THE RELATIONSHIP BETWEEN POSTSECONDARY EDUCATION AND LABOUR MARKET OUTCOMES: COMPARING GRADUATES OVER A FOUR-COHORT PERIOD

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Abstract

Drawing on data from the 1982, 1986, 1990, and 1995 National Graduates Surveys, this dissertation will build on previous research comparing graduates of different types of postsecondary programs on various outcome measures including earnings, employment, objective and subjective over-education, and the mismatch between education and work. Particular emphasis is placed on making field of study comparisons among graduates of different levels of postsecondary schooling (i.e. trades, college, university undergraduates, professional, master's, and Ph.D.), and identifying changes over time. The central theoretical issue addressed in this dissertation involves comparing the viability of human capital theory and the credentialist perspective with respect to the relationship between postsecondary education and skills. Statistical analyses are made using ordinary least squares, ordered logistic, and multinomial logistic regression models.

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Chapter 1

Introduction

The steady expansion of postsecondary education in industrialized nations has been identified as one of the most significant social trends of the second half of the twentieth century (Brint and Karabel, 1989). Enrolment in postsecondary institutions in North America increased dramatically over the last half-century, especially between 1970 and 1982, when postsecondary enrolment grew at an unprecedented rate (Smith, 1986; Picot, Wanell, and Lynd, 1987)[1].

The expansion occurred, in part, because it became evident that education directly affects future success in the labour market. This relationship is still apparent today. Empirical research continues to show that postsecondary graduates have advantages in the labour market. They achieve higher status and and they earn higher salaries, in comparison with those with only a high school diploma (see Guppy and Davies, 1998). At the same time, research also indicates that students who do not complete high school tend to earn less money and to experience much higher rates of unemployment (Tanner, Krahn and Hartnagel, 1995).

There are many reasons why people stay in school; parental pressure is a critical factor. Students may also choose to stay in school in order to satisfy their intellectual curiosity, for personal fulfillment, or simply to pursue knowledge for its own sake. However, research suggests that the most important reason why

students continue their education is to gain credentials that will increase their employment opportunities following graduation. Lowe and Krahn (1995), for example, reported that more than 80 percent of their survey participants said that they entered their most recent program of study mainly for job or career reasons. Indeed, most people feel that the major goal of educational institutions is to provide job or career training (Krahn, 1991: 137). However, an important question remains regarding whether education actually produces the skills necessary to be successful in the contemporary labour market. In fact, the issue of which educational programs actually meet the occupational expectations of their graduates is another important matter, altogether.

While it is well documented in the research literature that education leads to higher levels of income and lower levels of unemployment (Allen, 1999a; Brint and Karabel, 1989: 113; Collins, 1979; Davies, Mosher, and O'Grady, 1996; Finnie, 2000; Hunter, 1988; Jorgenson, 1984; Paju 1997; Tanner, Krahn, and Hartnagel, 1995), there is serious concern about the real returns on a postsecondary education (Finnie, 2001; Livingstone, 1998; Picot et al., 1987). Many young people find the transition from school to work very difficult (see Anisef and Axelrod, 1991, Côté and Allahar, 1994; Lowe and Krahn, 1995; Livingstone, 1998), and substantial numbers of young people are concerned not only about finding a job, but also whether it will be commensurate with their aspirations (Ashton and Lowe, 1991: 1; Côté and Allahar, 1994; Livingstone, 1998). There is evidence to suggest that even graduates with high levels of

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[1] In fact, by 1994 approximately one-third of all people between the ages of 18 to 24 were enrolled in full-time postsecondary programs in Canada (Guppy and Davies, 1998: 88).

education are experiencing difficulty moving into high status occupations, and that high school graduates are in a particularly difficult position as some university graduates are taking up lower level jobs (Ashton and Lowe, 1991: 22; Livingstone, 1998).

During the last quarter of the twentieth century, social theorists held a very cynical view of the relationship between postsecondary schooling and labour market outcomes. Nevertheless, it has been argued that while postsecondary education no longer assures a young person a good job, it has become all the more necessary (Smith, 1986). Studies continue to show that schooling is no less important today than it was in the past; this, of course, sends a message to students that they must stay in school if they want to obtain respectable jobs following graduation.

However, many still question whether the returns on a postsecondary education justify its costs. As more and more employers are demanding postsecondary credentials for basic entry-level positions, many people are deeply concerned about whether postsecondary credentials are actually needed in the contemporary labour market (Krahn and Lowe, 1995; Livingstone, 1998). Does a postsecondary education provide students with the skills that they need in order to be successful? Or does it simply create a market in educational credentials? That is, for example, does a bachelor's degree provide graduates with the skills needed to enter specific professional occupations, or does it merely provide them with a slight advantage when competing for jobs that require lower levels of schooling?

These are theoretically and empirically important issues that deserve further attention.

Theoretical Perspectives

There are two main theoretical perspectives within the sociology of education; they are the credentialist and human capital approaches. Credentialists take an extremely critical view of the relationship between postsecondary schooling and labour market outcomes. While they acknowledge that higher levels of education lead to higher earnings, they argue that this relationship is simply an artifact of having more credentials, rather than having more job-related skills. Credentialists also argue that higher education no longer guarantees a respectable job, maintaining educational expansion has, for the most part, only served to increase the underemployment levels of postsecondary graduates. The opposite view, adopted by human capital theorists, is that education is an investment; a means of increasing human capital by acquiring job-related skills. Those who take the human capitalist approach argue that education directly affects success because schooling provides graduates with skills that are needed in the labour market. They are also likely to hold the view that as the labour market becomes more sophisticated, the relationship between education and work will become tighter.

There have been extensive debates between human capital theorists and credentialists, and there is a wealth of empirical research to support each position. Studies clearly indicate that higher levels of schooling do lead to a more productive and skilled labour force, as predicted by human capital theory (Allen,

1999a, 1999b; Hunter, 1988; and Paju, 1997).[2] On the other hand, other research suggests that higher education does not necessarily lead to a more productive or skilled labour force, lending support to the credentialist position (see Livingstone, 1998, for a review of the recent literature). The mixed positions and findings on this issue raise some important questions about transitions from school to work.

Past Research

Unfortunately, there is not enough evidence available to allow us to adequately test the merits of each theory for recent cohorts. As well, there are many questions directly related to the issues discussed above that have not been thoroughly investigated. One of the major limitations of past studies in this area is that they focus primarily on earnings (Wannell, 1990), and pay less attention to the issue of whether education is directly related to skill utilization. In addition, less is understood about whether the postsecondary programs that provide students with specific work-related skills are the same programs that also provide higher economic rewards and improved chances of employment. Studies that do touch on this issue are limited because they generally distinguish only between those with and those without a postsecondary education. Less attention has been devoted to understanding the differences that exist among graduates of different types of postsecondary programs. At the same time, past research that does distinguish among different postsecondary programs has been more likely to infer, rather than demonstrate, that employment outcomes are better for programs that provide a closer correspondence between the skills learned in school and

[2] However, explanations for this relationship are not entirely consistent. While some argue that education generates skills, others argue that education serves as a mechanism whereby preexisting

those later used in the labour force (Allen, 1999a, 1999b; Côté and Sweetman, 1997; Davies et al., 1996; Finnie, 2001)[3]. Furthermore, of the limited number of published studies that directly examine the fit or the mismatch between education and work, very few distinguish between college and university programs (Burris, B., 1983; Clogg and Shockey, 1984; Finnie, 2001; Krahn and Lowe, 1998; Lowe and Krahn, 1995; Redpath, 1994).

As well, less is understood about earnings comparisons between community college and university undergraduates of different fields of study, as few assessments of this sort have been made in the research literature. More specifically, we do not know the extent to which graduates of technical and applied community college programs earn higher wages than do graduates of the so-called "softer" liberal arts programs. This is a particularly important issue since university fees are usually substantially higher than college tuition costs and the average duration of university programs is much longer than the average duration of college programs. Unfortunately, the limited research on this issue is restricted largely to profile reports that do not allow for statistical inferences or control for possible spurious factors (Allen, 1996).

It has been argued that if Canada "is to remain competitive and benefit from the current microelectronics and information technology revolution, it must provide a closer integration of skill development, on one hand, and skill utilization, on the other" (Lowe and Krahn, 1989: 187). This may be particularly

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skills are identified (Taubmam and Wales, 1974).

[3] One study that did investigate the fit or mismatch between postsecondary programs and work did not distinguish between the skills learned at school and the skills obtained through on-the-job training (Redpath, 1994).

true now, as we are in the early stages of the evolving "knowledge-based" economy. Characterized by globalization and the production of knowledge, particularly in areas related to information technology, the evolving "knowledge-based" economy requires skills that did not exist previously. While it has been suggested that labour market success is likely to be found in high technology sectors (Finnie, 2000), the research literature is still unclear as to which skills are needed in the modern economy. High rates of technological progress suggest that graduates with technical skills and expertise would be in high demand. Thus, programs that are highly skill-oriented, particularly those found in technical schools and community colleges, should provide excellent employment opportunities for their graduates. On the other hand, the new economy will also have a need for graduates who can generate knowledge and disseminate information. Workers who can think critically, who can make independent judgments, who are capable of understanding, transmitting, and communicating knowledge, and who are both numerate and literate will also be valued. People with these types of skills are more likely to be found in arts, humanities and social science programs, rather than in technically oriented programs (Krahn and Bowlby, 1999). Clearly, these changes in the economy have important implications for all levels of postsecondary schooling, and will likely have a profound effect on the transition from school to work.

Given that the cost of a university degree is considerably higher than the cost of a technical certificate or college diploma, a key concern for young students and for policy makers is whether university graduates earn enough to justify the

higher costs of their schooling. This question is particularly relevant to students wishing to pursue a degree in the arts or social sciences, because the graduates of these programs are generally at the bottom of the earnings distribution for all university graduates, and they are believed to graduate with few applied skills (Finnie, 2001).

The viability of a liberal arts university education has become a key policy issue, as most people now believe that programs that provide technical skills represent the best form of job preparation in the emerging "knowledge-based" economy.[4] In fact, this belief may be largely responsible for why large numbers of university undergraduates, particularly those from liberal arts programs, are attending community college programs in order to acquire technical skills, following graduation.

The term "recycling" refers to the practice of obtaining an additional postsecondary credential that is not designed to be a continuation of the first credential (Allen, 1996: 17). Thus, graduates who obtained a college diploma after already earning a university degree would be considered to be "recycled." Likewise, a graduate who pursues an additional university undergraduate degree would also be considered to be someone who has "recycled" through the postsecondary system.

"Recycling," particularly among university undergraduates, has become a very common phenomenon. In fact, a recent report by Statistics Canada, drawing on data from the 1995 National Graduates Survey, shows that 62% of university undergraduates who pursue further education do not continue on to a higher level.

Of these graduates, 24% entered another Bachelor's program, while the majority (38%) entered college or technical diploma/certificate programs (Statistics Canada, Applied Research Bulletin, 2001: 26). However, the extent to which, or even if, "recycling" leads to higher earnings remains unknown.

It would also be useful to compare the employment outcomes over time. The experiences of arts and social science graduates can be compared with those of the one-year technical/trades and two-year college programs. Unfortunately, studies that have examined the employment outcomes of graduates of various postsecondary programs have tended to be descriptive. Profiles are presented and the researchers usually did not perform sufficient statistical tests to allow us to draw any clear conclusions (Allen, 1997, 1999a, 1999b; Finnie, 2000, 2001; Finnie and Frenette, 2000). Because data relating to the latest cohorts have only recently been made available, little research has been done exploring the implications of the new economy for the employment prospects of recent postsecondary graduates, leaving room to make a contribution to the literature.

Gender

Gender has become an important issue within the sociology of education during the last fifteen years (Boyd, 1990; Davies et al., 1996; Gilbert and Guppy, 1988; Gunderson, 1989; Jacobs, 1995; Hughes and Lowe, 1993; Lorence, 1987; Redpath, 1994; Wannell, 1990). Research on gender clearly shows that women continue to earn significantly lower incomes than men (Guppy and Davies, 1998), despite the fact that women have received the majority of undergraduate degrees

[4] See Allen (1997) for a thorough discussion on this issue.

since 1982 (Gilbert and Guppy, 1988: 165)[5]. In fact, most of the postsecondary expansion after 1982 is attributable to the increasing number of postsecondary credentials awarded to women. For example, in 1982 approximately 90,000 bachelor's and first professional degrees were awarded by Canadian universities, in equal numbers to men and to women. By 1995, more than 130,000 bachelor's and first professional degrees were awarded by Canadian universities, an increase of 69% (Guppy and Davies, 1998: 18). Approximately 55,000 were awarded to men, and roughly 75,000 were awarded to women (Guppy and Davies, 1998: 90). By comparison, of the approximately 50,000 college diplomas awarded in 1982, 29,000 (58%) were given to women and 21,000 (42%) to men. By 1994, a total of 60,000 college diplomas were awarded, with 35,000 (58%) college diplomas awarded to women, and 25,000 (42%) college diplomas awarded to men (Guppy and Davies, 1998: 91).

Unfortunately, most of the existing research in this area is quite limited as investigators have tended to focus either on how education is related to gender differences in earnings (Davies et al., 1996; Gunderson, 1989; Guppy and Davies, 1998), or on the extent to which education is related to gender differences in labour market segmentation (Wannell, 1990). Less attention has been paid to whether the fit between education and work is different for men and women, when controlling for field of study. Since men and women typically enroll in

[5] It was not until 1995 when women first began to receive the same number of master's degrees (approximately 12,000 for each gender) as men (Guppy and Davies, 1998: 91). However, women earned only 33% of all Ph.D.'s awarded in 1995 (women were granted 1,273 Ph.D.'s, while men were awarded 2,545) (Guppy and Davies, 1998: 92). It has been projected that if the current rates of Ph.D. attainment stay the constant, gender differences will disappear by 2015 (Guppy and Davies, 1998: 93).

different types of academic programs[6], and since they tend to be concentrated in different segments of the labour market, it would be interesting to see whether there are gender differences in the degree of fit between education and work. Unfortunately, existing research cannot tell us whether men and women face different chances of finding a job that closely fits their level of educational attainment, when one controls for field of study and level of education. Research on this issue may lend support to existing theories that seek to explain why there are still large gender disparities in income.

Gender is also a particularly important issue for researchers who investigate the effect of human capital on labour market outcomes. Human capital variables, particularly education, have been found to explain a significant portion of the gender gap in earnings (Christie and Shannon, 2000; Rubinson and Browne, 1994).[7] Thus, gender differences in human capital appear to be a major reason why men and women experience different labour market outcomes.[8] One reason why men and women experience such different labour market outcomes, even with the same credentials, might be attributable, in part, to the fact that women do not utilize their human capital as effectively as men, perhaps because

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[6] Sex role stereotyping is assumed to play a large role in gender enrollment patterns by field of study. For example social psychologists have contended that sex-typed socialization leads men and women to favour sex-typed majors, where women tend to be disproportionately drawn to nurturing fields that involve working with people (Betz and Fitzgerald, 1987). It has also been shown that many mathematics and related fields are stereotyped as masculine domains, resulting in an underrepresentation of women in fields of study that require mathematical skills (Ethington and Wolfle, 1988).

[7] The studies reviewed by Rubinson and Browne (1994: 587) suggest that only about half of the gender gap in earnings is explained by human capital variables, leaving the other half unexplained.

[8] Labour market discrimination is believed to be another major factor that contributes to the wage gap between men and women. In general, measures of discrimination are left to be inferred from the unexplained variance from human capital variables (Rubinson and Browne, 1994). For the most part, the true extent to which gender discrimination is responsible for the gender gap is

they expect their careers to be interrupted by childrearing.[9] For this reason, women may have less incentive to seek out jobs that are in keeping with their credentials, and consequently, they may have a lower rate of return on their investment in education.

Gender must be addressed in any study that investigates the relationship between education and work. Evidence of gender segregation in various types of postsecondary programs, and in different segments of the labour force, suggests that there are significant implications for employment outcomes. Gender is a particularly intriguing issue for this study, because women entering professional programs have recently caught up to, and in some cases surpassed, men in many of the once traditionally male-dominated professional programs (for example, law schools, medical schools, and business schools). Thus, gender differences in both subjective and objective employment outcomes may have changed for the most recent cohorts. It would be particularly interesting to ascertain whether employment outcomes for women, relative to those of men, have changed over the last decade. Lastly, it is also important to compare the employment outcomes of aboriginals with non-aboriginals, particularly since considerable attention has been paid to the rights and opportunities for the aboriginal peoples within Canada.

Summary

We do not have enough evidence to determine which groups of graduates from specific postsecondary programs have benefited the most from the new

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unknown; however, there are strong arguments that discrimination accounts for a large portion of the unexplained gender gap in pay (see Smith, 1990).

"knowledge-based" economy. Some believe that educated workers with specific technical skills are in great demand. If this is in fact the case, then postsecondary graduates of technical and specialized programs, perhaps from all levels of postsecondary schooling, should show improved employment outcomes over time, relative to postsecondary graduates from the more "generalist" liberal arts programs. On the other hand, it is possible that there could be an even greater growth in the demand for the knowledge and the analytical skills possessed by arts and social science graduates. If this were to be true, then the employment outcomes of graduates of these programs should show improvement over time, relative to those of the graduates of technical and specialized programs. Clearly, the most appropriate way to determine how the new economy has affected the employment outcomes of postsecondary graduates is to document employment outcome patterns over time for graduates of various types of programs and for graduates with different levels of postsecondary education.

