EARLY LABOUR MARKET OUTCOMES OF RECENT CANADIAN UNIVERSITY GRADUATES BY DISCIPLINE: A LONGITUDINAL, CROSS-COHORT ANALYSIS

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ABSTRACT

This paper reports the results of an empirical analysis of the early career outcomes of recent Canadian Bachelor's level graduates by discipline based on three waves of the National Graduates Surveys, which comprise large, representative databases of individuals who successfully completed their programmes at Canadian universities in 1982, 1986, and 1990, with information gathered during interviews conducted two and five years after graduation for each group of graduates (1984/87, 1988/92, 1990/95).

The outcomes analysed, all broken down by sex and discipline, include: the distribution of graduates by field and the percentage of female graduates; the percentage of graduates who subsequently completed another educational programme; the overall evaluation of the choice of major (would they choose it again?); unemployment rates, the percentage of workers in part-time jobs, in temporary jobs, self-employed; the job-education skill and credentials matches; earnings levels and rates of growth; and job satisfaction (earnings, overall).

Many of the outcomes conform to expectations, typically reflecting the different orientations of the various disciplines with respect to direct career preparedness, with the professions and other applied disciplines generally characterised by lower unemployment rates, closer skill and qualification matches, higher earnings, and so on. On the other hand, while the "applied" fields also tend to perform well in terms of the "softer", more subjective measures regarding job satisfaction and the overall evaluation of the chosen programme (would the graduate choose the same major again?), the findings also indicate that graduates' assessments of their post-graduation experiences and overall evaluations of the programmes from which they graduated are based on more than simply adding up standard measures of labour market "success", with the job satisfaction scores and – perhaps most interestingly – the overall programme evaluations often departing from what the objective measures (unemployment rates, earnings levels, *etc.*) might have predicted. Some implications of the findings are discussed and avenues for future research are suggested.

I. INTRODUCTION

It is generally understood that early career – as well as longer-term – outcomes of university graduates vary significantly by field of study, but there is not a great deal of empirical evidence on the issue, especially in Canada.[1]

This general dearth of evidence is especially surprising given the interest of such cross-field patterns to a range of readerships. Labour economists would find any such analysis of interest for what it tells us about the returns to different types of human capital and economic well-being at a critical career stage, especially in light of evidence that the major portion of real lifetime earnings growth occurs during the first few years of young people's post-schooling careers (Murphy and Welch [1990]). Policy makers would be interested in knowing the fields into which they should perhaps be encouraging young people to enter. Universities and their representative bodies would be interested in knowing how graduates of different disciplines have been performing in order to perhaps adjust admissions strategies and help guide curriculum reform where the need was seen to be evident. Students would be interested in learning about outcomes by discipline so as to know what might be in store following graduation and to make more informed choices regarding field of study, while graduates might find it useful to compare their own experiences with the norm.

One of the principal reasons there is not a more extensive literature on comparative outcomes by field of study, with the record of recent graduates being particularly neglected, is that the established databases have not been particularly well-suited to the task. The contribution of this paper is, therefore, to present paper reports the results of an empirical analysis of the early career outcomes of recent Canadian Bachelor's level graduates based on three waves of the National Graduates Surveys, which comprise large, representative databases of individuals who successfully completed their programmes at Canadian universities in 1982, 1986, and 1990, with information gathered during interviews conducted two and five years after graduation for each group of graduates (1984/87, 1988/92,

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[1] See Côté and Sweetman [1997] for a review of the Canadian and American literature on earnings patterns by discipline, the former including Dodge and Stager [1972], Finnie [1995], Mehmet [1977], and Vaillancourt [1995], the latter including (in various applications) Altonji [1993], Bishop [1991], Bound and Johnson [1992], Brown and Corcoran [1997], Eide [1994], Grogger and Eide [1994], and Loury [1997]. To this list could be added the work by this author – including joint work with others – cited below.

1990/95).[2]

The size and representative structure of the NGS databases, their panel nature, the availability of three cohorts of data, and the interesting variables available, many of them focused on the particular circumstances of the school-to-work transition, thus provide the opportunity for an interesting, multi-faceted study of early labour market outcomes amongst Bachelor's level university graduates by major in Canada in the 1980s and 1990s. The outcomes analysed, all broken down by sex and discipline, include the following: the distribution of graduates by field and the percentage of female graduates; the percentage of graduates who subsequently completed another educational programme; the overall evaluation of the choice of major (would they choose it again?); unemployment rates, the percentage of workers in part-time jobs, in temporary jobs, self-employed; the job-education skill and credentials matches; earnings levels and rates of growth; and job satisfaction (earnings, overall).

The next section of the paper describes the National Graduates Surveys databases, the construction of the working samples, and the specific variables included in the analysis; followed by the presentation of the empirical results; with the final section summarizing the major findings, discussing some of the broad implications of the results, and offering suggestions for further research.

II. THE DATA[3]

II.1 The National Graduates Surveys

The National Graduates Surveys (and Follow-Up) databases, created by Statistics Canada, are well suited to this analysis for a number of reasons. First, the NGS files comprise large, stratified random

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[2] This paper is one in a series on the school-to-work transition and early years in the labour market of Canadian post-secondary graduates by the author: Finnie [1999a] documents the employment and earnings patterns of college and university graduates at all levels (Bachelor's, Master's, Ph.D.), Finnie [1999b] analyses the changes in the structure of graduates' earnings using standard regression based decomposition techniques, Finnie [1999c] focuses on the dynamic aspects of the school-to-work transition of graduates, Finnie [1999d] investigates the earnings patterns of Bachelor's level graduates by discipline using econometric techniques. Joint work includes Finnie and Wannell [1999], which explores the gender aspects of graduates' outcomes, Lavoie and Finnie [1999] is one in a series of papers on science and technology graduates, and Finnie [1999e] contains references to other work.

