general perception that college programs are more vocational in their content and more connected to the labour market in their intent. The principal lesson from Table 5 is, however, that there is no evidence whatsoever of any upward trend in the incidence of over-qualification, as one would expect if the supply of PSE graduates were to exceed the market's absorptive capacity.

Does over-qualification really matter? It may well be that individual's who feel themselves to be over-qualified may simply be over-estimating their own abilities or, if not, may still be more productive than exactly qualified individuals doing the same job. A full examination of this issue is beyond the scope of this research.[21] However, a cursory examination of earnings suggests that graduates who report themselves as being over-qualified do, on average, earn less than graduates who do not consider themselves to be over-qualified. Among male Bachelor's

[21] Frenette (2004) provides an excellent econometric analysis, finding that over-qualified graduates do, in fact, suffer an earnings penalty.

graduates, the over-qualified earned approximately 10 per cent less on average through all five cohorts, female Bachelor's graduates earned 12 per cent less. The differences are considerably larger for college graduates where over-qualified males earned 23 per cent less and females earned 22 per cent less. These should not be taken as true causal measures of the impact of over-qualification since they are simply comparisons of means. Nevertheless, these differences are consistent with the hypothesis that some skills learned in PSE are not being put to use by graduates. Remember, however, that there is no evidence that this phenomenon has grown through the large increases in the flows of graduates.

VI. CONCLUSIONS AND PUBLIC POLICY IMPLICATIONS

The extraordinary growth in the educational attainment of Ontario's labour force over the past 25 years is a very significant social achievement. It is also convincing evidence of the success of a provincial public policy that established the community college system and expanded the capacity of provincial universities to achieve wider participation in higher education.

Ontario's institutions of higher learning ought not to be judged on the single dimension of their ability to train young individuals for the labour market. Nevertheless, the growth in the number of individuals pursuing postsecondary education represents a remarkable increase in human capital investments, paid for by both taxpayers and those who have engaged in studies. As such, it is reasonable to ask for evidence that this growth has been effective and efficient.

Annual earnings estimates from the National Graduates Surveys from the class of 1986 through to the graduates of 2005 show no signs of a trend towards a general over-education of the Ontario labour force. When compared to all young Ontario workers, men and women graduating from the province's colleges and universities have at least maintained their earnings advantage early in their labour market careers. When Census data are used, the earnings advantages grow continually through the period of observation. This is generally regarded as the litmus test of over-education and would lead to the conclusion that the labour market has had the capacity to absorb the large influx of highly educated young workers and that these workers are as productive as was the case when a smaller proportion of Ontario's population undertook higher education. Importantly, this finding is consistent with evidence from Canadian census data that the educational earnings premium associated with postsecondary education has shown steady growth over the same period analyzed in this report. It is also consistent with international research motivated by the same concern about the labour market's need for and ability to use the ever-increasing amounts of human capital being produced by the higher education sectors of European countries.

The behaviour of unemployment rates, especially for women, is somewhat less reassuring. Relative to rates for all young Ontario workers, the unemployment rates in the latest cohort of

university and college graduates are no higher than they were for the 1986 cohort but there has been an upward trend for the last four graduating classes. Whether this represents eventual increases in life cycle unemployment or a growing, but temporary, difficulty in settling into the labour market is an issue that needs to be explored further.

A growing over-supply of highly educated labour should be reflected in the incidence of over-qualification among these graduates. In fact, the reverse is true, particularly for university graduates. The lower earnings among graduates who report themselves as being over-qualified suggests that their self-assessment is valid and that over-qualification is cause for concern. Nevertheless, as the number of young Ontario graduates from higher education has increased over the past two decades, the proportion who find themselves with more skills than they believe their jobs require has fallen. Interestingly, the incidence of over-qualification is lower among university graduates than among the more vocationally trained college graduates.

Field of study effects do show some cause for concern about the university sector's propensity to respond to changes in the skill needs of the labour market. Persistent earnings differences across programs of study are to be expected and enrolment patterns ought not to be driven solely by market needs. However, there is an increased variability of earnings across fields of study that is consistent with the hypothesis that enrolment patterns adjust to labour market needs only with a lag. As well, earnings advantages among graduates from the more technical university fields of engineering, mathematics, and computer science have grown through the cohorts suggesting a relative increase in the demand for these graduates not being met by supply. As might be expected, enrolment patterns among Ontario's colleges appear to adapt more quickly to changing labour market needs.

The general conclusion from the exploration of the National Graduates Surveys is that Ontario, like other jurisdictions that have witnessed extraordinary growth in the supply of graduates from higher education, need not be concerned about the quality of these graduates nor the ability of the labour market to absorb them.

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