A major problem with studies that indicate that educated workers have higher incomes and lower levels of unemployment is that they do not fully address the issue of whether employers actually need a more educated labour force. For example, university graduates may make more money than those with college diplomas, technical certificates, and high school diplomas, but, at the same time, they may not be able to find jobs that they feel are appropriate for people with their levels of schooling. A better test of whether graduates are adequately prepared for the labour market following graduation would entail

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[9] In fact, gender differences with respect to both job interruption and willingness to relocate have been identified as two key reasons why the returns to human capital are different for men and

using measures that tap into underemployment and education-job mismatch. These two concepts, mismatch and underemployment, will be central to this thesis. There is an urgent need for research on the underutilization of skills at the postsecondary level, as there are important issues at stake.

Another limitation of the earlier research relates to the fact that previous studies have generally treated education as a quantitative variable, measured in terms of 'years of schooling.' Quantitative measures for education tend to ignore important distinctions that need to be made when studying graduates at the postsecondary level. Consequently, little is known about the fit between specific postsecondary programs and jobs. So far, researchers have been unable to compare the experiences of community college and university graduates of comparable fields. By distinguishing between different types of academic programs, it is possible to determine which forms of postsecondary schooling are valued most by employers. The distinction will make it possible to explain some of the discrepant findings identified earlier, and to address theoretical questions, which to this point have not been adequately tested. Thus, by using dependent variables that tap into issues relating to fit and underemployment, and by distinguishing between different postsecondary programs instead of simply using 'years of schooling' to assess educational attainment, it will be possible to contribute to the debates between human capitalists and credentialists. The real test for the human capital theory is whether postsecondary schooling generates the skills that are valued in the contemporary labour market. If postsecondary graduates feel that their educations are related to their careers, then this provides

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women (see Jacobs (1995) for a revew of the literature on this issue).

evidence to support the human capital assertion that education produces skills that are needed in the workplace. On the other hand, the credentialist assertion that curricula are unrelated to occupational skills, and that graduates have far more education than is needed by the economy, would be supported if respondents believe that their educations were not related to, or even necessary for, their jobs. Identifying the applicability of these theories to different programs and levels of postsecondary schooling is one of the major goals of this dissertation.

In sum, the existing body of research leaves many unanswered questions regarding the relationship between postsecondary programs and employment outcomes. Given that the most recent Canadian evidence has not yet been collected and analyzed, the theoretical treatment of many of the issues addressed above is inconclusive.

Objectives

Drawing on a large Canadian dataset, this dissertation will explore the relationship between education and employment outcomes. The goal of this study is to provide an extensive and detailed analysis of the school-to-work transition. This analysis will focus on the employment outcomes of graduates who were surveyed two years after graduation.

This study will address many questions related to the transition from school to work that have not been thoroughly investigated in the recent past. For example, it seems reasonable to expect that college graduates from very specialized programs are going to report a closer fit between their education and

their work than university graduates from more general programs.[10] However, it is less clear whether community college and technical programs provide greater economic returns, higher levels of employment, and better access to more lucrative employment than the so-called "softer" university programs in the arts, humanities, and social sciences. More importantly, this dissertation will also address the question of whether the relative employment opportunities of college and university graduates from different types of programs have changed over time. By pooling recent waves of the National Graduates Survey (NGS), it will be possible to test statistically for changes in employment and income, over time, among technical and college graduates, as well as among the graduates of various types of university programs. Some important questions that will be addressed in this dissertation are summarized below.

1. Which postsecondary programs are most likely to provide the skills that are later used on the job?

2. Are respondents who are in jobs that simply require a postsecondary credential, though not a postsecondary credential in any specific area, more likely to report that they are overqualified or mismatched than respondents in jobs that do not require a postsecondary credential?

3. Are there differences between college and university undergraduates with respect to the above questions?

4. Have the outcomes for graduates with college diplomas and graduates from different types of university programs changed between 1982 and 1997?

5. For each of the six questions above, are there differences by gender?

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[10] In addition, this study will make a distinction between liberal arts graduates of the arts, humanities, and social sciences programs. Past researchers have had a tendency to group these graduates together and to treat them under the global heading "generalist"; however, arts, humanities, and social science graduates have been found to have quite different employment outcomes, suggesting that they should be treated separately in in statistical analyses (Finnie, 2000).

6. Do gender differences in the fit between education and jobs help explain gender differences in earnings?

7. To what extent, if any, does the "recycling" of a postsecondary credential improve ones chances of earning a higher income?

The questions that address the extent to which postsecondary programs are necessary for jobs in the evolving 'knowledge-based' economy are most effectively addressed by using measures that tap into the extent of mismatch and underemployment as well as measures of earnings and unemployment. Fortunately, the most recent wave of the National Graduates Survey (1995 NGS) provides valuable information on underemployment and mismatch that will allow us to address the aforementioned questions.

There are three key reasons why this dissertation focuses primarily on education at the postsecondary level. First, beginning in the late 1950's, postsecondary education expanded at an unprecedented rate for both sexes (Guppy and Davies, 1998: 91). In fact, more people are attending postsecondary institutions now than during the 1970's, when the largest cohort in the history of North America, the baby boomers, were eligible to attend postsecondary institutions. Thus, the importance of identifying the effect of higher education on employment opportunities is greater now, as postsecondary institutions play a more important role in the outcomes of more people's lives than ever before.

Second, because postsecondary education is becoming more expensive with each passing year, there are higher costs associated with staying in school longer in order to obtain a postsecondary education (Little and Lapierre 1996:2). Thus, students now need to borrow even greater amounts of money in order to

finance their postsecondary educations. This makes it extremely important to identify the relationship between postsecondary education and labour market outcomes so that students can make better-informed decisions regarding the costs and benefits of higher education, decisions that may have life-long implications.

Finally, the empirical research will inform the theoretical debates in this area. As mentioned earlier, much of the discussion and analysis in this dissertation will be organized around the credentialist and the human capital approaches. Unfortunately, as was mentioned earlier, there is little empirical evidence available that would enable us to adequately test the propositions of each theory at the postsecondary level.[11] Therefore, by focusing primarily on graduates at the postsecondary level, this dissertation will make a contribution to the theoretical debates on key issues relating to transitions from school to work.

While this study is based on Canadian data, the results are potentially applicable to other countries, including the United Kingdom and the United States. Past studies on skills and earnings show similar wage and employment trajectories for all three countries (Castells and Aoyma, 1994; Esping-Anderson, 1990; Livingstone, 1998). Others have also suggested that the transition from school to work displays similar, although not identical, patterns across the three countries.[12] As well, a recent review of the literature in this area by Hughes and

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[11] There is a growing body of research that evaluates the relationship between postsecondary programs and employment outcomes such as income and unemployment (Finnie, 2000a; 2000b). However, there has been less empirical research on the the issues that are central to this dissertation, in particular, skills mismatch and underemployment.

[12] Guppy and Davies (1998) have provided a brief discussion of the similarities between education systems in Canada and the United States, while Anisef and Axelrod (1991) have reviewed the similarities between postsecondary schooling in Canada and Britain.

Lowe (2000: 29) suggests that the relationship between training and work is highly consistent among all three countries.

Implications and Dissertation Outline

Theoretical and empirical work in the field of sociology of education should pay more attention to how the credentialing process operates at the postsecondary level. The findings of this study will be important to students, parents, and policy makers. This dissertation is intended to help students to navigate the contemporary labour market. They need to know which programs are going to offer them the greatest employment advantages. This study will also be of use to policy makers. This dissertation will also address issues relating to the financing of postsecondary schools and the subsidization of postsecondary education, so that policy makers will be better able to allocate resources.

The next chapter will discuss, in greater detail, the existing research on the issues that we address in this dissertation. In chapter 3 I describe the National Graduates Survey, and discuss the methodology that will be used for the statistical analysis. Unfortunately, most recent studies in this area, particularly panel studies, have provided only profiles and very limited insights into relationships (Allen, 1996; 1997; 1999; Finnie, 2000; Finnie, 2001; Finnie and Frenette, forthcoming), making it difficult to draw any definitive conclusions. Thus, most of the analyses presented in this dissertation, make use of either ordinary least squares or logistic regression. Regression provides a more powerful analysis because it makes it possible to control for confounding variables that also affect employment outcomes. The statistical results relating to both earnings and

employment are presented in chapter 4, and the models will include a number of interactions involving gender. Chapter 5 presents the logistic regression results for fit and mismatch, also including interactions by gender. Lastly, a discussion of the results, limitations of this study and suggestions for further research are provided in chapter 6.

Chapter 2: Literature Review

Chapter Outline

As outlined in the introduction, this dissertation will explore many issues related to the transition from school to work that have not yet been thoroughly investigated in the literature. The purpose of this chapter is to put the important issues into context. The first section of this chapter will discuss the human capital and the credentialist theories of education and consider the insights they provided into the relationship between education and work. Both are central in the sociology of education and both offer important insights into the literature on the transitions from school to work.

The second section of this chapter addresses the implications of the evolving "knowledge-based economy." Most agree that the new economy is demanding a more educated work force; however, there are conflicting views regarding which types of graduates are needed in the changing economy. The debates on this issue will be addressed in this section.

The third section of this chapter reviews the research on the employment outcomes of graduates of various types of postsecondary programs. In Canada, postsecondary schooling can be broken down into three distinct levels: technical and trades programs, community college programs, and university programs. These programs provide graduates with different skill sets, which ultimately lead to different employment outcomes. A clear distinction will be made between university graduates from the liberal arts fields, such as fine arts, humanities and

social science programs, and the graduates of professional programs and applied fields, such as engineering and the health sciences. Their employment outlooks differ considerably.

The fourth section of this chapter will address issues related to job mismatch and underemployment. While studies that look at the employment outcomes among postsecondary graduates are extremely valuable, they are limited because they do not truly indicate whether a postsecondary education is actually needed in the modern economy. That is why it is also important to identify whether graduates actually apply their education on the job. Thus, this section will review the available literature on underemployment and mismatch in order to document how earlier researchers have used and measured these concepts and to identify where improvements can be made in the of research projects.

The last section of this chapter is devoted to gender, reviewing past studies that have paid particular attention to gender when examining the relationship between education and work. Despite the greater number of women pursuing postsecondary education, evidence continues to show that patterns of enrolment in postsecondary programs vary with gender, as do labour market outcomes. The purpose of this section is to review some of the existing research and to illustrate why it is important to consider gender when investigating transitions from school to work.

Section I: Theoretical Perspectives

A thorough discussion of the transition from school to work is not possible unless the important issues are considered within a theoretical context. Moreover,

to better understand how a postsecondary education affects the employment outcomes of graduates during the early stages of their careers, it is necessary to look beyond any single theoretical perspective.

Functionalism and the Human Capital Theory

The idea that the expansion of the postsecondary education systems in developed countries after World War II is the consequence of industrialization is associated with the sociological functionalist approach. According to functionalist theory, economic and technological innovation generally raises the skill levels required to perform jobs. At the same time, manual labor jobs disappear as new knowledge-based jobs grow and the need for new knowledge increases within existing occupations. Thus, formal educational institutions must expand in order for individuals to learn the skills required for the more complex jobs (Rubinson and Browne, 1994: 585). The technical functional theory also asserts that education responds to industrial and economic growth. That is, higher educational institutions themselves become creators of new technologies and information, thereby increasing the complexity of jobs and sustaining educational growth. Thus, there is a reciprocal relationship between educational expansion and economic productivity. Proponents of the functionalist perspective on education argue that skill is the main determinant of occupational success and that jobs requiring more skill have higher rates of pay because fewer people are qualified to do them (Smith, 1990: 827).

The human capital theory of education is an economic variant of the technical functional theory. The fundamental postulate of human capital theory

(Becker, 1964; Schultz, 1971)[13] is that increases in schooling are responses to an increased demand for skilled labour. Thus, individuals will continue to pursue higher levels of education, until the opportunity cost of higher education is greater than the benefit that it provides. Attention was first directed to human capital as a form of capital (similar to physical capital) as economists began to realize that the growth of physical capital does not explain much of the income growth in most countries (see Becker, 1975). Earlier theoretical developments in economics suggested that it was necessary for a nation to have plenty of natural resources in order to develop a modern economy. However, following the rise of Japan as a world economic leader, despite its obvious lack of natural resources, it became quite apparent that resourceful land and an abundance of physical capital is not enough to sufficiently explain modern economic growth (Schultz, 1971). At the same time, because increases in national output in North America were substantial in comparison with the availability of land, man-hours, and physical reproducible capital, researchers began to look to other factors responsible for modern development, and the investment in human capital was viewed as the major explanation for the difference (see Schultz, 1971). For this reason, researchers began to pay more attention to the return on the investments that people make in themselves.

[13] The human capital theory is usually attributed to economists G. Becker (1964) and T.W. Schultz (1961). However, Jacob Mincer (1958) is considered to be one of the original pioneers of the human capital approach (see Becker, 1964), and the principles of the human capital theory can be recognized in the earlier work of Alfred Marshall and Adam Smith.

Education is a form of human capital that has been most widely discussed[14]. According to the human capital theory, schools were developed in order to prepare people for modern roles that could not be prepared for by the more traditional agents of socialization such as the family or the church. Education is assumed to provide students with skills that they can bring with them to their jobs, and it also allows them to be more productive and functional members of society. It represents a major means through which individuals acquire the mental skills and capacities for self-direction necessary for successful future performance in the workplace (Hunter, 1988). Education also encourages higher levels of competence and socializes students into modern tastes and values. Those with limited amounts of education enter the labour force destined to remain in lower level jobs because they lack the skills required to be successful.

The human capital theory is consistent with recent facts regarding the relationship between education and productivity. In the second half of the twentieth century, increases in national output coincided with increasing rates of participation in postsecondary education and this relationship has come to be considered to be reciprocal and self-reinforcing. The strongest support for the human capital theory lies in the fact that the most educated and skilled people almost always earn more than others, and, of course, this is a major reason why so many youth continue to pursue advanced education. Most North American work in the area before the 1970's was grounded in the human capital model and painted a glowing picture of the relationship between education and economic

[14] Other forms of human capital include: job training, migration, health, and economic information (Schultz, 1971).

growth (Fuller and Rubinson, 1992: 121). From the 1950's to the 1970's, the human capital theory helped to shape the thinking of policy makers and to a considerable extent was responsible for the expansion of schooling (Ashton and Lowe, 1991: 65).

Most of the empirical support for the human capital theory comes from within the discipline of economics (See Rubinson and Browne (1994) for a review), and some direct and indirect support for the human capital theory has been provided by sociologists (Hunter, 1988; Paju, 1997). For example, Hunter (1988) has argued that for both men and women, entry-level jobs with high cognitive complexity and verbal-activity requirements have become more common, while those with high gross-motor complexity requirements have become less common. Hunter's (1988) analysis suggests that the importance of schooling for access to jobs at different levels of skill did not decline between the 1930's and the 1980's. His data also verify that schooling is clearly related to the skill requirements of first jobs and that it prepares people for high skilled occupations with high levels of autonomy and verbal activity. Hunter argued that education remains a major factor in determining which individuals enter certain kinds of jobs, except for those requiring fine motor skills. He suggests the articulation of educational systems and labour markets in Canada were close throughout the period he surveyed, and he anticipated that this articulation will become even closer (Hunter, 1988: 763).

However, sociologists have been quite willing to criticize and challenge the human capital theory, methodologically, theoretically, and empirically. We now discuss some of these challenges.

Limitations of Human Capital Theory

The viability of the human capital theory was first seriously questioned in the early 1970's, following Braverman's (1974) assertion that the importance of education for job success at varying skill and autonomy levels had declined. Since then, many have challenged the human capital argument that education generates skills and productivity. For example, Livingstone maintains that most of the net skill upgrading of jobs since the 1940's had occurred before the 1960's, asserting that most human capital and post-industrial/knowledge-based economy theorists have exaggerated the extent of skill upgrading (Livingstone, 1998: 147-148). Livingstone further maintains that skill upgrading since the 1960's, in both Canada and the United States, has been exceeded by growth of the proportion of the population with academic qualifications. He also argues that the growth of skills and education reflect a Malthusian process, whereby the demand for skilled labour in North America has increased algebraically, whereas the growth in education has increased exponentially (Livingstone, 1998: 148-154). Others have made similar assertions. For example, having reviewed the literature, Rubinson and Browne (1994) concluded that the growth in the educational requirements for jobs has far exceeded any upgrading of skills.

Another concern relating to the human capital theory is the fact that it implies that schooling results in the creation of more productive jobs (Rubinson

and Browne, 1994). Using the results of cross-sectional surveys, investigators generally conclude that education increases the productivity of nations through increasing the productivity of individuals. The assumption is made that there is a correspondence between the individual level and the national level. However, assuming that increased productivity at the individual level automatically produces economic growth at the national level results in an ecological fallacy, because it is entirely possible that education allows a person to jump to the head of the queue and to manage to obtain a job that already exists. In other words, education may simply be allocating people to a fixed (zero sum) distribution of jobs, rather than generating more productive jobs or individuals[15]. Thus, education may affect the distribution of individuals, but not the rate of economic growth at the national level.

Human capital theory has also been challenged methodologically. Evidence to test the assertion that education creates a more productive nation is very difficult to obtain. Since skill and productivity are difficult to measure (see Farkas, 1996: 38), many studies are forced to use wages as a proxy measure of productivity, a practice which may lead to questionable conclusions[16] [17].

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[15] The argument follows that employers use education as a screening device that enables them to channel the brightest and most intelligent workers into better jobs.

[16] Moreover, the earnings statistics used to support the human capital theory are plagued by evidence which suggests that the relative growth of real wages of more highly educated/less highly educated workers is attributable to the decline in the wage levels of less educated workers rather than the increase in the wage levels of more educated workers (see Mishel et al. in Livingstone, 1998: 163). The viability of the human capital theory is also tested by other evidence, which suggests that real wage rates of postsecondary graduates in the mid 1990's are lower than they were in the mid 1970's (see Livingstone (1999) for a thorough review of this argument).