[3] See Finnie [1999e] for more detailed discussions of the material presented in this section and the following.

samples of those who successfully completed their post-secondary programmes of study in 1982, 1986, or 1990, with more than 30,000 individuals in each survey and over-sampling of graduates in the less common disciplines, thus facilitating the meaningful analysis of post-graduation outcomes by field of study.[4]

Second, the NGS databases have a longitudinal aspect, stemming from the two interviews carried out for each cohort, two and five years after graduation. This allows for a dynamic analysis of the school-to-work transition, with the associated view precisely situated as of the two specific points in time relative to graduation corresponding to the interview dates, while covering a relatively extended period of time – the first five years after leaving school.

Third, data are available for three separate cohorts of graduates – those who finished in 1982, 1986, and 1990 – thus permitting the comparison of outcomes over a period generally thought to have been characterised by important changes in labour market outcomes, especially for younger workers, while also bringing the record as up to date as possible.[5]

Finally, the NGS databases include an interesting array of variables covering the educational experiences, general labour market outcomes, and specific job characteristics of graduates. These include not only more conventional measures, such as employment status and earnings levels, but also others which are more specifically related to the particular experiences of recent post-secondary graduates and the school-to-work transition, such as the extent to which the skills learned at school were being used in the job and evaluations of both the current job and the education programme from

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[4] The databases include college and university graduates at the Master's and Doctoral levels, but these individuals are not included in the present analysis, which is focused on Bachelor's level graduates. The sample framework of the NGS databases is established through the use of institutions' administration files on graduates, with those records also providing some of the basic educational information on the NGS files, such as programme and discipline of study. All results reported here take the sample weights into account (the samples are weighted by province of residence and level of study as well as major).

[5] Beaudry and Green [1997], Beach and Slotsve [1996], Finnie [1997a], Morissette and Bérubé [1996], Morissette, Myles, and Picot [1995], Picot [1997], Riddell [1995], and Zyblock [1996] all report that the earnings levels of younger workers have been declining in relative and/or absolute terms; while Beaudry and Green, Morissette and Bérubé, and a series of papers by Finnie [*e.g.*, 1997b] indicate that younger workers' movements up the earnings ladder over the early years in the labour market have also slowed.

which the individual graduated.

In summary, the three NGS databases uniquely provide for a focused, detailed, and dynamic analysis of early labour market outcomes by field of study amongst Canadian post-secondary graduates in the critical early years following graduation from the early 1980s into the mid-1990s. The NGS data are interesting and unique not only in a Canadian context, but to the best of this author's understanding, unequalled in the world in terms of offering large representative surveys of post-secondary graduates covering various elements of the school-to-work transition over the last decade and a half.

II.2 Selection of the Working Samples

The entire analysis excludes graduates who had already accumulated five or more years of full-time work experience by the time of graduation from the programme in question or who were 35 years of age or older upon completing their studies. Such graduates are certainly an interesting group, but one which is best left to a separate study.

After looking at the distribution of graduates and their overall evaluations of their programmes of study, those who obtained an additional degree by one of the two interviews were deleted from the analysis at that point. Such graduates no longer belonged to the original education group (*e.g.*, a Bachelor's graduate might have become a Master's graduate and perhaps changed disciplines) and had in any event been mixing school and work in a way likely to affect the labour market outcomes upon which this analysis is focused. Including "additional degree graduates" would also have thrown off the precise post-graduation time frame corresponding to the two interview dates (*i.e.*, two and five years after graduation) which holds for the non-continuing group. Finally, it is impossible to identify the specific discipline corresponding to any new degrees in the 1984 survey for the 1982 graduates.

For all the labour market outcomes analysed below, part-time workers who cited school as the reason for their only partial involvement in the labour market were also deleted on the grounds that such individuals were – by definition – still principally students and had therefore not yet entered the school-to-work transition phase of their careers in earnest. Other part-time workers were, on the other hand,

generally included in the analysis, lending it a broad labour market base.[6]

Finally, "other" workers (*i.e.*, not paid, not self-employed) were eliminated from most of the labour market analysis, individuals deemed to have unreasonably low earnings, and those missing the required information were also dropped (the latter on a variable by variable basis) resulting in a small number of deletions (typically no more than 1 percent of the samples).

II.3 The Field of Study Classification and the Variables Included in the Analysis

The field of study classifications employed the analysis are as follows:

No Specialization	Agricultural & Biological Sciences
Elementary/Secondary Teacher	Veterinary Sciences
Other Education	Engineering
Fine Arts & Humanities	Medical Professions (*i.e.*, doctors, dentists, *etc.*)
Commerce	Other Health
Economics	Computer science
Law	Mathematics and Other Physical Sciences
(Other) Social Sciences	

This classification scheme resulted from the desire to keep the number of fields as small as possible (for the sake of a focused analysis), while allowing for important cross-discipline differences in the outcomes being analysed. The decision process began by using the standard Canadian discpline groupings employed in the NGS data as a starting point, and then conducting a preliminary analysis of cross-field earnings patterns (a key outcome) at a more detailed level across the different survey years (by sex). The indicated groupings of fields are thus characterised by being of at least a generally similar nature and by having reasonably consistent earnings patterns.

The following variables are employed in the analysis:[7]

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[6] Separate sets of calculations for most of the outcomes presented below have also been carried out with the samples restricted to full-time workers. These results (available upon request from the author) were generally very similar to the findings presented below (where part-time workers are included), lending an additional generalisability to the findings. Some of the key earnings results are presented for both all workers, and full-time workers only in Finnie [1999e].

[7] More detailed documentation of these measures is provided in Finnie [1999e], especially Annex B.

Overall evaluation of the education programme: Based on the question: "Given your experience, would you have taken the same field of study or specialization?" The tables report the mean scores of an index constructed from the responses to this question, with higher values indicating greater satisfaction with the choice and essentially representing the percentage of graduates who said they would have chosen the same programme again. The measure could not be constructed from the 1984 data, but should otherwise be quite comparable across all periods.

New diploma: The (cumulative) percentage of graduates who obtained one or more additional diplomas (at higher or lower levels) between graduation in the base year (1982, 1986 or 1990) and the interview dates.

Labour force status (unemployed): Essentially a standard measure, although there is one small departure which results in a slight upward bias (*i.e.*, full-time students are considered as unemployed if they meet the usual conditions of being without a job and looking for work, which is not usually the case).

Part-time employment: Less than thirty hours per week (standard definition)

Temporary job: Based on a direct question to this effect which is almost perfectly consistent across surveys. The 1987 data overstate the number of temporary workers to a small degree, however, since individuals who had worked continually with the same employer since the first interview (1984) were assumed to have been in a permanent job.

Self-employment: Based on a direct question. As noted above, "other" workers (non-wage/salary workers, not self-employed) are deleted from most of the analysis (*i.e.*, job outcomes).

The job-education skill match: Represents the mean scores of a discrete index running between 0 and 100 created by the author from the categorical information available in the raw NGS data derived from the question "Do you use any of the skills acquired through the education programme in your job?", with higher values indicating closer job-education skill matches. More specifically, for the 1982

and 1986 cohorts, the available responses of "no" and "yes" were assigned index values of 0 and 100 respectively, while for the 1990 cohort, values of 0 ("not at all"), 33 1/3 ("very little"), 66 2/3 ("to some extent"), or 100 ("to a great extent") were assigned. The measure is, therefore, consistent for the two interviews of each cohort, but not necessarily across the two earlier cohorts and the last cohort.

Educational pre-requisites of the current job: Represents the level of education required for the job as compared to the diploma obtained at graduation, based on comparing the responses to the question: "When you were hired...what were the minimum educational qualifications required?" to the degree received in 1982, 1986, or 1990. The response options varied across the survey years, but were converted to the broader categories (below College, College, Bachelor's, Master's, and Ph.D.) which correspond to the degree level information available for the 1982 cohort in order to have the most consistent measure possible across surveys.

Job satisfaction – earnings, overall: Based on the questions: "Considering the duties and responsibilities of your job, how satisfied are you with the money you make?" and "Considering all aspects of your job, how satisfied are you with it?" The tables report the mean scores of indices constructed from the responses to this question, with higher values indicating greater job satisfaction. The measures should be directly comparable across all survey years, since the response options were relatively similar: "very satisfied" (a score of 1), "satisfied" (.67), "dissatisfied" (.33), "very dissatisfied (0)" in the 1986 and 1990 survey years (1988/91 and 1992/95); and the last two options differing only very slightly for the first cohort: "not satisfied", "not at all satisfied"

Earnings: Based on the question: "Working your usual number of hours, approximately what would be your annual earnings before taxes and deductions at that job?" thus representing the rate of pay as measured on an annual basis, rather than the amount necessarily earned. All values are expressed in constant 1995 dollars, rounded to the nearest thousand, and capped at the $99,000 upper limit which characterises the 1984 data (the lowest bound in the six databases), or $143,035 in constant 1995 dollars.

III. THE EMPIRICAL FINDINGS

The discussion of the findings is focused on the following themes:

- The cross-discipline patterns which hold most generally – for both men and women and across all surveys.
- The evolution of the patterns over the early years in the labour market – from two to five years following graduation.
- The patterns by sex.
- Comparisons of the patterns across cohorts – looking for any shifts from the first through third cohorts.

III.1 The Distribution of Graduates by Field of Study and Sex

The distribution of graduates by field of study is shown in Table 1, while the percentage of female graduates within each discipline is shown in Table 2. Interestingly, the distributions by field were relatively stable across cohorts, with the only significant shifts being a moderate decline in the percentage of engineering graduates amongst men; and declines in elementary and secondary teaching and fine arts and humanities graduates amongst women, offset by increases in the percentage of commerce graduates and general social sciences.

The extent of this stability in the distribution of graduates by field is perhaps somewhat surprising, leading to a number of related questions. Was this stability primarily due to demand side or supply side factors – that is, students' preferences or the spots available at universities? Is the "production" of graduates in different fields as flexible and responsive as it should be as employment opportunities (and employers' needs) ebb back and forth over time? Should the general lack of any secular shifts in the distribution of graduates by field of study be cause for worry as the economy moves in directions which should presumably favour certain types of graduates over others? As a concrete example, the share of computer science graduates did not increase in any dramatic fashion across cohorts (3 percent of male graduates in 1982 and 4 percent in 1990, and 2 and 3 percent of female graduates in the same years), despite what would seem to be a clear need for greater numbers of such graduates.