[17] In addition to the above concerns, the viability of the human capital theory is also called into question because the mathematical models used to support the theory rely heavily on the assumption that the labour market is perfectly competitive and in equilibrium (Rubinson and Browne, 1994: 584), and that individuals behave rationally with a full awareness of all possible information (Gunderson and Riddell, 1993). Economic models that assume that people take into

Furthermore, most of the evidence that is available to test the assertion that education improves worker productivity comes from cross-sectional surveys (Rubinson and Browne, 1994: 584). Yet, the most appropriate way of determining whether education increases productivity at the national level requires the use of aggregate-level studies. Unfortunately, however, aggregate-level studies are less common, and have produced inconclusive results regarding the positive relationship between education and productivity at the national level (for a review of macro-level economic studies see Rubinson and Browne, 1994: 583) [18]. In a more recent treatment of this issue, Alison Wolf (2002) argues that education does not increase the economic growth of a nation. Her conclusions were based on her comparative research among a number of industrialized nations, in addition to her many years of experience as a government analyst, researcher, consultant, and academic observer of education policy in Great Britain [19].

The above criticisms notwithstanding, human capital theory remains the dominant approach in the minds of both economists and laypeople, and it continues to have an incredibly strong influence on policy makers (Rubinson and Browne, 1994). However, many believe that the continued support for the human capital argument, that education produces skills and increases productivity, to be based largely on faith rather than on empirical evidence (Brown, 1995; Colins, 1979: 15; Livingstone, 1998: 163; Meyer, 1977). In fact, it has been argued that

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account all of the relevant costs and benefits when they make decisions allow economists to predict behaviour very well, but only under these particular circumstances. However, critics of the human capital theory regard the ceteris paribus (all things equal) assumption as tenuous at best.

[18] Incidentally, Canada was not included in her analysis.

the belief in education as a means of providing human capital is almost "religious" (Brown, 1995: 1). It has also been argued that the powerful positive relationship between education and national productivity is assumed to be true only as a result of the ideological power of the educational institution, and not because of empirical evidence (Meyer, 1977).

In sum, it appears that human capital theory has received the most support at the individual level, and the least support at the macro-level. Nevertheless, after decades of debate regarding the viability of human capital theory, social researchers, particularly those in sociology, have become somewhat disenchanted with the glowing version of the relationship between education, skills, and national economic growth. Most of the discontent with the human capital theory stems not so much from the methodological problems and the inconsistent empirical evidence, but rather it is associated with the emergence of new, more critical, theoretical perspectives within the sociology of education (see Rubinson and Browne (1994) for further discussion)[20]. The leading ideas in this area are addressed below, under the heading of credentialism.

Credentialism

During the last thirty years, the human capital theory has been challenged on a number of grounds. It has been criticized for not adequately dealing with the fact that those from upper classes benefit and for failing to acknowledge a correspondence principle (Bowles and Gintis, 1976). It has also been challenged

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[19] The debates regarding whether investments in human capital (education) actually generate a more productive labour force, while intriguing, are not of central concern to this dissertation.
[20] However, as we will see below, much of the new theoretical development in the area is stimulated by evidence that is inconsistent with the human capital theory.

for not dealing with social and structural arrangements, which, along with individual factors, are responsible for the reproduction of inequality (Smith, 1990). Human capital theory is limited because it does not devote enough attention to the fact that some people are socially and culturally better prepared to gain access and succeed within the education system than others (Bernstein, 1973). However, the most telling theoretical challenge to the human capital theory comes from the proponents of the credentialist perspective; these theorists took immediate issue with the argument that education produces the necessary skills to be successful in a contemporary labour market.

Ivar Berg (1970) was one of the first credentialist theorists to challenge the prevailing argument that industrial economies need even higher proportions of highly educated workers. However, it was Randall Collins' (1979) influential work on the "credential society" that has become the hallmark of what is known as the credentialist theory. Collins, like Berg, disagreed with the functionalist assertion that technological change requires constant skill upgrading and, in response, expansion of the formal education system. According to Collins (1979), there is a weak connection, at best, between formal educational credentials and skills required on the job. He maintained that what is learned in school has much more to do with conventional standards of sociability and propriety than with instrumental and cognitive skills (Collins, 1979: 19). He also argued that the value of any kind of education depends less and less on specific content and more and more on having attained a given level and having acquired the formal credential that allows one to enter the next level (Collins, 1979: 93). One of

Collins's major claims is that the "rise of a competitive system for producing abstract cultural currency in the form of educational credentials has been the major new force shaping stratification in twentieth-century America" (Collins, 1979: 94).

Essentially, Collins' (1979) credentialist position was that employers were using credentials to allocate more educated workers to better jobs, and proponents argued that more highly educated workers were finding more lucrative jobs, not necessarily because they were more skilled or productive, but simply because they had more education. Collins did not believe that those in privileged positions possess greater technical skills or that more highly educated people were in higher positions because they had acquired more skills through postsecondary education. Instead, he felt that as long as employers continued to allocate better jobs to more highly educated people, there would be increased pressure for the system to provide better-educated workers, regardless of the skill requirements of the job. Collins concluded that educational credentials had become the currency for employment and that students were expected to attain a sufficient amount of this "artificial good" in order to obtain respectable positions (Collins, 1979: 183). He maintained that education would allow people to purchase more desirable occupational positions, while at the same time, those in elite occupations were able to control the requirements for admission to specific professional programs in such a way as to maintain their dominant status.

Later theorists maintained these central elements, but have diverged in certain ways[21]. Having had more time to observe the political, social, and economic effects of modern economic development, contemporary credentialist theorists are able to devote more attention to the major consequences of increased postsecondary enrolments, consequences that were less apparent twenty-five years earlier. Brown (1995), for example, maintains that the effects of credentialism on society and on education, have been "profoundly" negative, and that the existing system is inefficient. He argues that there are two types of public benefits that postsecondary schooling was designed to provide: 1) to train students to be productive workers, and 2) to prepare them to be capable citizens. He believes that these goals have not been met. Instead, what has happened is that the population has become over credentialed. His reasoning is that people now pursue degrees not for knowledge, but for the access to jobs that they provide. In this situation nobody wins because the spiral of crendential holders continues to lower the value of education, while scarce financial resources continue to promote credential inflation. Thus, according to Brown, the system becomes very wasteful, because even when employers have increased the educational

[21]According to Brown (1995: 31), most early theories of credentialism have focused more on the basic meaning of credentialism as a conscious reproduction of the ruling class and the oppression of the working class than on the historical emergence of higher education. While Brown (1995) agrees with earlier assertions that a credential-based system of education serves meritocratic "cover up" for socially reproductive labour market outcomes, he strongly disagrees with Collins' views on how the credential system emerged. Brown suggests that education was driven by a combination of religious and market forces, rather than solely by the pursuit of credentials, a sentiment also shared by Labaree (1997). Brown also argues that Collins' theory is not well supported by the historical evidence, and maintains that Collins did not provide empirical support for some of his critical claims (See Brown, 1995: 37).

requirements of entry-level jobs, they still have to invest a large amount of money to provide training.

David Labaree (1997) is another contemporary credentialist, who like Brown, has been heavily influenced by Collins. However, unlike Collins, Labaree focuses more on the labour market recruitment aspect of educational expansion. Labaree (1997) believes that his version of the credentialist theory helps to explain the social reproductive effect of expanding education without denying agency. Borrowing from the status-competition approach of Max Weber, Labaree (1997) examines the effect of markets on the role of educational credentials. Labaree argues that educational expansion was a response to consumer demand rather than being simply a functional necessity. He takes many of the ideas put forward by Brown (discussed above) and develops them more thoroughly. For example, he argues that the credentialist system has transformed the primary purposes and goals of the education system to such an extent that the current (North American) education system, which is heavily oriented around the promotion of individual social mobility, to service private rather than public interests (Labaree, 1997: 261). Consequently, we are left with a system that allows individual consumers to earn the credentials that they seek, but, at the same time, undercuts learning, overproduces credentials, and reinforces social advantage (Labaree, 1997: 262).

Labaree (1997) also argues that the socially useful learning that takes place in educational institutions should be emphasized more than the enhancing of the advantages of individual educational consumers. Unfortunately, however, the

formal feature of schooling, for example grades, credits, and degrees, have become more important than actual learning (Labaree, 1997: 2). Students are now motivated to attend postsecondary institutions because of extrinsic factors such as the consequences of success and failure, rather than intrinsic factors such as the process of learning (Labaree, 1997: 251). Students seem more interested in what is going to be on the test than in learning. They focus on getting good grades and on meeting requirements, and they end up missing the core element of education – learning. Now we have a system which emphasizes educational credentials over the content. Going to the "right" college and entering the "right" program is more important than educational performance, and learning to "work the system" is much more important than mastering a particular field of study (Labaree, 1997: 250). Basically, Labaree's key argument is that many students in North America have become disengaged from the process of learning. Acquiring a credential simply in order to further one's career results in the devaluation of the knowledge and skills provided by schools.

These arguments suggest that education has been reshaped into a commodity, designed primarly to satisfy the desires of individual consumers for status attainment. This, of course, results in a paradox. The public education system, which is supposed to provide a wide array of citizens with the chance to improve their lives, simply does not. At the same time, this process has negative consequences. The never-ending quest for educational advantage actually threatens to transform the educational system into a personal advancement mechanism. Consequently, the postsecondary education system has become even

more hierarchical, and credentials are now the objective of education rather than a byproduct of it (Labaree, 1997: 253).

Clearly, there are a number of reasons why credentialists are genuinely concerned about whether the unprecedented expansion of the postsecondary education system is actually beneficial for recent graduates. While the above issues are important, the most widely recognized consequence of the rapid expansion of postsecondary schooling discussed within the contemporary credentialist literature is underemployment (Duffy, Glenday, and Pupo, 1997; Krahn, 1991, 1995; Livingstone, 1987; 1993; 1997; 1999; Low and Krahn, 1995)[22] [23]. Underemployment occurs when postsecondary graduates move down the occupational ladder, taking jobs away from high-school graduates, who in turn, take jobs away from those who do not graduate from high school (Clogg and Shockey, 1984). Young graduates, thus, are forced either to return to school to acquire even higher credentials, or change their expectations regarding what constitutes an acceptable job. A major consequence of this credential crisis is that many occupations are accessible only to people with specific postsecondary credentials (even though the jobs actually do not require substantial education), leaving many graduates with impressive credentials in lower-level positions (see

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[22] Another term, "over-education," is also commonly used in the literature. While the concepts over-education and underemployment are similar, in that they both reflect an inadequate use of education on the job, over-education is the more conservative of the two terms. For example, Freeman (1976) uses the term "over-education" to suggest that the returns on education had declined, whereas Berg (1790) used the term "underemployment" to express the idea that people get more education than they need. Both terms are used synonymously in this dissertation.

[23] The term underemployment is used in many different contexts and to signify many different things. For example, Livingstone (1999) identifies six different dimensions of underemployment: the talent use gap, structural unemployment, involuntary reduced employment, the credential gap, the performance gap and subjective underemployment. Underemployment, when used in this dissertation, is used as a broad term to describe the underutilization of educational skills.

Livingstone, 1998). The over-qualification of workers is now viewed as a major social phenomenon, and is a major challenge to human capital theory (Livingstone, 1998: 167). In fact, Livingstone (1999) argues that human capital theorists have greater difficulty explaining underemployment than they have explaining unemployment or involuntary part-time employment (Livingstone, 1998: 213)[24].

Underemployment is a particularly salient issue for young graduates, especially during times of recession (Côté and Allahar, 1994; Krahn, 1995; Krahn and Lowe, 1990; Livingstone, 1998). Youth experience the most difficulty finding jobs, and they are the ones who are most likely to be forced to settle for jobs that generally required less education during an earlier period. In fact, substantial proportions of recent cohorts of college- and university-educated workers have shifted into lower level clerical and administrative positions; jobs that previously did not require a postsecondary education (see Krahn, 1991: 34). The expansion of the service industry over the past quarter century has opened up a new student labour market, where sales and service sector jobs represent viable career opportunities for some recent postsecondary graduates.

The implications for young graduates trying to cope in a labour market saturated with advanced degree holders becomes particularly salient when reading the testimonies of young educated workers discussing their experiences in the

[24] However, perceptions of the severity of underemployment vary considerably. For example, Freeman (1976) argued that the excess of educated workers is the result of a temporary disequilibrium in the market for educated labour. According to this perspective, an excess of overqualified workers is considered to be an imbalance in supply and demand as a result of various demographic shifts. This, in turn, creates an oversupply of college graduates, which temporarily leads to a fall in the economic return on investments in higher education. Basically,

labour force (Côté and Allahar, 1994; Livingstone, 1998: 99-115). The interviews conducted by Livingstone (1999) in 1994 and 1995 with recent graduates, first surveyed in Metropolitan Toronto at university placement offices, adult basic education classes, and food banks, provide compelling descriptions of highly educated workers living in the education-jobs gap. They illustrate how difficult and frustrating it can be for young adults who have invested much time and money in themselves, only to find that they cannot meet their career aspirations.

Limitations of Credentialist Research

Even though the credentialist approach has remained the dominant theoretical perspective within the sociology of education since the 1970's, the credentialist perspective typically receives the most attention during recessions, when unemployment levels are high, and stories of university graduates driving taxis or working as retail sales clerks at shopping malls are commonplace[25]. These are also times when the fear of underemployment promotes panic among students and concern among policy makers that education has not been living up to expectations. However, in better economic times underemployment, the central tenet of modern credentialist theorists, is less of a concern, and some have questioned the extent to which it even exists.

The credentialist perspective has also had less influence on mainstream thought, and policy issues continue to be more heavily influenced by the human capital theory, probably because evidence continues to show that more highly

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then, over-education is generated by a decline in the growth in demand for educated labour, while, at the same time, the education system is slow to respond.

[25] For example, it is important to note that Livingstone's (1999) interviews (above) were conducted in 1994 and 1995, just following the recession of the early 1990's.

educated workers generally make the most money. As well, recent research has also challenged some of the core arguments of the credentialist theory. For example, some recent evidence suggests that the postsecondary education system is not producing enough of certain types of highly trained workers, which runs counter to the credentialist assertions that there are too many graduates. In fact, many employers claim that there are severe skill shortages in the labour market (see Redpath, 1994: 100). Others have argued that firms are reporting that, next to cost, the greatest barrier to technological change is a shortage of technically qualified employees (Betcherman and McMullen, 1986; see also Redpath (1994) for a discussion on this issue). These claims are substantiated by research from Robert Allen (1999a), who, drawing on data relating to postsecondary graduates from the province of British Columbia, maintains that the Canadian economy is demanding greater numbers of certain types of highly trained workers than the educational system is capable of providing. These arguments seem to contradict the credentialist assertions that there are too many over-qualified workers. They also challenge some of the earlier unsystematic evidence offered by Collins (1979) and Berg (1970).

The above arguments and evidence also suggest that a paradox exists. On the one hand, as argued by the credentialists, large numbers of graduates have been underemployed and have not able to adequately utilize their skills on the job. According to this perspective, there are too many over-educated graduates and not enough commensurate jobs. On the other hand, others argue that the education system has not adequately prepared graduates for the labour market, suggesting

that there are not enough qualified workers to meet the needs of the contemporary economy. These seemingly inconsistent arguments will seem less inconsistent with one another when we have discussed the needs of the modern economy.

Section II: Returns On Schooling

The Emerging Knowledge-Based Economy

The implications that the evolving knowledge-based economy will have for the transitions from school to work is an issue that has received considerable attention from social scientists in a variety of different fields. The purpose of this section is to outline the possible implications of the emerging "knowledge-based" economy for the labour market outcomes of postsecondary graduates. This section is also designed to help clarify some of the issues that are central to our analysis, and to place the later sections of this chapter in context.

It has been argued for quite some time that skill upgrading is a central characteristic of a developing economy (Bell, 1973)[26]. Since the first decades of the twentieth century, technological change has created the need for a certain number of new types of workers, as inventions such as the car, the airplane, radio, and television revolutionized the North American life. Twentieth-century technology has also revolutionized the way in which work is structured and organized. For example, the decline in manufacturing and a growth in financial

[26] At the same time, Braverman (1974) has argued that technology and automation have served to deskill workers. Skill degrading, according to Braverman, occurs when the activities performed on the job are restructured so that less skill is required. He used the development of the assembly line as a prime example of how modern technology has changed the structure of jobs in such a way that workers were trained to be skilled at very specific and limited jobs. Braverman (1974) also felt that deskilling was a consequence of the increasing proportions of workers employed in service and unskilled clerical work.

service jobs, created a new view of a "professional class" of workers organized around knowledge rather than property (see Drucker, 1993).

The argument that North America is moving into the "knowledge" (or "post-industrial") economy was initially promoted by Daniel Bell (1973) in the United States and by John Porter (1971) in Canada (see Brown, 1995: 135; and Livingstone, 1998: 135). This assertion is no less true today. Business operations have been revolutionized by advances in computers, computer software, biotechnology, telecommunication systems, and other information technologies. The globalization of the modern economy intensified during the 1990's as a result of the rapid growth in microcomputers, and, even more recently, by the internet revolution. We have experienced the globalization of information and knowledge, particularly in areas such as science and technology (Burke and Rumberger, 1987; Davies and Guppy, 1997b; Drucker, 1993; Hughes and Lowe, 2000). Many sectors of the new economy now demands skills that simply did not exist a generation ago. Now it is knowledge (rather than land or capital) that is considered to be the most valuable resource. In fact, even in the early 1990's, about one-fifth of the gross national product of Western developed nations was devoted to the production and distribution of knowledge, either through education, on-the-job training, or research and development (Drucker, 1993: 186).