The overall share of female graduates rose over time, from 50 percent in the first cohort, to 52 percent

in the second, to 54 percent in the third – women thus coming to represent a clear majority of Bachelor's level graduates. There have, however, been tremendous differences in the gender patterns by discipline. Female graduates having been significantly over-represented in teaching/education, fine arts/humanities, the general social sciences, and other health disciplines (*i.e.*, apart from doctors, dentists, pharmacists, optometrists, and the like – dominated by nursing graduates). Women have, on the other hand, been under-represented in economics, engineering, computer science, and mathematics and the physical sciences. The other fields have had more or less similar numbers of male and female graduates (agricultural and biological sciences, veterinary sciences, medical professions); or have seen women catch up to men over time (commerce, law).

The relative stability of these patterns is perhaps surprising – although the data cover graduates who finished their studies just eight years apart (1982 through 1986 to 1990), and we should perhaps not expect particularly dramatic changes over such an interval. Nevertheless, the sorts of points raised regarding the relative stasis in the distribution of graduates by field of study could again be noted in the context of these gender patterns, especially as there has been relatively slow entry of women – or even declines – in some disciplines typically perceived as needing to attract greater numbers of students which have traditionally been male dominated, such as engineering, computing, and the pure sciences (the significant under-representation of females in economics is also notable). In short, why are women still staying away from these disciplines, what are the consequences of this penury, and what should and can be done about it? These male-female differences are also important in an analytical sense, as they typically play an important role in the overall differences in outcomes by gender seen below.

III.2 Overall Evaluation of the Educational Programme

Graduates' overall evaluations of their choices of major are given in Table 3, with these figures interpretable as representing the percentage of graduates who said that, given the chance, they would have chosen the same field of study again. Overall, the results indicate that approximately three-quarters (or just under) of all Bachelor's graduates were satisfied with their choices, with female graduates' scores running slightly lower than males' scores in all years. Yet while the clear majority of graduates were happy with their choice of discipline, the fact that approximately one-quarter of them were not similarly content should perhaps be cause for question, concern, and further investigation as

to why this might be and what could be done to improve matters – this being such an important decision in an individual's career and life generally, and for the nation's economic performance.

The generally high satisfaction fields include the professional programmes – teaching (especially for women), commerce (although less so for females than males, especially in the most recent cohort), law (again excepting the 1990 female graduates), engineering (only of late for women), medical professions, other health – as well as computer science. The next tier of disciplines with medium or more mixed levels of satisfaction includes other education, fine arts and humanities, veterinary sciences, and mathematics and physical sciences, the latter being generally weaker than the others. The lowest levels of satisfaction have been amongst graduates with degrees in economics, other social sciences, and agricultural and biological sciences.

Although the highest approval ratings went to the disciplines most directly connected to labour market skill sets and career paths (the professionals and computer scientists), the fine arts and humanities graduates, who are presumably the polar opposite in this respect, scored in the middle rank, placing them almost uniformly ahead of social science graduates, as well as those in the pure and applied sciences. It would appear that satisfaction with the educational programme is clearly more than a matter of job market preparation – at least for some groups of graduates.

One particularly noteworthy group is female economics graduates, who had the lowest scores in all periods, with astoundingly low approval ratings of just 41 and 33 percent as of the two interview dates for the last cohort in particular – that is, as many as two-thirds of these graduates said that, given the chance, they would have chosen another field of study. The economics discipline is presumably given reason to consider the meaning of these results, their underlying causes, and what might be done to improve matters (even as it should be emphasized that male economics graduates have generally expressed levels of satisfaction similar to those in the other social sciences, although this is not setting the bar very high) – especially since enrolments in economics have typically been falling of late (thus at the same time validating the meaning of these numbers).

The relatively low levels of satisfaction amongst graduates in mathematics and the physical sciences, as

well as those with degrees in the agricultural and biological sciences, might be cause for concern at a broader social level, since science and technology are so critical to the wealth of nations in the new "knowledge based economy", a theme focused upon in Lavoie and Finnie [1999].

There are no clear trends in the scores from the first interview to the second for each of the given cohorts, perhaps implying that (in particular) graduates have not generally been (un)pleasantly surprised by the evolution of their post-graduation outcomes – at least as they relate to their chosen fields of studies – even as job outcomes changed to a considerable degree over this interval (see below). This is an interesting and potentially important finding regarding the "rational" and informed nature of individuals' choices of discipline and the relation of these choices to labour market outcomes (a topic the author plans to pursue in future research).

Neither were there any general shifts in the scores across cohorts (see in particular the first and third groups, for which labour market conditions and rates of further education were similar), with these relatively stable satisfaction levels contrasting with what would seem to be the popularly held belief that things have become increasingly difficult for succeeding cohorts. While the question underlying these evaluation scores is obviously a subjective one, it is quite clearly worded and any general increases in the dissatisfaction of this generation might have been expected to show up to at least some degree in this variable.