The emerging "knowledge-based" economy has had an enormous impact on business across the world. The growth of the internet and wireless forms of communication have changed the way in which businesses are organized, as well as the way that information is shared within and across companies around the

world. The structure of successful businesses has also changed dramatically, particularly over the last 15 years. The new business model has been characterized as being horizontal, rather than vertical; organizations are now less hierarchical and more network-oriented; and bureaucratic management is becoming less efficient (Allen, 1999b; Nohria and Eccles, 1992). This new form of organization has required businesses to change their approaches to advertising, sales, data collection and storage, and communications in order to remain competitive. The development of technologically innovative ways of transmitting knowledge has also generated new jobs in customer relations and human resources departments (Allen, 1999b). Even businesses in the sales and service sectors have been affected by the globalization of information. Internet companies such as Yahoo, Amazon.com, and America Online are just a few examples of information and service providers that have transformed business operations and helped to generate a global economy that is heavily oriented towards the production and distribution of knowledge[27].

The effect of the emerging "knowledge-based" economy on the relationship between postsecondary education and the employment outcomes of recent graduates has received a growing amount of attention, especially among economists. Indeed, some recent research suggests that there will be opportunities for highly educated workers in the modern economy. For example,

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[27] On the other hand, it has been argued that the post-industrial era has not produced more interesting or more fulfilling paid work. Nor has it produced a radical shift in the way that modern societies are organized (Livingstone, 1998). Livingstone argues that the "new and different job-related information is not necessarily more complex or more advanced knowledge. Instead, much of what is occurring is job enlargement with increasing numbers and intensity of tasks, rather than job enrichment using more comprehensive knowledge systems in more discretionary ways" (Livingstone, 1998: 161).

recent Canadian census data show that most postsecondary graduates fare very well in the modern economy and that the rate of return on postsecondary education has increased substantially relative to the rate of return on a high school education between 1991 and 1996 (Allen, 1999b). Another study, also by Allen (1999a), using obtained data from graduates in British Columbia also suggests that the economy needs a highly educated labour force. Allen's results indicate that there has been an increase in the demand for postsecondary graduates, whereas the demand for those with only a high school diploma has been declining.

Drawing on data from the 1990 National Graduate Survey, Finnie (2000) also found that, contrary to popular belief, university graduates find reasonable first jobs soon after graduation, and that their employment prospects improve significantly over time[28]. He reports that most postsecondary graduates from the class of 1990 fared quite well. As his data show, most of them were able to find full-time and permanent jobs with reasonably high salaries. His research also suggests that there was no relative deterioration in postsecondary graduates' labour market outcomes over time[29]. These findings are particularly encouraging for young graduates, given that these data were obtained from graduates during the recession of the early 1990's[30]. However, while this evidence is encouraging

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[28] Finnie (2000) exploits the longitudinal nature of the previous 1990 NGS; using data from graduates who were surveyed both two years and five years following graduation.

[29] The findings of this study should be viewed with caution as the results are primarily descriptive. Much of the analysis simply involves the use of either frequencies or cross tabulations and not statistical inference. Furthermore, this study does not include the most recent cohort (those who graduated in 1995). Postsecondary graduates of 1995 are more likely to have been affected by the emerging knowledge-based economy than are graduates from the previous cohorts.

[30] Certainly the labour market outcomes of 1990 graduates would have been greatly affected by the poor employment opportunities during that period.

for young people considering a postsecondary education, the results should be interpreted with caution, given the fact that the employment patterns of more recent cohorts are still being investigated.

The Postsecondary Education System in Canada

A particularly intriguing question that has not yet been addressed to this point is which academic programs are favoured the most by employers in the emerging "knowledge-based" economy? Students, in particular, need to know which types of qualifications are in demand. During a time of economic change, businesses are forced to restructure, and the demand for different forms of human capital changes. Canadian students are particulary affected because the Canadian postsecondary education system is highly structured and is organized around academic programs (Davies and Hammack, 2001).

In Canada, as in the United States, students are faced with a number of choices with regard to types of postsecondary education. Higher education in Canada is divided into three different levels: technical/trades, community college, and university. Postsecondary technical and trade programs generally represent the lowest level of postsecondary schooling available in Canada. Students usually enter trade programs in order to train as hairdressers, carpenters, electricians, plumbers, and mechanics, to name a few examples. Technical programs offer certificates in areas such as computer programming, (other) computer software use and development, health-related fields, hotel management, and so on. These programs usually do not provide students with what one might call "a balanced portfolio" of skill sets. Instead, they are designed to provide students with the

technical or trade skills necessary for their specific occupational field. Technical or trades programs generally take a year or less to complete and most do not provide graduates with an opportunity to progress to a higher level. A high school diploma is generally required of those entering trade and technical programs. However, some programs do not even require that.

Community college are generally considered to be more prestigious than technical or trade programs. They usually have more selective admission requirements[31]. Students entering community college programs are generally required to have a high school diploma. Some programs require high school grades. Community college programs are usually one or two years, and like technical programs, they are designed to provide students with technical expertise in specific areas; however, some community colleges do offer general programs in arts and social sciences. Both technical and trades programs, as well as community college programs are usually terminal[32].

A university education is generally considered to be the highest level of postsecondary schooling in Canada[33]. Undergraduate university programs in Canada generally last three years (four years in the case of honours students), and

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[31] The two-year community college system in Canada closely resembles the two-year junior college system in the United States (See Brint and Karabel, 1989, for information on the two-year junior college system in the United States). Both systems have probably benefited from the expansion of the 1980's and 1990's.

[32] It is possible for community college graduates to use their college grades to be admitted into an undergraduate university program. In some cases, students can receive university credit(s) in exchange for courses taken at a community college. However, most community college programs are not designed to be steppingstones to university programs.

[33] Within the university system, as in the American undergraduate college system, some schools and programs are considered to be more prestigious than others (see Davies and Guppy, 1997). However, the hierarchy of postsecondary schooling, particularly at the university level, is much flatter in Canada than in the United States (Davies and Hammack, 2001).

are usually more expensive than community college and technical programs[34] [35]. Admission to university programs is generally more competitive as students are selected on the bases of rigid admissions criteria. Unlike community college and technical programs, all universities in Canada require a high school diploma or equivalent[36].

University programs are generally broken down into different areas, or academic fields, such as the arts, social sciences, sciences, and engineering. Most programs at this level are not considered to be terminal. If students have done well in their undergraduate programs they may be admitted to higher levels such as master's and Ph.D. programs. Universities also provide professional programs in areas such as business, nursing, law, medicine, and other health-related fields. As in the case of graduate programs, admission to these programs is very competitive and students usually cannot enter them until they have completed at least two years of undergraduate study. Students who successfully complete an undergraduate program at the university level are awarded a university degree.

Postsecondary Schooling and the Knowledge-Based Economy

Because these different types of postsecondary schooling have different admission requirements, program lengths, and tuition costs, it is extremely important to identify which programs provide the best opportunities for their

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[34] There are, however, some select community college programs, and even some technical programs, that have per-year tuition rates that are higher those of many undergraduate university programs.

[35] In September 2000, the yearly tuition rates for most undergraduate programs were approximately between $4,000.00 and $5,000.00, excluding books and living expenses (see Macleans, 2000 for university tuition costs), which is generally much higher than for community colleges (Statistics Canada, Applied Research Bulletin, 2001).

[36] In certain cases, for example, the admission for mature students, high school graduation or the equivalent may not be required.

graduates. The predominant view, sometimes referred to as the "techism" (or "technik") argument (Allen, 1999b), is that the emerging "knowledge-based" economy demands technical skills, and that those sectors in the economy that emphasize technology will prosper in the future. The argument follows that, with the rapid development of technology, the economy will require more graduates with specific types of technical training. This means that computer technicians and programmers, other computer technology specialists, hardware and software developers, scientists, biotechnologists, and engineers will be in great demand.

An alternative and emerging view is that the evolving economy will require various types of highly educated workers, not just those with very specific technical skills (see also Allen, 1999; Allen, 1999b; Giles and Drews, 2002; Krahn and Bowlby, 1999; Axelrod, Anisef, and Lin, 2001). According to this view, technical skills, while important, will not be the only skills demanded in the emerging economy. In fact, given rapid technological change, the acquisition of specific technical skills may be risky. Skills that are valuable today may soon be obsolete, possibly leaving narrowly educated graduates at risk of facing unemployment, temporary employment, and limited contract jobs. On the other hand, graduates whose skills are less specific, and more transferable, may be at an advantage. For example, even though narrowly trained personnel will build and test new forms of technology in the new economy, there will be a need for even greater numbers of employees who can understand various aspects of the new technology, who know how to use it and how to promote it. There will be a need for more middle managers who can understand and analyze information, who can

make informed decisions and independent judgments, who can deal with people, and who can work in a team environment. There will also be a need for people with strong interpersonal skills who are self-directed and who can make critical assessments (Allen, 1999b). This means that people with analytical and communication skills will continue to be highly valued and sought after by businesses.

Contrary to the (once widely held) view that a university degree is the best avenue for career-oriented students, most people now hold the "techism" view that programs that provide technical skills represent the best form of job preparation in the modern economy. For example, the results of a 1998 Angus Reid poll conducted in Ontario found that most people believe that specific skill training is the best form of job preparation. Of those surveyed, 37 percent believed that a trade or apprenticeship program, or even a high school diploma with technical experience, is the best preparation for the future labour market. Another 35 percent felt that a technical college diploma is the best form of preparation for the modern economy. In contrast, only 25 percent felt that a university degree was the best form of job preparation for the future (Globe and Mail, 1998).

Drawing on a survey of 1,000 adults, 18 years and older, surveyed in 1992, Livingstone found that 32% of the respondents felt that community colleges were best able to develop and deliver labour force training, whereas only 3% of those surveyed felt that universities are best suited for this task (Livingstone, 1993, 31). Similarly, employers, when surveyed, felt that university graduates do

not have the skills that are required by the contemporary labour market (Rush and Evers, 1986). Thus, there appears to be a general belief that universities provide graduates with an education, whereas technical training provides graduates with a job, which is probably the reason why many university graduates, particularly those from liberal arts programs, attend college following graduation to acquire technical and practical skills.

However, Allen (1996) argues that the view that a university education is only loosely related to employment outcomes is largely based on empirical studies from the late 1980's, which showed that university graduates were having trouble finding jobs, while graduates with trade or technical certificates were in high demand. After reviewing the situation, one report, using evidence from the 1980's, suggested that education in Canada should focus on equipping graduates with the technical skills needed to meet the demands of the new economy (Canadian Chamber of Commerce, 1988: 29, 38). In another report, titled *Training for What*, the Labour Force Development Board in British Columbia concluded that the new economy would require graduates with the specific technical skills that are obtained in trade, technical, and vocational programs, and recommended a substantial expansion in postsecondary technical and vocational training programs in the province of British Columbia. The Labour Force Development Board also argued that some university graduates cannot find work because they lack practical skills, and suggested that funding for many university programs should be reduced (see Allen 1996 for a more thorough discussion of this report).

Not all university programs have been criticized for failing to meet the needs of the evolving economy. As mentioned earlier, different university programs have unequal payoffs in terms of power, prestige, and economic returns (Davies and Guppy, 1997a). In general, applied fields such as engineering and business are considered to be more prestigious and provide higher returns than the "generalist" programs such as the arts, humanities and social sciences (Davies and Guppy, 1997a). Graduates from applied and professional programs are thought to obtain jobs with high wages because they later utilize the skills they learned in school, whereas arts, humanities, and social science graduates are believed to work for lower wages in jobs that do not require university training[37]. The skills obtained from the latter programs have typically not been formally recognized by employers to be directly related to job requirements, making it difficult for their graduates to find decent jobs (Redpath, 1994).

On the other hand, the assumption that graduates from university programs in the liberal arts find themselves in lower level jobs because they lack the specific skills required in the contemporary labour market is believed to be based largely on faith rather than evidence (Allen, 1996: 1). The common perception that specific technical training is necessary for successful employment opportunities has been challenged in recent research, and a number of arguments have been put forward to suggest that the skills obtained in arts and social science programs are extremely important in the modern economy.

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[37] The higher prestige associated with applied and professional programs such as law, commerce, medicine, and dentistry is reflected in their higher tuition rates and more competitive admission requirements.

The skills learned in arts, humanities and social science programs have been gaining acceptance in the modern economy (Krahn and Bowlby, 1999). For example, graduates from these programs are assumed to have obtained analytical reasoning and problem-solving skills, which are transferable from one job to another (Rush and Evers, 1986). In addition, these graduates have also demonstrated that they have the ability to read, write, listen, and speak effectively, and to assimilate abstract material (Allen, 1996: 15-16). They are also likely to be proficient in languages, to have strong critical thinking skills, and to be able to work independently (a highly valued trait).

Empirical evidence also suggests that graduates of liberal arts programs have higher levels of decision-making, interpersonal, and communication skills than business and engineering graduates (Rush and Evers, 1986). In addition, these graduates have often absorbed considerable information about various theoretical perspectives as well as cultural, social, and economic trends. Those in the more applied disciplines are much less likely to have this breadth of knowledge (Lowe and Krahn, 1995). At the same time, arts and social science graduates are also able to work well with others, manage conflict, and relate abstract systems to real life situations (Allen, 1999b). Employers may believe that these particular graduates are worthy of on-the-job training, which is particularly important in the contemporary labour market, as most occupations require skills that are partially learned on the job. Students from the "academic" disciplines generally obtain both occupation-specific skills and analytical skills and knowledge, whereas workplace-specific information is obtained through

formal on-the-job training. The valuable critical thinking and problem-solving skills that are learned in the course of academic university programs are important because they are much less likely to be developed during on-the-job training (Lowe and Krahn, 1995).

These skills are believed to be vital in a knowledge-based economy (Krahn and Bowlby, 1999; Axelrod et al., 2001). Some suggest that social skills are just as highly valued as technical skills, arguing that employers now need employees with a general capacity to work effectively in organizational environments while, at the same time, they need employees who have the potential to assume authority over others (Brown, 1995; Labaree 1997: 257). University life is thought to provide valuable socialization for bureaucratic work. Moreover, the very process of gaining access to and graduating from university provides students with institutionalized confirmation of their "social superiority and qualifications for leadership" (Labaree, 1997: 257). While these traits may be considered by some to be superficial, they are necessary in a contemporary business environment[38].

Others (Giles and Drews, 2002; Krahn and Bowlby, 1999) maintain that graduates from programs such as the humanities and social sciences have a long-term advantage because they have "generic" skills that are portable across job and economic sectors. They are believed to have broadly based knowledge, along with the ability to think critically and explore new ideas openly (Giles and Drews, 2002). Toffler (1990) also argues that employers need more workers with strong

interpersonal skills and cultural sensitivity for certain rapidly growing sectors including recreation services, health care and elderly care. Allen (1996) also believes that the general literacy and numeracy skills learned by students in "academic" university programs will be more important for economic success than the specific skills provided by the more "applied" programs, particularly those offered in short-term and two-year trade and vocational schools.

These arguments suggest that there may not be a serious problem regarding the types of skills learned in arts, humanities, and social science programs. Indeed, it is quite possible that past employers have underestimated the extent to which the graduates of academic university programs can be successful in technical or business-related positions. In fact, research has shown that almost one-third of arts graduates compete successfully with business and science graduates for positions as financial managers or administrators, accountants, and planners (Redpath, 1994). This, of course, begs the question: Is it really necessary to have an engineering or business degree for certain jobs?

It is also quite possible that the demand for different skill sets has changed, and that this may explain why employers are struggling to find suitable employees for their jobs. As mentioned in the introduction, the best way to address this issue is to investigate whether labour market outcomes have changed over time (across cohorts) for graduates of various types of postsecondary programs. So far, this has not been done for the most recent Canadian graduates.

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[38] The social benefits discussed above may also represent a form of social capital (see Coleman, 1988). The social capital obtained from postsecondary schooling represents a return on investment in oneself.

However, researchers have uncovered some intriguing results that provide insights. This body of literature is addressed next[39].

Section III: Employment Outcomes of Postsecondary Graduates

Earnings

One way of evaluating the viability of a postsecondary program is to examine the earnings of its graduates following graduation. Perhaps the most surprising finding available in the current literature is that the graduates of technical programs have not been doing well. For example, a recent study, using data from the 1991 and 1996 Canadian Censuses, has found that graduates with technical or trades certificates do not even earn as much as high school graduates (Allen, 1999b). Of course, this evidence runs counter to the assertion that a technical education meets the needs of the new economy. However, recent community college graduates have been found to fare quite well. Drawing on data from the 1991 Census and 1992 Survey of Graduates, Allen (1996) found that the completion of a two-year community college programs generally has a higher economic payoff than both high school completion and the completion of shorter technical and trades programs. In fact, this same study found that managers in their early twenties with community college diplomas earn almost as much as managers with master's degrees or post-graduate certificates[40]. However, the outlook for college graduates is not entirely positive. Community

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[39] Unfortunately, much of the published material relating to recent graduates is not yet available. Therefore, much of the literature reviewed in the following section comes from working papers or journal articles that are forthcoming.

[40] While this may be true for younger age groups, university graduates generally earn higher incomes later in life (Allen, 1999a). In their late twenties, university graduates usually earn higher incomes than community college graduates (Allen, 1996). The discrepancy at younger ages

college graduates in sales and service occupations have been found to do no better than high school graduates (Allen, 1996).

There is a clear earnings hierarchy among university graduates. As mentioned earlier, graduates from "generalist" programs earn less than university graduates from professional or skill-oriented programs (Davies and Guppy, 1997a; Finnie, 2001; Finnie and Frenette, forthcoming). As has been discussed, some recent evidence suggests that graduates of "generalist" programs are better prepared for jobs than employers may have assumed in the past (Allen, 1996; 1999; Giles and Drews, 2002; Redpath, 1994; Axelrod et al., 2001). Drawing on sample survey data from the 1991 Canadian Census and the 1992 Survey of Graduates, Allen (1999) found that earnings of social science graduates were not far behind those of engineers, scientists, and even MBA graduates. He also found that the rate of return on most academic university programs exceeds the cost of borrowing, and concluded that the rate of return across most university programs is about the same (Allen, 1999) [41]. These results suggest that supporting university education is a wise investment for Canadian governments.

It is particularly important to compare university graduates of liberal arts programs with those who graduated from technical schools and community colleges, since these graduates compete with each other for management, sales,

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probably reflects the fact that university graduates take time to establish themselves in their careers.

[41] The cost of borrowing for postsecondary education to Canadian Governments is 5 percent, which represents the interest on long-term provincial debt to send students to school (Allen, 1999a: 10). All university programs, including arts programs, produce a social rate of return which exceeds the government's cost of borrowing. The rate of return on social science programs is 18 percent, engineering is 19 percent, and commerce is 21 percent. The rate of return on arts and humanities is lower, at 7.6 percent, but still above the 5 percent cost of borrowing (Allen, 1999a).

and service jobs. When making this comparison, Allen (1996) reports that, in general, arts and social science graduates do quite well when compared with technical graduates. The median income for university graduates with an arts and social science degrees is higher than the median income for community college graduates and graduates with technical certificates. However, graduates from some fine arts programs earn less than community college graduates[42].

Another way of comparing the employment outcomes of various types of postsecondary schooling is to look at earnings over time. If the "techism" argument is correct, then the earnings of graduates of technical schools, college programs, and university programs in specialized fields of study should have increased over the last 15 years, relative to the incomes of graduates from academic programs. Contrary to this expectation, Canadian Census data from 1991 and 1996 show that arts and social science graduates have not gone into less skilled work and their salaries have not been falling, relative to the salaries of graduates of other, more technical, programs (Allen, 1999b)[43] [44]. These studies seem to suggest that the "knowledge-based" economy has also had the need of the general skills obtained from liberal arts programs.

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[42] However, in a later study, Allen (1999a) found that "academic" university programs and college programs have similar rates of return. Unfortunately, in this study, Allen (1999a) did not provide a thorough discussion of the rates of return on specific university programs, nor did he make direct statistical comparisons between graduates of specific university programs and graduates of community colleges.

[43] Once again, the results are based largely on the earnings profiles of postsecondary graduates, without controlling for the effects of possible spurious relationships.

[44] This finding is also consistent with the results of Finnie and Frenette (forthcoming), also using only university graduates, from three different cohorts (1982, 1986, and 1990).

Unemployment

Measures of unemployment provide additional insight into which particular postsecondary programs provide the best employment outcomes for their graduates. The results below, drawn from employment outcome studies, are provided to complement the earnings results above, and to paint a clearer picture of the relationship between various forms of postsecondary schooling and labour market outcomes.

For the most part, but with some exceptions, the unemployment rates of graduates with different types of postsecondary schooling tell much the same story as the income studies discussed above. Among postsecondary graduates in Canada, those with technical certificates have the highest unemployment levels, followed by graduates with college diplomas, while university graduates have the lowest unemployment rates (Allen, 1997; 1999b). The unemployment rates of graduates of trades programs, in particular, tell a particularly interesting story. Similar to the earnings results discussed above, the high unemployment rates of technical trades graduates refute the prevailing view that the economy needs people with technical skills.

When looking only at the university graduates, past evidence suggests that graduates of the so-called "softer" fields of study, for example, the arts, humanities and social sciences, have typically experienced higher levels of unemployment, whereas graduates in fields such as commerce, education, health sciences, and the professional areas have generally enjoyed full employment (Finnie, 2001). Similarly, a recent study, which investigated the employment

experiences of a large sample of university graduates over a five-year period (1993-1997), found that graduates from humanities and social science programs have an immediate short-term disadvantage because it takes them slightly longer than graduates from applied programs to find a job after graduation (Giles and Drews, 2002). However, at the same time, the authors reason that graduates from programs in the humanities and the social sciences have a greater degree of long-term mobility in the labour market.

There is some recent evidence that the "softer" fields are faring better in the 1990's, as arts and social science graduates have higher rates of employment rates than some science (and even engineering) graduates. When graduates from the "softer" disciplines are compared with graduates of technical and community college programs, they tend to look even better. When one examines both national and provincial data, the unemployment rates among graduates of technical and vocational programs as well as community college programs are higher than those of graduates of almost all university programs, including arts programs (Allen, 1996, 1999b)[45]. University graduates from social science programs have been doing particularly well, as they showed the most substantial employment growth between 1991 and 1996, both in absolute terms and on a percentage basis[46].

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[45] Exceptions are graduates with fine and performing arts degrees. Early in their careers, they have higher unemployment rates than technical and college graduates (Allen, 1999a).

[46] The percentage change for fine arts, humanities, and social science graduates, were 31.6%, 41.8%, and 55.9% respectively (Allen, 1999b). Of course, the high percentages are probably attributable to the different economic circumstances of these two sets of graduates. Nevertheless, the percentage changes for the liberal arts graduates are markedly higher than for graduates of most other fields.

When combined, the income and earnings studies discussed above lead to a number of closely related conclusions. First, it appears that individuals with one-year technical and trade certificates have high unemployment rates, and little, if any, income advantages over high school graduates. A one-year technical/trade certificate does not seem to provide sufficient preparation for the new economy, because graduates from these programs often fail to obtain jobs that require the skills that they acquired in school. The lower employment rates among technical graduates may be due to the fact that technical schools only train students to meet the short-term needs of local employers. Those who graduate from these programs obtain specific skills relating to particular industry, not general skills that can be used elsewhere.

Secondly, the graduates of more technical and specialized university programs, particularly engineering, have the highest incomes and the brightest employment outcomes of all university graduates, whereas graduates with degrees in the so-called "softer" disciplines are generally at the bottom in terms of both income and employment outcomes. However, some of the recent evidence reviewed here suggests that the employment outcomes of graduates of the more "academic" programs are better than has been commonly perceived and that they have been improving. Social science graduates, in particular, have been doing better than engineering graduates and graduates from some of the "hard" sciences, with respect to avoiding unemployment. In terms of earnings, social science graduates are not far behind university graduates with engineering and even commerce degrees, and their long-term employment prospects appear to be good.

The above evidence is not conclusive, however. Data from recent cohorts need to be analyzed before definitive conclusions can be reached, particularly with regard to the impact of the emerging "knowledge-based" economy on postsecondary schooling. Furthermore, the existing research cannot yet tell us clearly whether graduates of "generalist" programs have experienced better employment outcomes than the graduates of community college programs. Nor can this research tell us whether their respective employment outcomes have changed over the last 15 years. Unfortunately, the explicit goal of most of the past research in the area has not been the comparison of the employment outcomes of graduates from these two types of postsecondary schooling. Furthermore, most of the studies reviewed do not make use of appropriate controls and the researchers were unable to make statistical inferences. Thus, more carefully conducted research is necessary in order to identify the precise relationship between education and labour market outcomes.

As was mentioned in the introduction, it is not possible to determine whether the economy truly needs more educated workers by drawing on income and employment studies alone. A more thorough way of assessing the needs of the economy is to address issues related to underemployment and the prevalence and extent of mismatch between education and work among postsecondary graduates. These issues are discussed next.

Section IV: Underemployment and Education-Job Mismatch

The terms mismatch and underemployment have both been used in the literature to reflect the idea that some graduates are not finding jobs that fully

utilize their educational credentials. In fact, 'education-job mismatch' has been described as a "form of underemployment which occurs when a job requires lower educational qualifications than those possessed by the worker" (Redpath, 1994: 90). However, for this dissertation, mismatch and underemployment represent two different, but not mutually exclusive, aspects of the inadequate use of postsecondary schooling. While underemployment clearly reflects the underutilization of education, mismatch does not; it represents an inappropriate use of educational credentials. Thus, it is possible for educated graduates to be mismatched with jobs, but not underemployed. For this reason, in contrast with what has been done in some of the past research (see Clogg and Shockey, 1984; Clogg and Sullivan, 1983; Redpath, 1994; Vahey, 2000), this dissertation will treat the two terms, mismatch and underemployment, as separate constructs. Given that most of the existing research has focused on the underutilization of educational credentials, the discussion below will focus primarily on the issue of underemployment. The issue of mismatch will be addressed separately at the end of this section.

Objective measures of underemployment have generally been considered to be the superior way of obtaining information on underemployment (Clogg and Shockey, 1984). Objective measures of underemployment usually involve using some external evaluation technique in order to determine the educational level required for a particular occupation. The most widely used objective measure of underemployment is the General Educational Development Score (G.E.D). Developed in the United States, but also used in Canada (Anisef, Gottfried, and

Turritin, 1980; Redpath, 1994), the GED compares a graduate's level of education with the educational requirements of an occupation. The level of required schooling for an occupation is derived from estimates created by the U.S. Labor Department (Statistics Canada in Canada). Occupations are rated on the basis of factors such as general reasoning, mathematical requirements, and general language skills. The rating process uses the Dictionary of Occupational Titles (DOT) which contains detailed descriptions of all occupations in the United States (CCDO in Canada), based on a categorized according to certain occupational characteristics. To evaluate the educational requirements of occupations, the three-digit U.S. census occupational categories are assigned an average GED score, and occupations that are homogeneous with respect to educational attainment are grouped together[47].

The GED is designed to provide a measure of the specific training needed for the "average performance" of a job. Using a formula, GED scores are converted into educational equivalents. For example, a GED score of 1 or 2 indicates that the educational requirement for a job would be between 0 and 11 years of schooling. A GED of 3 suggests that a job requires 12 years of education. A job that requires between 13 and 15 years of education would receive a GED score of 4. An occupation that requires a university degree (16 years) would receive a GED score of 5, and an occupation that requires more than a bachelor's degree would be assigned a GED score of 6. Graduates are

[47] In Canada the GED score is one of several worker traits included in the Canadian Classification and Dictionary of Occupations (C.C.D.O). The GED is assigned to the four-digit Canadian occupation code (see Canada, 1971; 1978).

considered to be overeducated if they are in jobs that require less schooling than they have attained[48].

Unfortunately, objective measures of underemployment such as the GED are of limited use to researchers who wish to compare the underemployment levels of graduates with different forms of postsecondary schooling. Since objective measures are generally only capable of assessing underemployment for different levels of education, they are less capable of distinguishing between different types of postsecondary schooling. For example, only GED scores of 5 and 6 correspond to a postsecondary (university) education, making it virtually impossible to fully recognize the great variability in schooling beyond high school[49]. This is a very important issue, given that the percentage of students pursuing some form of postsecondary schooling has increased over the last 25 years[50].

One other way of measuring over-education involves comparing the level of schooling obtained by a graduate with the level of schooling requested by the graduate's employer. Graduates with higher levels of education than those

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[48] Clogg and Shockey (1984) created another objective measure of underemployment. Their method was developed using a process similar to that used to estimate GED scores, such that all occupations that require a similar level of education are grouped together. Using the method developed by Clogg and Shockey, a respondent is considered to be overeducated if his or her education is greater than one standard deviation, rounded up to a whole year, above the mean education in his or her occupation (for more information on this measure, see Clogg and Shockey, 1984).

[49] The method used by Clogg and Shockey (1994) is also limited for the same reason.

[50] Objective measures have other limitations. For example, Livingstone (1987) argues that objective methods are questionable because class and gender influence the ways in which skill requirements are determined, rewarded, and valued. Boyd (1990: 289) also argues that the complexity of ratings systems used for objective measures, particularly the GED, are influenced by sexual stereotypes (Boyd, 1990: 289). As well, the assignment of education levels to occupations is considered somewhat arbitrary and may not necessarily reflect the actual skill requirements of a job. At the same time, there is no consensus regarding the equivalence of GED scores and educational requirements (Burris, V 1983: 457). Finally, while the average GED score

requested by their employers are considered to be overqualified for their particular jobs. While assessments of over-education of this sort are not widely used by researchers, probably because there are few data sources available that include this type of information, they are considered to be essential to understanding the phenomenon of underemployment (see Livingstone, 1998 for a discussion).

Subjective evaluations of underemployment may be used when it is not possible to obtain information using an objective approach. Subjective information on underemployment is generally obtained through self-reports. In the past, most Canadian studies obtained subjective information on the underutilization of skills by surveying employers. Much less attention was given to workers' evaluations of the usefulness of their education and training (Betcherman, 1993; Lowe and Krahn, 1995: 363, 370). However, it has been argued that researchers should devote more attention to the actual experiences of graduates. For example, Lowe and Krahn (1995: 363), argue that using employees' assessments to evaluate the usefulness of their education can provide a valuable contribution to the research literature because these assessments tap into the reality of the respondent[51]. The advantage of using respondents' assessments, rather than employers' assessments, lies in the fact that employees are capable of assessing whether the training they received is, or is not, being utilized on the job (Krahn and Lowe, 1995: 364). Furthermore, since the

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is applied to occupations in a similar category, there may be wide variations in skill levels in those occupations.

[51] However, others perceive this as a disadvantage of subjective approaches (Clogg and Shockey, 1984).

responses are subjective, they are believed to more accurately reflect the actual job experiences of the respondent (Rumberger, 1986). Subjective measures are also able to capture respondents' unfulfilled aspirations for job-satisfaction, income, and status, as well as their assessment of the underutilization of their technical skills (Buris, 1983: 464).

The use of subjective measures of underemployment is questionable, because these measures have been found to be only loosely related with more objective measures (see Clogg and Shockey, 1984)[52]. Subjective evaluations of educational requirements for occupations have also been criticized because they may also be open to various interpretations, and these could lead to inflated estimates of over-education (Burris, 1983). In fact, when compared with objective measures, self-reported measures have been found to overestimate underemployment (see Clogg and Shockey, 1984: 240). Burris (1983: 457) also argues that self-reported measures are often questionable because perceptions of underemployment may be influenced by other factors. Clogg and Shockey (1984), in particular, believe that subjective measures may be confounded with age, experience, sex, and time, and have encouraged researchers to be wary of subjective measures until such time as their validity is better established[53].

The fact that both subjective and objective measures have inherent limitations presents challenges for future researchers, but deciding which method

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[52] On the other hand, it has also been argued that self-reported measures of skill underutilization on the job provide fairly good assessments of objective skill (O'Brien, 1986: 40-46).

[53] Unfortunately, little research is available to assess the validity and reliability of subjective measures of underemployment (see Krahn and Lowe, 1991). However, some argue that subjective measures have a reasonable degree of validity (Krahn and Bowlby, 1999: 14). In particular, self-report measures provide adequate face validity. That is, they do appear to measure what they are intended to measure (Krahn and Lowe, 1998).

to use depends largely on the research question as well as on the availability of data. Even though objective measures are better established in terms of validity and reliability, subjective measures are better suited for studies that seek to compare underemployment levels among various types of postsecondary graduates. This is probably the main reason why most of the recent empirical research on underemployment or mismatch has relied on self-reported data (Krahn and Bowlby, 1999: 14).

The empirical research on the underemployment of recent postsecondary graduates from various fields of study has produced some interesting results. When looking only at the university level, underemployment is strongly predicted by field of study. For example, research on the labour market outcomes of university graduates in the province of Alberta by Krahn and Lowe (1998), found that graduates of arts programs were most likely to report that they were overqualified for their current jobs (45 percent). Business graduates (32 percent) were the second most likely group to report feeling overqualified for their current jobs. Science and engineering graduates were next (26 percent), followed by graduate students (25 percent), and graduates with degrees in education (23 percent). Not unexpectedly, the graduates who were least likely to report feeling underemployed were those from professional programs (14 percent). These patterns have been confirmed by other recent studies, which also indicate that graduates of professional programs (health fields in particular) and applied disciplines (engineering and applied science) generally report lower levels of

over-qualification than graduates of arts, humanities, and social sciences programs (Bowlby, 1996; Finnie, 2001; Hay, 2000; Livingstone, 1997: 220).

Few researchers have made comparisons between underemployment rates of those who graduated from university programs and those who graduated from college and technical programs. However, one study did find that, between 1982 and 1990, college graduates were more likely than university graduates to be underemployed (Livingstone, 1993). However, Livingstone's data indicate that the rates of underemployment experienced by graduates of both types of postsecondary schooling increased during this eight-year period. The rate of underemployment among college graduates stood at 30 percent in 1982 and at 42 percent in 1990. University graduates experienced underemployment rates of 24 percent in 1982 and 36 percent in 1990 (Livingstone, 1993: 95). Unfortunately, as one finds in most studies that address this issue, Livingstone (1993) did not distinguish between different fields of study. The lack of comparisons on both dimensions - level of schooling and field of study – probably results from the limited availability of large-scale nationally representative surveys that contain this information[54].