III.3 Further Studies

Table 4 shows that, overall, 15 to 19 percent of all Bachelor's level graduates had obtained another diploma as of two years following graduation, and from 22 to 36 percent had done so by five years later. Interestingly, male and female graduates continued with their studies at very similar rates. Recall that such individuals are deleted from the remainder of the analysis, for the reasons given above.

The percentage of Bachelor's level graduates who obtained an additional diploma was lower for the second cohort – especially as of the second interview. This might suggest the existence of two broad types of Bachelor's graduates who continue with their studies: those who go straight through after finishing their undergraduate degrees and who might be committed to this path more-or-less regardless

of the prevailing labour market conditions, and those who make initial forays into the labour market and subsequently return to school if they find their employment opportunities to be relatively limited.

With the precise mix of graduates at the College, Bachelor's, Master's, and Doctoral levels – in terms of both their numbers and their quality – now generally recognised as an important element of the "knowledge based economy", the patterns by field are interesting and important. Focusing on the second interview cumulative totals, the broad patterns for male and female graduates across the three cohorts show that the percentage of graduates who continued with their studies tended to be high in fine arts and humanities, general social sciences, agricultural and biological sciences, and mathematics and physical sciences. More average or mixed rates are seen in teaching/education, economics, law, and veterinary sciences. The lowest rates are for commerce, engineering, and computer science, as well as medical professions and other health graduates.

Some of the higher rates presumably reflect natural career progressions – that is, in areas such as the social and natural sciences, the Bachelor's degree essentially provides an introduction to the discipline, while those who wish to work in these areas generally require an advanced degree. In other cases, such as fine arts and humanities, the higher rates probably often reflect individuals switching from one discipline to another, including going on to professional school; after having studied what they liked (and perhaps proved their talents along the way), many such graduates change to a degree where they are more likely to be able to find a job and build an interesting and productive career.

At the other end of the spectrum, the relatively low rates of further studies in the case of engineering and (especially) computer science graduates might be cause for concern, even as these patterns presumably largely stem from the good job opportunities faced by such graduates. Are we, in particular, producing sufficient numbers of such graduates at a time when science, technology, and computers are at the fore?[8]

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[8] See Lavoie and Finnie [1999].

III.4 Employment Rates and Job Status

Unemployment Rates

Table 5 shows that unemployment rates for all graduates in the working samples taken together were generally quite low, ranging from 3 to 10 percent across the different interview periods, with similar rates for men and women. Within this range, the rates generally declined quite significantly from two to five years following graduation, from 8-10 percent down to 3-6 percent over this three year interval. Interestingly, the rates show no clear trend across cohorts, with the rates for the first set of graduates similar to those of the last (interviewed at roughly comparable points in the business cycle).[9]

There was, not surprisingly, significant variation in unemployment rates by field. The generally low unemployment disciplines include teaching (except for female graduates in 1984 and 1991), engineering (except female graduates in 1991), medical professions, other health, and computer science. The next tier of medium and more mixed rates includes other education (mixed), commerce (tending towards the lower side of average), economics (on the higher side), law (the most boom-and-bust record), general social sciences (again tending towards the above average, but with large spikes in certain years), and mathematics and physical sciences (quite mixed). The generally high unemployment fields include fine arts and humanities, which was predictable, and agricultural and biological sciences, which is perhaps more surprising.

Part-Time Employment

Rates of part-time employment (Table 6) have been much higher for women than men: over all fields, the rates amongst female graduates were between 11 and 14 percent, versus 3 to 7 percent for men.[10] Furthermore, these gender differences grew in the years following graduation, with the proportion of female graduates in part-time jobs dropping just one percentage point from the first interview to the second in each case, while the males' rates declined 2 to 4 points from their already lower levels. The men's rates undoubtedly primarily reflect current employment opportunities and the improvements in these conditions in the years following graduation, while the women's rates also reflect labour supply

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[9] See Finnie [1999a] for further discussion of employment and earnings patterns (see below) amongst graduates by sex and level of education (College, Bachelor's, Master's, Doctorate).

decisions related to having and raising children, other family influences, and additional factors which have traditionally led to a generally looser labour force attachment.[11]

Like the unemployment rates, there is no clear trend in the rates of part-time work across cohorts, with comparisons of the first and last sets of graduates indicating slightly lower – not higher – rates for the later group in three of the four cases (males and females as of two and five years following graduation). At a time when it is often taken for granted that there have been increases in "non-standard work" in general – especially amongst the young – the data provide no empirical evidence of this phenomenon in the form of part-time work amongst Bachelor's level university graduates.

Turning to the patterns by discipline, the results would seem to suggest certain differences in the structure of employment opportunities along this dimension, especially when the part-time rates are viewed along side the unemployment rates seen above. For example, commerce, economics, and law graduates are almost uniformly characterised by low rates of part-time work – low in absolute levels and/or low relative to what their unemployment rates might have suggested in terms of demand side forces. Rates of part-time work amongst law graduates were, for example, very low even in the years when unemployment rates were relatively high. In short, there would appear to have been less scope for the part-time option in general – there was either a full-time job available, or there was no job at all. These patterns are especially strong for men, but largely hold for women as well.

The other fields tending to have low rates of part-time work were perhaps more predictable in this respect, as they were also characterised by generally low unemployment rates: engineering, medical professions, other health, computer science. The generally full-time nature of the jobs found by graduates in these disciplines would, therefore, appear to be the result of the combination of i) the generally good employment opportunities available in these areas, ii) the desire of employers to hire

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[10] Recall that individuals working part-time precisely because they were in school are not included in the analysis.