Mismatch

There are no well-defined objective measures available that adequately address the issue of mismatch among postsecondary graduates, and information on the education-job mismatch in Canada has generally been obtained through

[54] The article by Krahn and Bowlby (1999) is an exception; however, they did not make direct comparisions between college and university graduates.

subjective reports (see Krahn and Lowe, 1998)[55]. Some Canadian studies have provided interesting, but primarily descriptive (profile), results on this issue. For example, looking only at university graduates in the province of Alberta, Krahn and Lowe (1998) found that arts and social science graduates were less likely to find themselves in matched occupations than were university graduates from engineering, commerce, and other professional programs. Allen (1986) obtained similar results using the 1992 Survey of Graduates. He found that graduates of applied university and professional programs were most likely (52 percent) to feel that their jobs were directly related to their education. Among community college graduates, 37.3 percent reported that they were in jobs directly related to their education, whereas only 28.8 percent of technical trainees felt that they were in jobs closely related to their education. University graduates from the fine arts, humanities and social sciences were least likely to report that they were in jobs related to their education (percentages not provided). The low percentage for technical graduates further suggests that this form of postsecondary schooling might not meeting the needs of graduates.

Not only do mismatched graduates come from different types of postsecondary programs, they are also concentrated in different segments of the labour market. For example, when looking at labour market distribution of mismatched graduates, Redpath (1994) found that the largest proportion of mismatched graduates (27 percent) are located in the service industries which include retail, food, accommodation, entertainment, and personal services.

[55] Mismatch is generally assessed by asking respondents whether or not there is a correspondence between the skills they learned in their academic programs and the skills that they utilize on the

Somewhat surprisingly, the next largest proportion is found in business services (21 percent). The workers most likely to report being mismatched were those in clerical, sales, and service occupations. This is not surprising given that earlier research also found that clerical workers are particularly prone to feeling overqualified (Burris, B., 1983)[56].

Unfortunately, the earlier research literature which examines the issues of mismatch and underemployment of postsecondary graduates has certain limitations. The studies reviewed here do not make comparisons between college and university graduates with equivalent fields of study. In fact, the most recent comprehensive study that could be found which addresses these issues for graduates from different fields of study and levels of schooling does not explicitly make comparisons between college and university graduates (Krahn and Bowlby, 1999). Moreover, no recent studies could be identified which examine the earnings implications for graduates who are in jobs that are not commensurate with their educational attainment. Thus, the primary body of research literature on these issues is restricted to the separate profile reports of college and university graduates. This makes comparisons extremely difficult.

Section V: Gender

So far gender issues have not been considered. However, the matters addressed above become even more complex when gender is taken into account. The extent to which gender differences in employment outcomes can be attributed

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job.

[56] Unfortunately, few, if any, other studies have compared the extent of mismatch among college graduates with the extent of mismatch among graduates among various university programs.

to gender differences in education is a very important issue in the sociology of education. It is no secret that education has different effects on men and women. Unfortunately, a major problem with much of the previous research in the area is that gender is too often ignored or only mentioned in passing (see Rubinson and Browne, 1994: 607). However, in every known society, social and economic life is organized around gender. Since the rise of industrial capitalism, production and reproduction have been organizationally divided between the female household and the male economy (Cockburn, 1983). Even in contemporary North America, there is no single labour market in which men and women compete on equal terms (Rubinson and Browne, 1994: 609). Therefore, it is important that we discuss previous research on gender and on postsecondary education. Historically, women have always earned less than men; however, over the last quarter century, gender income inequality has declined considerably. This decline has corresponded with a shift in women's financial and economic aspirations, from finding a suitable husband to achieving independence and autonomy in their own careers. Today women are much more ambitious, they are much more independent and career-oriented, and have a different perspective on what constitutes an acceptable occupation. Higher divorce rates, more liberal ideals with respect to women in the workforce, affirmative action programs, and the greater need for a dual income family are among the many factors that are probably contributing to this shift.

Moreover, little is known regarding how mismatch between education and work among recent postsecondary graduates has been affected by the emerging "knowledge-based" economy.

While there is compelling evidence that substantial gender differences in earnings persist, the extent of these differences vary according to certain factors. For example, the gender gap in earnings is much narrower among younger people than among older people. Christie and Shannon (2000) found that among 1990 graduates between the ages of 45 and 54 the earnings ration is .62, but it is higher (.75) for men and women between the ages of 25 and 34. A major explanation for this difference is that the educational attainment levels of men and women have changed over time. That is, the difference in attainment levels of men and women at older ages is much greater than it is for younger men and women, suggesting that gender differences in educational attainment were probably factors contributing to the historical income inequality among men and women[57].

The gender earnings gap also varies according to level of schooling. For example, there is a substantial gender income gap at lower levels of schooling, but the gap narrows considerably among male and female graduates with advanced degrees. For example, U.S. data from the early nineties suggest that women with a college certificate earn less then men with high school diplomas (Rubinson and Browne, 1994). While the gender gap is quite pronounced at the college level, the wage gap between men and women is smallest among graduates with university degrees, and almost negligible among men and women with master's and doctorates (Christie and Shannon, 2000).

Field of study is another factor. There are still considerable gender enrollment differences by field of study. Most undergraduates in the arts and

[57] Christie and Shannon (2000), however, are critical of the extent to which gender differences in educational attainment explain the current earnings gap between men and women.

humanities are women (Davies and Guppy, 1997a; Redpath, 1994). Female undergraduates are also concentrated in nursing and primary education programs, whereas male undergraduates are concentrated in engineering and applied sciences (Redpath, 1994). Men have generally been more likely than women to enter more selective programs and fields of study that provide higher payoffs (Davies and Guppy, 1997a)[58]. The fact that men and women tend to enroll in different programs has major implications for their labour market outcomes, as gender-differentiated enrolment patterns determine occupational destinations. Postsecondary gender segregation leads to striking gender differences in levels of technological training and computer skills (Lowe and Krahn, 1989). However, evidence suggests that occupational stratification has decreased more in the professional occupations (Rubinson and Browne, 1994: 604), women are less likely than men to be in higher skilled positions across all occupational sectors, and have traditionally been concentrated in lower level white-collar occupations (Boyd, 1990). Women also represent the majority of nurses, clerical, elementary school teachers, and sales and service workers. Women tend to choose such fields as social work, psychology, and human relations, while men tend to favour engineering and accounting (see Redpath, 1994).

Studies that control for field of study as well as level of schooling provide a better understanding of how postsecondary schooling affects the labour market outcomes of men and women. For example, recent evidence suggests that field of study affects the labour market outcomes of undergraduate men and women

[58] Some traditionally male-dominated fields such as medicine, pharmacy, and law are undergoing feminization (Davies, Mosher, and O'grady, 1996).

differently. While obtaining a university degree generally results in higher earnings for both men and women, not only in the case of applied degrees but also for academic programs, it is particularly important for women, as female university undergraduates in all fields have higher incomes than college graduates of all ages (Allen, 1996). However, this is not the case for males. Men who graduate from university programs in the fine arts generally earn less than men with college diplomas, particularly at younger ages. In fact, in their early twenties, male graduates from these programs earn less than men with technical college certificates (Allen, 1996)[59] [60]. On the other hand, women in the arts and humanities earn as much as, or more than, women with community college certificates. However, they generally earn less than women with other types of degrees (Allen, 1996). In contrast, technical programs have been found to be somewhat rewarding for men, but not for women. Drawing on data from the 1991 and 1996 Canadian Censuses, Allan (1999b) found that female graduates of technical programs generally earn low incomes. Technical certificates probably do not provide women with superior employment opportunities because these women are primarily occupied in secretarial and hair dressing programs, which provide only modest rates of return (see Allen 1999b). Men, on the other hand, are more likely to be found in technical and computer-related programs that may be more valued in the modern economy. Unfortunately, the inferences that can be

[59] Of course, this probably occurs because those with technical college certificates finish their programs at an earlier age. Therefore, they have more work experience in their early twenties.
[60] Actually, men with a fine arts or nursing degrees even earn less than men with only a high school diploma. Women who graduate from these fields have been found to do much better than men; however, men generally do not go into these programs (Allen 1996).

drawn from this study are limited, as the analyses presented are limited to mean earnings figures. No attempts were made to control for confounding factors.

Christie and Shannon (2000) also show the extent to which field of study affects gender inequality. Drawing on 1986 and 1991 Canadian census data, they show that gender differences in fields of study are more important contributors to the earnings gap than level of schooling. In fact, for 1990 graduates, they found that nearly 10 percent of the total gender earnings gap was explained by field of study[61] [62].

Unemployment among postsecondary graduates also varies considerably by gender. Drawing on NGS data for 1982, 1986, and 1990 graduates, Finnie (2000) found that the labour force participation rate for female postsecondary graduates is more variable than it is for their male counterparts. Not unexpectedly, this same study also found that, across all three cohorts, women were more likely than men to be concentrated in part-time and temporary employment (Finnie, 2000)[63]. This finding is consistent with other research

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[61] The results of this study are similar to those obtained by Wannell (1990), who found that differences in fields of study explain more of the gender gap than differences in level of schooling.

[62] These findings, however, are subject to further qualification. For example, Boothby (1999) found that the earnings structure for men and women is quite similar for most fields of study, but only under certain conditions. For those fields that have a significant representation of both female and male graduates, the earnings patterns of women and men are similar. However, if graduates of a particular program only include a small number of one sex, then the earnings structures of women and men appear to be much less similar (Boothby, 1999). This is a particularly salient issue for women in traditionally male occupations. Women tend to be penalized if they are employed in traditionally male occupations (Duncan, Prus, and Sandy, 1993; Kanter, 1977). At the same time, men are also penalized if they are in traditionally 'female' occupations (Allen, 1996).

[63] There may be an exception among social science graduates. A later study by Finnie (2001) found that men with social science degrees have higher part-time employment rates than women with social science degrees.

(Duffy, 1997, Redpath, 1994)[64], and is explained in terms of women's looser labor force attachment (Finnie, 2000)[65].

As might also be expected, the highest unemployment rates among male university graduates are to be found among those with fine arts and humanities degrees. Male science and engineering graduates, on the other hand, have very low unemployment rates (Allen, 1999b). In contrast, and quite unexpectedly, women show almost the reverse pattern. Female graduates of engineering and mathematics programs, and the physical and biological sciences have the worst employment records of all female university graduates (Allen, 1999b)[66]. This finding may confirm the assertions made earlier, that some women are having difficulty breaking into certain male-dominated work environments[67]. A slight gender difference was also noted among graduates of social science programs. Female graduates of social science programs have the lowest unemployment rates among women, next to women in education and health-related fields. In contrast, the unemployment rates for male social science graduates were around the average, only slightly above those of men in engineering or commerce (Allen, 1999b).

Research on gender differences in underemployment and mismatch is quite young, but, nonetheless, it has produced interesting results. Research from

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[64] In fact, one researcher found that women are three times more likely than men to work part time (Krahn, 1995: 36).

[65] It may also be explained by the fact that women are more likely than men to choose academic programs that lead to part-time and temporary employment, but this assertion was not tested in the study by Finnie (2000).

[66] The surprising higher rates of unemployment for women in engineering, mathematics, and science programs was also found by Finnie (2001) using data for 1990 graduates.

[67] It may be that some of the jobs demand extremely long work-hours and very high commitments, and that some women decide that these sacrifices are too much.

the early 1980's found over-education to be slightly higher among males, particularly at the university undergraduate level (Burris, V. 1983)[68]. However, data collected in 1987 show no significant gender differences in self-reported measures of mismatch (Redpath, 1994) [69] [70]. This could be due to the fact that women in the 1980's were more concentrated in areas such as social work, teaching, and nursing. These are all fields in which certification standards correspond closely with the skill requirements of occupations. Not unexpectedly, job-mismatched men and women were found to be located in different segments of the labour market. Mismatched women, particularly those with arts degrees, were concentrated in clerical jobs (38.4 percent), whereas mismatched men were more likely to be found in sales jobs (30.4 percent).

Recent research suggests that gender differences in patterns of underemployment vary according to level of schooling. Drawing on the underemployment data available in the 1990 NGS, Frenette (2000) found that male college graduates are more likely to be overqualified than female college graduates, while male bachelor's graduates are slightly less prone to feel overqualified for their jobs than female BA graduates. This finding is reversed for master's graduates. Females with master's degrees are less likely to feel overqualified than similarly qualified males. Unfortunately, this study did not account for gender comparisons by field of study.

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[68] Unfortunately, the evidence on this issue is inconclusive, as few studies make gender comparisons having controlled for different types of postsecondary schooling.
[69] The author did not search for differences between college and university graduates.
[70] Although, Finnie (2001) found that women are slightly less likely than men to be satisfied with their university program.

The fact that some gender differences in employment outcome differences between men and women can be explained, at least partially, by gender differences in postsecondary schooling lends support to the human capital theory[71]. However, the fact that differences still persist, even when gender differences in human capital have been taken into account, raises an interesting question: What is responsible for the remaining difference? Structuralists and dual-labour market theorists point to labour-market discrimination as one of the leading explanations (see Smith, 1990)[72]. However, as was discussed in the previous chapter, another resaonable explanation, one which has not been thoroughly investigated in the literature, is that women and men utilize their human capital differently. Men, for example, might devote more time and effort to selecting occupations that are directly related to their schooling, and this could be a major explanation for why men earn more than women, even after controlling for level of schooling and field of study.

The above studies illustrate that men and women have different employment outcomes, and these outcomes are not always what might have been expected. Recent research also suggests that gender differences in labour market outcomes are largely attributable to the fact that women and men enter the labour market with different types of postsecondary credentials. Women are believed to experience less favourable employment outcomes because they graduate from

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[71] In fact, almost 50% of gender gap has been explained by human-capital variables (see Rubinson and Browne, 1994).

[72] Other factors, such as gender differences in geographical mobility, differences in experience and training (Royalty, 1996), and labour force attachment (Duncan, Prus, and Sandy, 1993; Kilbourne, Farkas, Beron, Wier, and England, 1994) have also been found to help explain gender differences in employment outcomes.

programs that offer different, less valuable, forms of human capital (Kilbourne, Farkas, Beron, Wier, and England, 1994)[73]. This illustrates why it is extremely important to take into account credentials and other employment-related factors when comparing men and women. Studies that investigate gender differences in earnings, employment, mismatch, and underemployment, but do not take into account the fact that men and women graduate with different types of postsecondary schooling are less able explain why gender differences persist.

Summary

It was argued in this chapter that policy makers believe that the emerging 'knowledge-based' economy is demanding greater numbers of more highly educated workers. However, there is still little evidence available to test whether the experiences of recent graduates bear this out. Nor do we know whether graduates of specific programs have benefited the most from the jobs supposedly created by the "knowledge-based" economy. Some believe that the emerging economy demands educated workers with specific skills, and therefore favours the training of graduates with specific technical skills. If this is the case, then postsecondary graduates of technical and specialized programs, at all levels of postsecondary schooling, should show improved employment outcomes over time relative to university graduates from the more "generalist" liberal arts programs.

On the other hand, it has also been argued that there is an even greater demand for the knowledge and analytical skills possessed by arts and social

[73] Drawing on individual-level panel data relating to approximately 10,000 respondents from the 1966-1981 National Longitudinal Survey of Youth, Kilbourne et al., (1994) found that there is a negative effect associated with the "nurturant social skills" that are disproportionately acquired by women.

science university programs. If this is the case, then the employment outcomes of graduates from these programs should show improvement over time, relative to those of the graduates of technical and specialized programs. Thus, the most appropriate way of determining whether the emerging economy has affected the employment outcomes of postsecondary graduates is to identify employment outcome patterns over time among graduates of various types of programs with various levels of postsecondary schooling. The most useful comparisons will be comparisons between recent graduates, who are most likely to be affected by the evolving knowledge-based economy.

In the past, little empirical has dealt with fields of study (Finnie, 2001: 143). Most past research has focused on the amount of human capital rather than on the type of human capital (Finnie and Frenette, 2000). While researchers have started to focus on field of study and the body of research is growing the results are still inconclusive, particularly when one attempts to compare different types of postsecondary graduates. For example, recent research on the transitions from school to work that has distinguished between different fields of study has focused on university graduates only (Axelrod et al., 2001; Butlin, 2001; Hay, 2000; Krahn and Lowe, 1998; Finnie, 2001; Finnie and Frenette, forthcoming). At the same time, other research that compares graduates with different levels of schooling does not make comparisons between graduates with various fields of study (Christie and Shannon, 2000; Finnie, 2000a; 2000b; Vahey, 2000). Lastly, most of the recent research in the area is restricted to profile reports of postsecondary graduates. These do not allow one to control for important factors

and no statistical inferences can be made (Allen, 1999a; 1999b; Krahn and Bowlby, 1999; Krahn and Lowe, 1998; Finnie, 2001; Finnie, 2000a; 2000b; Axelrod et al., 2001).

This review has also shown that the employment rates and income levels of postsecondary graduates are increasing relative to those of high school graduates, making it unclear whether the rapid expansion of the higher education has been detrimental to the labour market outcomes of postsecondary graduates. At the same time, the fact that more highly educated workers have higher incomes and lower levels of unemployment does not fully address the issue of whether the economy needs a better educated labour force. For example, university graduates may make more money than those with college diplomas, technical certificates, and high school diplomas, but they still may not be able to find jobs that are in keeping with their level of schooling. Thus, a better test of whether graduates are adequately prepared for the labour market following graduation would entail using measures of job fit and underemployment. It is evident that a more thorough investigation of the fit between education and occupation is needed. There is much speculation, but little is actually known regarding which specific postsecondary programs are actually providing the skills that are most in demand.

Lastly, by using variables that are designed to explore issues of fit and underemployment and by distinguishing between postsecondary programs instead of simply using 'years of schooling' to assess educational attainment, it is possible to make a contribution to the debates between human capitalists and credentialists. The real test for the human capital theory is whether postsecondary

education generates the skills necessary to enable graduates to compete in the contemporary labour market. If postsecondary graduates who are in jobs where the employer requested their specific credentials are more likely to feel that their education is related to their work than graduates in jobs where the employer did not specify their credentials, then this provides evidence to support the human capital assertion that there is a good match between the skills provided within the education system and those needed in the labour market. On the other hand, the credentialist assertion that education is unrelated to the skills needed in the labour market would be supported if respondents who are in jobs where the employer requested their credentials are not any more likely than respondents in jobs where their specific credential were not requested to feel that their education was related to their jobs. As was discussed in the previous chapter, identifying how these theories can shed light on the experiences of graduates of various programs and levels of postsecondary education is one of the central concerns of this dissertation. The statistical analysis presented in the next chapter will clarify these issues.

Chapter 3

Data and Methods

The source of data for this dissertation is Statistics Canada's National Graduates Surveys (NGS). The NGS is sponsored by Human Resources Development Canada and has been conducted by Statistics Canada since 1984[74]. The National Graduates Surveys provide information on postsecondary graduates who are contacted twice, two years and five years following graduation[75].

Surveys are conducted by telephone, and respondents are asked a variety of questions relating to their educational histories and employment situations. These surveys provide information about the labour market experiences of recent graduates of postsecondary institutions. The main goals of the National Graduates Surveys are to provide information about the link between educational experiences and employment outcomes and to document school-to-work transitions and the rate of return on investment in human capital.

Since the data are collected for four different cohorts, the NGS is extremely valuable in that it enables us to compare the labour market outcomes of graduates over time. Each survey has more than 30,000 observations. All provinces and territories in Canada are represented. These are the largest and

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[74] In 1978 a similar survey was sponsored jointly by the Department of the Secretary of State and Employment and Immigration Canada, and conducted by Statistics Canada. It was called the Survey of 1976 Graduates of Postsecondary Programs. The content of the National Graduates Surveys was expanded from the 1978 survey to include graduates of trade/vocational programs in addition to graduates of community colleges and universities. Unfortunately, the 1978 Survey of 1976 Graduates has not been made available by Statistics Canada to the Research Data Centre (RDC) at McMaster University.

most comprehensive surveys available in Canada that focus on the relationship between education and work. The sample sizes and response rates for each of the National Graduate Surveys are listed below in Table 3.1[76].

Table 3.1

Year	Sample Selected	Interview	Usable Sample/Response Rate
1982	49,150	1984	35,717 (73%)
1986	53,136	1988	40,814 (77%)
1990	51,111	1992	36,280 (71%)
1995	61,759	1997	43,040 (70%)

NGS Sampling Information

The 1990 survey was conducted in June of 1992. The 1995 survey was developed in 1996, plans and interview questions were tested in early 1997, and the actual survey was conducted between May and July of 1997. The content of the questions and methodologies of the 1990 and 1995 NGS surveys are similar to

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[75] The follow-up survey for the 1995 NGS was not available in time to be used for this dissertation.

[76] The usable sample listed here is actually the usable sample from the first interview. The usable sample for this analysis includes all 43,040 respondents from the 1995 NGS; however, this analysis is limited to graduates who were successfully contacted and who completed both interviews (the two-year interview, and the five-year follow-up interview) for the 1982, 1986, and 1990 surveys. This leaves 30,816 respondents from the 1990 NGS. The usable sample for the 1982 and 1986 surveys is not yet available. There is a concern that bias could be introduced into the analysis if the outcomes are different for those who responded only once versus those who were successfully interviewed twice in the 1982, 1986, and 1990 surveys. However, a detailed in-depth study of a sub-sample showed this bias to be small for unemployment and earnings (see Finnie, 2000: 199).

those of previous graduate surveys[77]. For each survey, the base population of each survey is all graduates from Canadian postsecondary educational institutions who have completed the requirements for degrees, diplomas, or certificates during the calendar year for which the survey was planned. The three levels of postsecondary institutions included in the population are universities, colleges, and technical institutions. University programs lead to a bachelor's, master's or doctorate degree, or to a specialized certificate or diploma. Programs of community colleges, technical schools, and similar institutions are generally at least one year in duration, and normally require a secondary school diploma or equivalent for admission. Skilled trades programs are generally three months or more in duration. The population does not include those who graduated from private postsecondary education institutions that do not follow a standard curriculum of the type developed for publicly funded institutions. It also does not include individuals who took part-time trade courses while employed full time, or people who completed vocational programs lasting less than three months (more detailed information is provided in the Users' Guides for the 1990 and 1995 NGS).

A stratified, systematic random sample design was used. The survey sample was first stratified by province, then broken into five levels 1) skilled trades; 2) college; 3) undergraduate (degrees, diplomas, and certificates); 4) master's level degrees; and 5) doctorates. Lastly, the survey was stratified into nine fields of study for university and career/technical programs and eight fields

[77] Documentation for the earlier surveys is not made available by Statistics Canada. Thus, any reference in this dissertation to the survey methodology or sample size for the 1982 and 1986

of study for trade/vocational programs. Then, an independent systematic random sample of predetermined size was selected from each stratum.

A common problem when using a series of cross-sectional surveys is that not all of the questions are asked in every survey. At the same time, in addition, the wording of questions can often change over time, as can the response options. This is a limitation of the National Graduates Surveys, given that Statistics Canada and Human Resources Development Canada made certain changes in the content of the questions asked of the four cohorts. Thus, a great deal of care and attention was devoted to recoding the variables so that meaningful comparisons could be made across surveys. Obviously, only variables that are compatible, or could be made compatible, across surveys were used in the analyses that compare graduates over time.

Selection Criteria for the Analysis

The analysis includes those who have not obtained an additional degree, diploma, or certificate subsequent to the one originally received in 1982, 1986, 1990, or 1995. Those graduates who had obtained additional qualifications were excluded because they no longer belong to the original educational group. The analysis also excludes those who are working part time because they are continuing their education. It is important to exclude these respondents in order to prevent mixing school and work in a way that would affect labour market outcomes (Finnie, 2000)[78]. Lastly, analyses were restricted only to paid workers

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surveys was obtained from published material rather than NGS documentation.

[78] The selection criteria used in this study is similar to the criteria used by other researchers using NGS data (Finnie, 2000; Frenette, 200; Krahn and Bowlby, 1999). Moreover, they are the only selection variables that are consistent across all of the surveys.

when the dependent variable is a measure of fit or underemployment (objective or subjective), because these questions were asked only of paid workers.

Variables

Sociodemographic Independent Variables

The important control variables - sex, marital status, age, region, parental socioeconomic status, and the presence of dependent children - are available in all surveys. Marital status is coded into three different categories. Those who are married or in common-law relationships are placed in one category[79]. Respondents who are single are in the second category, and the divorced, separated, and widowed are grouped together to form the last category.

Age is coded in years and will be incorporated into the regression models as a categorical variable[80]. This is done because our concern is not so much in the age coefficient, but rather the pattern of the relationship between age and the dependent variables. Thus, the individual parameter estimates for each year of age will be plotted against age. For the ordered and multinomial logit models, the age parameter estimates will be converted into predicted probabilities, which will be plotted against the age.

A variable representing the region in which the respondent was surveyed was created. The four categories for this variable are: 1) Atlantic provinces, which include Newfoundland, Nova Scotia, New Brunswick, and Prince Edward Island; 2) Quebec; 3) Ontario; and 4) Western provinces and territories, which

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[79] In the earlier surveys, Statistics Canada had already grouped married and common-law respondents into one category.

[80] While this generates a large number of parameter estimates for the age variable, this is not a major concern, as there are an extremely large number of degrees of freedom.

include Manitoba, Saskatchewan, Alberta, British Columbia, Yukon, and the Northwest Territories.

The respondents were interviewed in either English or French. The language in which the interview was conducted was recorded, and this information is used to create a language variable.

In each survey respondents were asked whether they had any dependent children. The variable will be particularly important for the analyses that explore gender differences in employment outcomes. It is included as a control variable because women are disproportionately more likely to be responsible for the care of dependent children. Thus, their labour market outcomes are more likely to be affected by the presence of dependent children than are men's[81].

There are no direct questions available in the NGS to capture parental socioeconomic status. However, in each survey, the respondents were asked to report their mothers' and fathers' educations. The response options for this question had to be recoded because they were similar, but not identical, across all of the surveys[82]. The final categories for mother's and father's education are: 1) Less than a high school diploma; 2) Received high school diploma; 3) Some postsecondary education; 3) Trade certificate; 4) College diploma; 5) University undergraduate degree; 6) Master's degree; 7) Professional degree; 8) Earned doctorate.

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[81] At the same time, men may have to work harder because they have children to support.
[82] The 1995 NGS allowed for a greater number of response options than the earlier versions.

In each of the four surveys, the respondents were asked whether they were native Indian (i.e. North American Indian, Metis, or Inuit). This question is used to distinguish between Indians and non-Indians.

There are two variables in the National Graduate Surveys that may be used to distinguish among different types of occupations. These variables are generated using the Standard Occupational Classification (SOC) codes. The SOC codes were developed by Statistics Canada. Similar occupations are grouped together into major occupational categories (See Appendix A of the 1995 NGS for details on the occupations included in particular codes). Unfortunately, while both the SOC 1980 and SOC 1991 codes are available in the 1990 and 1995 surveys, only the SOC 1980 code is available in the 1982 and 1986 surveys. Thus, only the SOC 1980 codes are used in the analyses.

There are 21 occupational categories based on the SOC 1980 codes. The categories are as follows:

1) Managerial administrative and related;
2) Natural sciences, engineering and mathematics;
3) Social sciences and related fields;
4) Religion;
5) Teaching and related;
6) Medicine and Health;
7) Art, literary, recreational and related;
8) Clerical and related;
9) Sales;
10) Service;
11) Farm, horticultural, animal husbandry;
12) Fishing, trapping, related;
13) Forestry and logging;
14) Mining, quarrying, oil and gas;
15) Processing;
16) Machining and related;
17) Production, fabrication, assembling and repair;
18) Construction trades;

19) Transport equipment operating;
20) Material handling and related; and
21) Other crafts and equipment operating.

Categories 11 through 21 are grouped together and labeled as category 11) Occupations unique to processing, manufacturing, and utilities.

Education

As was discussed in the introduction, part of the problem with past research in the area is that studies often assess the relationship between education and work using a quantitative measure for education. Quantitative measures that distinguish years of education do not adequately address the research questions that are central to this dissertation. The NGS includes three key variables that tap into the qualitative dimension of postsecondary schooling. For the first variable, respondents were grouped according to five levels of postsecondary schooling: 1) Trade or vocational certificate; 2) College diploma or certificate; 2) Bachelor's degree; 3) Master's degree (e.g., M.A., M.Sc., M.Ed.); 4) Degree in medicine (M.D.), dentistry (D.D.S., DM.D.), veterinary medicine (D.V.M.), law (Ll.B); optometry (O.D.), theology (M.DIV); and 5) Earned doctorate (e.g. Ph.D., D.Sc., D.Ed.). While a higher score generally implies a higher level of schooling, this variable will be treated as categorical considering the discrete nature of the categories.

In each survey, respondents were also asked to report their field of study. Their responses were then converted into a five-digit field-of-study code. Field-of-study codes are part of the University Student Information System (USIS) and Community College Student Information System (CCSIS), developed by the

Centre for Education Statistics at Statistics Canada. These codes are hierarchically constructed so that the first digit indicates a major group, the second and third digits indicate a broad field of study within the major group, and the fourth and fifth digits indicate a more specific field of study within the broad field. Eventually, these field of study codes were aggregated by Statistics Canada into a smaller subset of ten categories, using a harmonization code which matches the university student field of study codes (USIS) and the community college and trade-vocational field of study codes (CCSIS) to Census field of study codes.

The census field-of-study codes are applicable for all graduates, and were designed so that the NGS findings could be compared with those of other Statistics Canada surveys and the Census of Population (see Appendix B of the 1995 NGS). The harmonized categories are grouped according to the following fields of study:

1) Education, recreational and counseling services;
2) Fine and applied arts;
3) Humanities and related fields;
4) Social sciences and related fields;
5) Commerce, management and business administration;
6) Agricultural and biological sciences;
7) Engineering and applied sciences, technologies and trades;
8) Health professions, sciences and technologies;
9) Mathematics and physical sciences;
10) Interdisciplinary studies, unknown, or other.

Unfortunately, the harmonization codes were only available for the later surveys (1990 and 1995). Thus, the field of study codes for the earlier surveys were harmonized manually [83].

[83] Respondents were also asked to report their second (minor) field of study, if applicable. If respondents reported a second field of study, the harmonization codes were used for this variable as well.

The last education variable used in this study indicates whether the respondent graduated from a cooperative (coop) program. This is an important control variable because graduates from coop programs generally receive hands-on work experience as part of their educational training, and presumably this experience would leads to stronger linkages between school and work[84]. The question "Was your program a coop program?" was not asked of trades graduates.

Dependent Variables

Earnings and Employment

The earnings variable in the 1982, 1986, and 1990 surveys was obtained from the respondent's answer to the question: "Working your usual hours, approximately what would be your annual earnings before taxes and deductions at that job?" This earnings variable has been referred to as a somewhat "atypical measure" because it represents what the graduate would earn on an annual basis if the job were to last a full year (adjusting for irregular work patterns), rather than what the graduate actually earned (Finnie, 2000: 201). However, at the same time, it is also considered to be a well-defined measure, which is analytically interesting, and presumably well reported (Finnie, 2000: 201). The 1995 survey uses a similar, although derived, estimate of the gross annual earnings for the job held during the 1997 reference week. It is based on the respondent's reported salary, how it was paid (yearly, monthly, weekly, hourly), and his or her usual number of hours worked[85] [86]. For analyses that involve comparing earnings over

[84] Coop programs also allow students to graduate debt-free.
[85] This earnings variable in the 1995 NGS is derived using questions c51, c53, and c55.

time, the consumer price index was used to convert the earnings variables to constant (1992) dollars. As well, to be consistent with the earnings variables in the earlier datasets, the earnings variable in the 1995 NGS was rounded to the nearest thousand dollars. Because earnings are skewed, the log of earnings is used instead of actual earnings.

Employment status was derived specifically for this project using two different variables. The first variable distinguishes between employed workers, unemployed workers, and those not in the labour force. The second variable distinguished between full-time and part-time workers. These two variables were combined by the researcher to distinguish between four employment status categories: 1) those employed full time; 2) those employed part time; 3) those who are unemployed; and 4) those not in the labour force.

Fit and Underemployment Variables

As was discussed in previous chapters, there are generally two ways to explore the issues relating to over-education and the mismatch between education and employment. One can use objective measures and self reports. Both measures will be used in this analysis.

The objective measures of underemployment and mismatch used in this study are not fully objective in that they employ assessments of job characteristics such as the Hay Job Evaluation (Capelli, 1993) and the General Economic Development scale (Anisef, Gottfried, and Turritin, 1980; Redpath, 1994). These rely on an external assessment of job conditions or characteristics, and to our

[86] Because the method estimating earnings was changed slightly in the 1995 survey, comparisons with the previous surveys are slightly affected, and some caution should be exercised when

knowledge, there is no objective measure of this sort available that enables one to assess a correspondence between the skills obtained at postsecondary institutions and the skills demanded at work. Instead, the measures used in this study are considered objective in the sense that they compare the job requirements provided by the employers with the academic credentials of the respondents, and do not depend on the opinion of the respondent. Similar measures have been considered as objective in the research literature (Livingstone, 1998).

The subjective measures, such as the self-reported assessments of fit, are commonly used to obtain information about job characteristics that could not be obtained in other ways, or in this case, to supplement other, more objective, measures. The use of these questions is grounded in the assumption that respondents are just as able to decide whether their educations are related to their jobs as any objective or external measures. Unfortunately, there is little research available to assess the validity and reliability of these measures (see Krahn and Lowe, 1998). However, the self-report measures used in this study do provide adequate face validity. That is, they do appear to measure what they are intended to measure[87].

Fit (Mismatch)

The NGS is a particularly useful source of information on the fit between postsecondary programs and employment. There is an objective variable for job fit which captures the extent to which respondents' qualifications match the

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interpreting comparisons of earnings over time.

[87] While there is an issue as to whether "objective" and "subjective" assessments of job characteristics are better or even different (Myles and Fawcett, 1990), there is also a strong

educational requirements of their jobs. This variable was derived by the researcher using several questions. The first question asks the respondents: "When you were selected for your job, what level of education was needed to get the job?" The second question asks: "Did the employer specify that it must be a specific field of study?" (yes/no). The third question asks the respondents to identify the field[88]. The derived variable has four categories: 1) No education was required for the job; 2) Postsecondary education was requested, but not in a particular area of study; 3) Education was requested in a specific field, but the respondent did not graduate from a program in that field of study; and 4) Education was requested in a specific field which matched the respondent's field. It is used to determine whether respondents in jobs that require a postsecondary degree or diploma are more likely to report a fit between their education and their work (see the subjective question directly below) than respondents in jobs that do not require a postsecondary credential, or those in jobs that require a credential, but not from a specific field of study.

Each version of the NGS includes a question which provides the respondents with the opportunity to express their feelings regarding the relationship between their education and their jobs. When asked about the relationship between studies completed and the job held last week, respondents

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consensus in the research literature that self-reported assessments adequately reflect the true nature of work (see Hughes and Lowe, 2000).

[88] This question is only available in the 1995 NGS. In the earlier surveys (1982, 1986, and 1990) respondents were asked whether or not the field requested by the employer was the same as their field of study.

were allowed to chose from three options: 1) Closely related; 2) Partly Related; 3) Not related [89].