[11] Finnie [1999c] shows that women were much less likely to be in part-time jobs involuntarily than were men, and that the involuntarily part-time rates generally declined significantly from the first interview to the second (as employment opportunities generally improved) for each cohort of female graduates – thus resembling the male patterns in this respect.

workers on a full-time basis, and iii) the preferences of graduates to work on a full-time basis.

Returning to the "flexibility of employment options" issue, the reverse to the situation described for graduates in commerce, economics, and law would appear to hold for teaching, other education, and fine arts and humanities, where the rates of part-time work have varied to a much more significant degree and have generally moved (inversely) with demand conditions. The labour market for graduates in these disciplines would, therefore, appear to have been more flexible in terms of employment status in general, while recessionary periods have been characterised by increases in the relative number of part-time job opportunities.

It is also worth noting that the disciplines associated with apparently more flexible employment options – for men and women alike – are generally those dominated by women. It is interesting to speculate as to whether the presence of women has perhaps made those particular labour markets more amenable to "non-standard" work conditions more generally – which would be a quite interesting institutional dynamic, with a range of implications, including what might be predicted for labour markets related to disciplines where the numbers of female graduates have been increasing, such as commerce and law.

Turning to the other disciplines, part-time rates amongst social science graduates (apart from economics) have tended to be above average for men, but about in the middle for women; the agricultural and biological sciences rates have generally been in the middle range for men and women alike; while for mathematics and physical sciences, the rates have been about average for men, but very low for women. The latter result is especially interesting – perhaps part-time work is less of an option for women trying to crack the hard sciences; alternatively, perhaps these disciplines attract the sort of women who are particularly focused on their careers and are thus less interested in working part-time.

Temporary Employment

Table 7 shows that female graduates were more commonly in temporary jobs than were men, but any simple supply-side explanation comes up against the fact that for the one year such data are available, the proportions of men and women in temporary jobs voluntarily were similarly low (figures not reported here, see Finnie [1999c]). In short, temporary employment would appear to generally be due

to the absence of permanent jobs, and the results reported here should be interpreted in this context.

With respect to the dynamics of temporary employment, there were uniformly large declines from two to five years following graduation. For graduates of all fields taken together, the men's rates fell from the 18 to 21 percent range to 5 to 9 percent, while for women the rates fell from the 22 to 27 percent range to 9 to 13 percent, presumably again reflecting the improvements in job opportunities over this interval. There was, however, something of a shift in these dynamics – and the second period levels – over time: while the percentages of graduates with temporary jobs as of two years following graduation as low or lower in each subsequent cohort, the reverse was true as of the five year rates.[12]

As for the patterns by field, the findings for temporary work are fairly similar to those for part-time work – perhaps largely driven by similar factors related to labour demand and institutional arrangements. Thus, fields characterised by lower rates of temporary employment include commerce, economics, law, engineering, computer science, and mathematics and other physical sciences (the latter for women only). The other fields tend to have higher rates, although the patterns are fairly mixed – presumably reflecting the various demand, supply, and institutional influences at play. Medical professions appears at first to be an outlier case, but the relatively high rates found here probably reflect internships, residencies, and other such standard transitional elements of careers in these areas.

Self-Employment

Being self-employed – as opposed to being a wage or salary worker – could be for one of two broad reasons: i) not being able to find suitable employment of a more conventional status, ii) preferring self-employment for personal reasons or the short-term monetary benefits and/or enhanced longer-term career opportunities which can accrue. The NGS surveys do not, unfortunately, contain information which would facilitate an analysis which addressed these elements, thereby leaving us with the simple rates shown in Table 8.

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[12] See Finnie [1999c] for further investigation of this dynamic at a more aggregate level (*i.e.*, by level of study rather than field).

The percentage of individuals who were self-employed varies between 6 and 10 percent for all graduates taken together, with rates generally twice as great for men (7 to 13 percent) as women (3 to 7 percent). The rates generally increased from two years following graduation to five years out. Given that labour market opportunities generally tended to improve over this interval (as seen above), these results would seem to suggest that self-employment has more often stemmed from the advantages of the self-employment option rather than the lack of suitable opportunities with respect to wage and salary positions – at least at the margin. No cross-cohort trends are evident.

The patterns by field are mostly quite predictable, but also include a few surprises. Thus, by far the highest rates were amongst doctors and lawyers, with veterinarians following somewhat behind, presumably reflecting the private practice option for these professionals. Perhaps more surprising are the consistently higher than average rates among fine arts and humanities graduates, although a more detailed analysis would be required to find out what is driving this outcome: independent artists? cab-driving philosophy majors? English majors who have become by-the-hour editors? Also of surprise are the relatively high rates amongst agricultural and biological science graduates in certain years, especially for men – with no obvious explanation for this finding. Beyond this, the rates are all moderate to low.

III.5 Skill and Qualifications Matches

The Job-Education Skill Match Index

Table 9 reports the mean scores of the job-education skill match index, with higher values indicating greater use of the skills learned in the programme from which the individual graduated. As previously noted, the results should be directly comparable across interview years for a given cohort, and between the first two cohorts, but not between the first two and last groups of graduates due to changed response options given in the NGS questionnaire, and directly comparable across disciplines in every case.

The reported scores imply that the great majority of graduates were to at least some degree using skills learned at school in their current jobs. The mean scores in the 82 to 87 point range for the earlier cohorts (1984/87, 1988/91) represent corresponding percentages of graduates who responded in the

affirmative to the simple "yes"/"no" question regarding their use of the skills learned at school in the current job, while the 69 to 72 point range for the 1990 cohort (1992/95) represents an average response of slightly more than "to some extent" where the other options were "not at all" "very little", and "to a great extent".

Perhaps surprisingly, there were no dramatic changes in the index scores from two to five years following graduation – but this could reflect the nature of the underlying question and the construction and interpretation of the resulting measure more than the actual underlying job-education skill match relationship *per se*, with graduates perhaps having difficulties identifying what exactly they learned in school and how those "skills" relate to their current work.

Regarding the patterns by discipline, the professional fields again scored well – with high match scores amongst graduates in teaching, commerce, law (very high), medical professions (again very high), other health, computer science, and engineering (although considerably less so in the latest cohort, especially for men). Fields with consistently lower scores include fine arts and humanities, economics, other social sciences, and agricultural and biological sciences (except for female graduates of the first cohort) – fields which, again, are either not particularly linked to the development of specific job market skills, or for which a career in the area typically requires an advanced degree, leaving these Bachelor's level graduates on uncertain ground in terms of career options related to their fields of specialisation. Fields with middle rank or more mixed scores include other education, veterinary sciences (a bit of a surprise), and mathematics and physical sciences.

Educational Pre-requisites and Graduates' Qualifications

The job-education *credentials* match is analysed by focusing on the percentage of graduates who were over-qualified for their jobs, shown in Table 10. Overall, a substantial proportion of graduates appear to have been over-qualified for their jobs, with these rates varying from 25 to 34 percent across the various surveys. These results could, however, at least partly reflect a certain ambiguity regarding the formal educational prerequisites versus the true requirements of many jobs. It might, for example, often be the case that a Bachelor's degree is not officially required, but is needed to successfully compete for a position – a case which might be registered as an "over-qualification" (depending on how the

graduate responded). The results should, therefore, be meaningful, but be interpreted with some caution.

Being over-qualified was somewhat more common amongst female graduates than males for the class of 1986 cohort, but not for the other cohorts. The rates generally declined a little from the first interview to the second, consistent with graduates gaining promotions and generally moving into positions where they were being given more scope to work up to their qualifications. There was perhaps a tendency towards moderately lower rates of over-qualification for the most recent group of graduates relative to the earlier ones, and while it is again difficult to know exactly how to interpret this finding, we can at least say it offers no support for the notion that the quality of jobs found by graduates has deteriorated over time.

By discipline, the professions show the best job-education qualification matches, with the fields with low rates of over-qualification including teaching, law, engineering, medical professions, and computer science. Fields with medium or more mixed rates include other education, commerce (perhaps a bit of a surprise), agricultural and biological sciences (women), and mathematics and other physical sciences. Fields tending to have higher rates of over-qualification include fine arts and humanities, economics, other social sciences, agricultural and biological sciences (men), and other health (only women's rates reportable).

III.6 Earnings and Job Satisfaction

Earnings Levels and Growth Rates[13]

Table 11 reports the mean real earnings of graduates in constant 1995 dollars. Over all fields, mean earnings ranged from the mid-30,000s to mid-40,000s for men, and from just under the $30,000 mark to $36,000 for women, including substantial increases from two to five years following graduation (see the relevant columns in the table).

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[13] Earnings patterns by level of education and sex are focused on in Finnie [1999a], while Finnie [1999d] investigates the patterns by discipline econometrically.

Over time, male graduates' mean earnings declined for each cohort relative to the preceding one, with the third cohort's earnings levels being 5.9 percent lower than those of the first cohort's as of the first interview, and down 8.1 percent as of the second interview. For women, on the other hand, earnings either held steady or rose for each set of graduates, finishing 8.3 percent higher as of the first interview and 1.4 percent higher as of the second interview.[14]

By field of study, the numbers in Table 11 and Figures 1 and 2 reveal that the clear earnings leaders are – not surprisingly – medical professionals, with this advantage rising substantially from two to five years following graduation, especially for the first and last cohorts (see their relatively high earnings growth rates in those years). The second tier fields include law (especially as of the second interviews for each cohort), veterinary sciences, engineering, computer science, other health disciplines, and (less consistently) mathematics and physics graduates. The next rank includes teaching, commerce, and economics. The fields with the lowest earnings levels include other education, arts and humanities, other social sciences, and agricultural and biological sciences.

Regarding growth rates from two to five years following graduation, medical and law graduates of both sexes typically had amongst the largest increases in earnings (except for male doctors in the middle cohort), while teachers had amongst the smallest gains, along with engineers in the case of men and other health graduates on the female side – these figures presumably giving us a glimpse of the longer-term earnings profiles amongst different sets of graduates.

Job Satisfaction

Table 12 shows graduates' levels of satisfaction with their earnings levels according to the index constructed for these purposes described above. To some degree, the earnings satisfaction results conform to the patterns of actual earnings levels just seen, but there are clearly many departures from any strict rule in this regard. Thus, the most earnings-satisfied graduates are those in the medical professions, other health (men only), computer science, and mathematics and the physical sciences – all amongst the higher paying fields – but law and engineering graduates (especially men) are not as

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[14] Median earnings and earnings patterns restricted to full-time workers show similar trends (see Finnie [1999e]).

consistently satisfied with their earnings as their higher than average levels might have suggested, some of the low paying disciplines are characterised by satisfaction scores which belie their low earnings levels in at least some years, some of the disciplines in the middle rank in terms of actual earnings have amongst the lowest satisfaction scores in certain periods, and the cross-discipline differences in satisfaction levels are generally proportionally smaller than the differences in earnings levels (although this could be at least partly due to the nature of the underlying questions and the index which has been constructed therefrom).

Perhaps the most intriguing result, however, is that the earnings satisfaction scores are very similar for men and women – despite the fact that men had significantly higher earnings levels (as seen above). Thus, the most general, interesting, and perhaps important general conclusion to draw from these results is that while many of the differences in earnings satisfaction scores are statistically significant and there is obviously a relationship between actual earnings levels and individuals' satisfaction with those rates of pay, other factors are involved, including – presumably – *expectations*, which presumably vary by discipline, while the closeness of the male-female satisfaction scores perhaps represent the clearest and most interesting manifestation of that dynamic.

Roughly similar comments might be made about the overall job satisfaction scores shown in Table 13: many of the differences are statistically significant; there is clearly a general correlation between earnings levels and overall job satisfaction, but that relationship is far from perfect and there are many interesting outliers (*e.g.*, teachers); and there is generally much less cross-discipline variation in the overall job satisfaction earnings scores than in actual earnings levels – although more here than with the earnings satisfaction measure.

IV. CONCLUSION

This paper has provided an empirical analysis of a range of post-graduation outcomes by major field of study based on three waves of the National Graduates Surveys of Canadian post-secondary graduates, each group interviewed two and five years following graduation in 1982, 1986, or 1990.

The first interesting finding is the relative stasis of the distribution of graduates by discipline, raising

questions as to what is driving these patterns – relatively stable demand on the part of students, or supply side rigidities in the form of the universities offering relatively fixed numbers of places which have been slow to evolve.

The second significant result is that relatively large numbers of graduates have gone on to further studies, with the cross-discipline patterns and significant shifts over time leading to speculations regarding the role of current labour market conditions on the decision to continue on and (related) whether Canada has been obtaining the right mix of graduate students – overall, and by particular fields of study – especially in the context of the emerging "knowledge based economy".

The third and most important general finding is that many of the patterns of post-graduation outcomes conform to expectations, typically reflecting the different orientations of the various disciplines with respect to direct career preparedness, with the professions and other applied disciplines generally characterised by lower unemployment rates, closer skill and qualification matches, higher earnings, and so on. On the other hand, while the "applied" fields also tend to perform well in terms of the "softer", more subjective measures regarding job satisfaction and the overall evaluation of the chosen programme (would the graduate choose the same major again?), the findings also indicate that graduates' assessments of their post-graduation experiences and overall evaluations of the programmes from which they graduated are based on more than simply adding up standard measures of labour market "success", with the job satisfaction scores and – perhaps most interestingly – the overall programme evaluations often departing from what the objective measures (unemployment rates, earnings levels, *etc.*) might have predicted.

Thus, earnings satisfaction clearly depends on more than actual earnings levels in many cases (with the male-female results perhaps being especially clear in suggesting that "expectations" play a key role in this regard), overall job satisfaction departs from earnings levels to an even greater degree, and overall programme evaluations appear to depend on other factors besides post-graduation employment opportunities and earnings levels. Perhaps the best example of this is the medium levels of overall satisfaction with the educational programme expressed by fine arts and humanities graduates, generally placing them squarely above those of graduates in fields such as economics, other social sciences, and

the pure and applied sciences, even though they typically did amongst the worst in terms of labour market outcomes.

As for the broader implications of these findings, it should be emphasized that encouraging individuals to choose one discipline or another, or prompting universities to expand enrolments in one area over another out of a desire to increase the number of contented and productive graduates according to the results presented here would guarantee nothing. These results pertain to the average (not marginal) outcomes for those who have previously chosen to apply to, been accepted in, and completed the indicated programmes, and shifting applications and/or admissions would not necessarily lead to newcomers replicating the records of past graduates. For example, to shift students from, say, the general social sciences to teaching or engineering or fine arts and humanities would not necessarily lead to increases in post-graduation labour market outcomes in the case of the first two, or higher levels of overall satisfaction with the chosen discipline in the case of the latter.

In short, the results reported here represent the outcomes of a given set of choices by students and institutions alike, as well as the specific labour market conditions which prevailed over the relevant period, and any predictions of changed outcomes would have to take all these processes into account – a complicated exercise well beyond the scope of this paper. Nevertheless, the results should be useful from at least a descriptive point of view, and could at least point the way to further research in a variety of directions, from economics faculties investigating their relatively low evaluations, especially amongst women; to educational and labour market specialists conducting more detailed analyses of the relationships between individuals' labour market experiences and their overall programme evaluations; to institutions studying the slow moving nature of the distribution of their graduates by discipline or their gender differentiated enrolment patterns in the light of the observed post-graduation outcomes; to education and labour market policy makers addressing the large questions of how to best spend post-secondary dollars in ways which will make for contented and productive graduates; and so on. It is hoped that the present study will help provide a useful starting point for these and other future investigations.