Underemployment (Over-education)

Fortunately, there is a variable for underemployment that is available in all four surveys. This variable was derived by Statistics Canada using information from two different questions. For the first question, the respondent was asked, "When you were selected for that job, what level of education was needed to get the job?" The response categories are:

1) No qualifications required;
2) High school diploma;
3) Trade or vocational certificate;
4) College diploma or certificate;
5) Bachelor's degree;
6) Master's degree (e.g., M.A., M.Sc., M.Ed.);
7) Professional degree in medicine (M.D.); dentistry (D.D.S., D.M.D.); veterinary medicine (D.V.M.); law (Ll.B); optometry (O.D.); theology (M.DIV); and
8) Earned doctorate (e.g. Ph.D., D.Sc., D.Ed.)[90].

The responses to this question were then compared with the respondent's own level of schooling. If the respondent's level of schooling was higher than the level required for his or her job, then he or she is coded as being overeducated. If respondent's level of schooling was lower than the level required, then he or she was coded undereducated. If the respondent's level of schooling was the same as the level of schooling required by his or her job, then that individual was classified as matched (neither under- nor overeducated). Lastly, there are two additional categories, one for respondents who were in jobs that did not require

[89] The response options for this question are slightly different in the 1995 NGS. They are: 1) closely related; 2) somewhat related; 3 Not at all related.
[90] Of course, this question only applies to paid workers.

any postsecondary schooling, the other for respondents for whom this information could not be determined. This derived underemployment variable is coded as follows: 1) No education was required for the job; 2) Graduate had more education than was required; 3) Graduate had the same level that was required; and 4) Graduate had less than was required.

In the 1995 NGS, respondents were asked, "Considering your experience, education and training, do you feel that you are overqualified for your current main job?" (Yes or No). This question is not available on the earlier surveys. Therefore, subjective feelings of underemployment can only be assessed using the 1995 NGS.

"Recycling"

Another form of underemployment occurs when graduates pursue another type of postsecondary schooling. This form of underemployment is referred to as "recycling." It happens when graduates with one type of postsecondary schooling, some of whom are not satisfied with their labour market prospects, proceed to another form of postsecondary schooling that is not designed as a continuation of the credential already acquired[91]. "Recycling" is most common among college and university undergraduates. For example, graduates from undergraduate programs will sometimes enroll in other undergraduate programs or college programs in order to obtain technical skills or experience and to supplement their academic credentials. Likewise, college graduates who are dissatisfied with their career prospects will sometimes enroll in another college

program or pursue a university education, in the hope of improved employment opportunities.

The "recycling" variable is derived using two variables in the NGS: 1) the level of schooling obtained during the survey year, and 2) the level of postsecondary schooling obtained prior to the program completed during the survey year. The derived "recycling" variable has six categories:

1) University graduates (only);
2) College graduates (only);
3) University graduates who previously obtained a college diploma or certificate;
4) University graduates who previously obtained a different undergraduate degree;
5) College graduates who previously obtained a university degree following graduation; and
6) College graduates who previously obtained a different college certificate or diploma.

This variable provides an additional way of tapping into graduates' discontent with the fact that the economy and/or their postsecondary programs do not provide rewarding employment prospects following graduation[92]. It will be used as an independent variable to determine whether graduates who have "recycled" through the postsecondary system enjoy better employment outcomes.

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[91] Thus, students who graduate from undergraduate programs and who continue on to law school or graduate school would not be considered to be "recycled," because those who are admitted to law school or graduate school are generally required to have an undergraduate degree.

[92] Ultimately, there are a number of ways in which "recycling" can occur. For example, it is possible, though unlikely, that a master's graduate would attend a technical program or that a disenchanted law school graduate would go back and obtain an undergraduate degree in engineering. These, and other forms of "recycling" not addressed in this dissertation, are less common; while intrinsically interesting, they are not a concern in this dissertation. As mentioned in the previous chapters, the primary purpose of this dissertation is to compare the labour market outcomes of graduates with technical skills from community colleges with those of graduates with undergraduate degrees. Thus, only "recycling" that occurs between college and university undergraduate programs will be addressed in this dissertation. Furthermore, the analyses that includes the "recycling" variable will involve only the sample of graduates with college certificates and university undergraduate degrees (or less) during or prior to the survey year.

Lastly, the 1995 NGS has a question that provides a subjective assessment of how satisfied the respondents are with their field of study. The respondents were asked: "If you could choose again, would you select the same field of study or specialization that you completed in 1995?" (yes or no). The usefulness of this question is limited to the 1995 graduates, as it is not available in the earlier datasets.

Chapter 4: Results

Earnings, "Recycling," and Employment

The statistical analyses are presented in the next two chapters. This chapter addresses issues related to the earnings and employment outcomes of postsecondary graduates, and is divided into four sections.

The first section summarizes the real earnings for the various categories of the field of study and level of schooling variables for both men and women.

The second section provides the ordinary least squares regression results for real earnings using a pooled analysis which combines all four NGS cohorts. A number of regression models will be estimated in a series of stages, which include estimating a number of interaction terms.

The third section involves estimating another series of multiple regression models, also using all four NGS cohorts, but using employment status as an outcome measure. Since there are three unordered categories (employed full time, employed part time, and unemployed) for this variable, multinomial logistic regression analysis is used in this section.

The last section addresses the issue of "recycling." The "recycling" variable will be treated as one of the independent variables and earnings will be the dependent variable for the series of ordinary least squares regression models estimated in this section. Since the "recycling" variable could not be derived for all four NGS cohorts, only the 1995 cohort is used for this analysis. The multiple

regression results for the education-job fit and underemployment-related variables are presented in the next chapter.

Section One: Earnings

The real earnings of men and women with various types of postsecondary education are broken down by cohort and summarized in Table 4.1[93]. The results clearly illustrate that, for each cohort, university undergraduates earn more than college graduates, and college graduates earn more than trades graduates. At the same time, master's graduates typically earn more than graduates of professional programs, while Ph.D. graduates generally earn the most[94].

The real earnings of male and female university undergraduates, graduates of professional programs, master's, and Ph.D. programs have generally declined over the four-cohort period. While the earnings of male college graduates appear to have remained relatively constant over time, the earnings of female college graduates were stable across the first three cohorts, then showed a sharp decline from the 1990 cohort to the 1995 cohort. In contrast, the earnings of graduates of trades programs, both male and female, have remained relatively constant over the four-cohort period.

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[93] Since there are four different waves of data, corresponding to the four different time periods when the graduates were surveyed, the income variable for each wave was first converted into real dollars using the consumer price index, where 1992 is the base wage rate. The real earnings figures are derived from both full-time and part-time graduates.

[94] However, in 1982, 1986, and 1995 the mean earnings of male graduates with doctorates. was slightly lower than the mean earnings of male graduates with a master's degree. This can probably be explained by the high salaries of MBA graduates, who, in nearly every cohort, earn more than other graduates with master's degrees. As well, the lower than expected earnings among graduates with professional degrees is probably attributable to the fact that certain nursing and teaching programs are included in this category along with the generally more prestigious law and medical programs.

Table 4.1

Real Earnings by NGS Cohort (1992 Dollars)

	1982			1986			1990			1995		
	Males	Females		Males	Females		Males	Females		Males	Females	
Trades (all)	**24,387**	**18,603**	**76.28%**	**27,228**	**19,423**	**71.33%**	**24,925**	**19,151**	**76.83%**	**26,240**	**17,745**	**67.63%**
College (all)	**28,721**	**24,796**	**86.33%**	**28,702**	**24,198**	**84.31%**	**27,513**	**24,356**	**88.53%**	**27,986**	**20,446**	**73.06%**
Education. Rec. Counseling	25,504	19,649	77.04%	26,488	19,367	73.12%	25,574	21,785	85.18%	23,630	17,380	73.55%
Fine Arts	21,936	18,585	84.72%	24,519	21,542	87.86%	20,333	19,051	93.69%	21,572	17,362	80.48%
Humanities	26,825	20,848	77.72%	25,180	22,910	90.98%	22,865	20,656	90.34%	22,835	18,591	81.41%
Social Sciences	30,040	24,145	80.38%	30,495	23,350	76.57%	27,925	22,097	79.13%	27,057	19,988	73.87%
Commerce/Business	27,278	21,037	77.12%	28,025	21,329	76.11%	27,282	21,610	79.21%	26,213	19,327	73.73%
Agricultural/Bio Sciences	24,617	21,737	88.30%	27,673	19,865	71.78%	22,054	21,140	95.86%	21,779	18,011	82.70%
Engineering/Applied Sciences	30,908	19,615	63.46%	29,545	18,398	62.27%	25,538	20,667	80.93%	27,605	18,023	65.29%
Technical Trades	29,375	25,109	85.48%	28,738	25,482	88.67%	27,966	25,549	91.36%	29,659	25,158	84.82%
Health Professions	34,697	30,016	86.51%	33,867	28,996	85.62%	32,523	29,624	91.09%	29,462	23,461	79.63%
Math & Physical Sciences	40,300	33,096	82.12%	29,876	28,854	96.58%	30,505	26,896	88.17%	31,211	23,070	73.92%
Other	26,569	28,055	105.59%	25,441	19,855	78.04%	19,733	24,580	124.56%	20,814	15,560	74.76%
University Undergraduate	**34,648**	**30,649**	**88.46%**	**33,856**	**29,975**	**88.54%**	**31,633**	**29,282**	**92.57%**	**31,467**	**26,591**	**84.50%**
Education. Rec. Counseling	36,923	32,637	88.39%	34,660	30,400	87.71%	31,736	29,914	94.26%	29,961	26,229	87.54%
Fine Arts	25,561	23,809	93.15%	27,637	25,985	94.02%	22,233	23,760	106.87%	21,991	18,394	83.64%
Humanities	28,678	27,833	97.05%	29,823	27,810	93.25%	24,609	25,324	102.91%	24,932	22,930	91.97%
Social Sciences	33,723	29,563	87.66%	31,112	27,747	89.18%	28,723	26,342	91.71%	26,949	23,519	87.27%
Commerce/Business	34,559	28,526	82.54%	34,121	28,982	84.94%	31,704	29,555	93.22%	32,450	28,157	86.77%
Agricultural/Bio Sciences	29,727	25,878	87.05%	29,119	26,768	91.93%	25,408	25,439	100.12%	27,259	21,777	79.89%
Engineering/Applied Sciences	38,203	33,792	88.45%	36,162	33,117	91.58%	36,107	34,524	95.62%	37,292	35,256	94.54%
Health Professions	36,870	35,476	96.22%	48,290	35,451	73.41%	41,104	35,956	87.48%	39,008	34,767	89.13%
Math & Physical Sciences	36,377	34,246	94.14%	34,770	33,037	95.02%	34,360	30,063	87.49%	34,279	30,558	89.14%
Other	27,716	34,111	123.07%	31,501	28,631	90.89%	30,510	30,722	100.69%	27,410	27,099	98.87%
Professional	**53,489**	**38,349**	**71.70%**	**48,381**	**39,563**	**81.77%**	**41,881**	**35,954**	**85.85%**	**38,724**	**34,702**	**89.61%**
Master's (all)	**49,719**	**41,777**	**84.03%**	**47,864**	**41,752**	**87.23%**	**44,936**	**40,956**	**91.14%**	**44,865**	**39,395**	**87.81%**
Education. Rec. Counseling	56,779	47,486	83.63%	53,374	46,639	87.38%	52,741	46,299	87.79%	48,465	44,872	92.59%
Fine Arts	32,314	25,473	78.83%	30,639	30,586	99.83%	23,840	23,909	100.29%	22,773	24,131	105.96%
Humanities	33,542	33,181	98.92%	31,879	34,803	109.17%	31,436	32,187	102.39%	29,256	30,316	103.62%
Social Sciences	43,771	37,803	86.37%	41,582	38,437	92.44%	39,228	38,059	97.02%	37,213	33,350	89.62%
Commerce/Business	52,667	46,014	87.37%	54,920	46,429	84.54%	53,108	46,502	87.56%	55,770	45,875	82.26%
Agricultural/Bio Sciences	38,619	34,787	90.08%	37,234	33,910	91.07%	35,104	32,563	92.76%	36,343	30,270	83.29%
Engineering/Applied Sciences	48,893	40,779	83.40%	45,346	40,187	88.62%	43,220	38,980	90.19%	43,901	38,630	87.99%
Health Professions	64,810	46,717	72.08%	65,642	45,918	69.95%	47,493	42,991	90.52%	52,051	44,882	86.23%
Math & Physical Sciences	44,720	37,769	84.46%	41,841	38,122	91.11%	38,673	36,081	93.30%	42,187	36,486	86.49%
Other	51,050	39,087	76.57%	47,435	39,938	84.20%	40,750	41,063	100.77%	37,797	42,664	112.88%
Ph.D.	**48,641**	**44,843**	**92.19%**	**47,034**	**44,109**	**93.78%**	**47,140**	**46,289**	**98.19%**	**43,504**	**42,864**	**98.53%**

As can also be seen in Table 4.1, the earnings of graduates of college, university undergraduate, and master's programs are broken down according to field of study. Unfortunately, since there was only a small number of respondents in several of the field of study categories for trades, professional, and Ph.D. graduates, the data could not be broken down according to field of study for these groups[95].

At the college level, we see a decline in real earnings for graduates of most fields of study between the 1982 cohort and the 1995 cohort, but the decline is particularly pronounced when one compares the 1986 cohort with the 1995 cohort[96]. Among men, the most pronounced decline was experienced by graduates of mathematics and physical sciences programs, whereas among women the most pronounced decline was experienced by those in the health professions.

At the university undergraduate level we see a similar, yet somewhat more dramatic, picture. There appears to be a clear pattern of decline in real earnings among both men and women in most fields of study[97]. Among male graduates, the largest decline over the four-cohort period was experienced by education and social science graduates[98]. The most noteworthy declines for women come from education, fine arts, humanities, and social sciences graduates. The only field of

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[95] To protect the anonymity of the NGS respondents, Statistics Canada has very rigorous restrictions regarding the disclosure of their data.

[96] Incidentally, the decline in real earnings among college graduates is due mainly to women's earnings going down. Between 1982 and 1995, men's earnings declined from $28,700 to $28,000, whereas women's declined from $24,800 to 20,400.

[97] The obvious exception is male graduates of health profession programs. Male graduates of these programs in the 1995 cohort earned more than their counterparts belonging to the 1982 cohort ($39,008 versus $36,870).

study in which women actually showed an earnings improvement is engineering (median income two years after graduation rose from $33,792 in 1982 to $35,256 in 1995).

At the master's level, again we see a general decline in real earnings in most fields of study. It was experienced by both men and women. Among men, and somewhat surprisingly, the most dramatic decline was experienced by graduates of health profession programs. Another noteworthy finding is the rapid decline in real earnings for male master's graduates of the fine arts programs. Their salaries are particularly low for the 1995 cohort ($22,773). In fact, their earnings are nearly identical to those of fine arts graduates of undergraduate programs[99]. Also, male master's graduates in the field of education and the "other" category also showed substantial declines from 1982 to 1990. The only field of study that showed an earnings improvement for men over the observation period is commerce.

Women, on the other hand, experienced a modest decline in earnings. This held for nearly every field of study. Their earnings decline was persistent, but, for the most part, much less dramatic than the earnings decline experienced by men. The only exception is female graduates of the "other" category. While male master's graduates of this category experienced a rapid decline, female graduates in this category belonging to the 1995 cohort actually earned, on average, $3,000 more than their counterparts in the 1982 cohort.

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[98] Interestingly, for the 1995 cohort, male graduates of university undergraduate social science programs actually earned less than male graduates of college social science programs.

[99] Incidentally, in 1993 males and females (aged 25 to 29) with only a high school diploma earned approximately 23,250 and 16,000, respectively (Guppy and Davies, 1998: 153; see also Crompton,

Table 4.1 also shows the female-to-male earnings ratios for the different postsecondary education categories. The gender earnings ratio is much closer to 100% among graduates of the higher levels of postsecondary education, and this is consistent across all four cohorts. When looking at trades graduates of the 1995 cohort, women earn on average approximately 68 percent of what men earn. The female-to-male earnings ratio is slightly higher at the college level (73 percent), and even higher at the undergraduate level (84 percent). At the master's level, the gender earnings ratio is approximately 88 percent, and it is nearly 90 percent among graduates of professional programs. The gender earnings ratio is highest (99 percent) in the case of those with Ph.D.'s.

Surprisingly, female college graduates of engineering programs have the lowest earnings ratio (65 percent). In contrast, at the university undergraduate level, the gender earnings ratio is highest among graduates of engineering programs. The gender earnings ratio is also high for undergraduates of university humanities programs, as well as undergraduates of the "other" programs. At the master's level, female graduates of fine arts, humanities, and "other" programs actually earn more than their male counterparts. The gender earnings ratio is also generally high among master's graduates of engineering, health, and mathematics and physical science programs.

While these results are very interesting, they are largely descriptive, and, thus, do not help explain why these patterns occur. Moreover, one cannot apply tests of statistical significance (with appropriate controls) and assess the

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1995). Thus, in comparison, the economic returns for graduates of fine arts programs are quite low.

significance of changes that occur over time. The multivariate results relating to earnings, discussed next, are more useful for these purposes.

Section Two: Multiple Regression Results for Earnings

As was discussed at the beginning of this chapter, the first set of models will utilize the NGS data from all four cohorts. By pooling the four different waves of data that correspond to the four different cohorts of graduates, it is possible to identify whether the effect of education on earnings has changed for graduates with various types of postsecondary programs over the four time periods.

The dependent variable for the first series of regression models estimated in this dissertation is the log of real earnings. Since income is a quantitative variable, ordinary least squares regression is used for this analysis[100].

The sociodemographic variables sex, marital status, region, language, mother's education, father's education, and NGS cohort are entered first (Model 1), followed by a second model which also includes an interaction between cohort and sex (Model 2). The interaction term is used to determine whether gender differences in earnings have changed over time, while controlling for the other variables in the model. The next model (Model 3) adds the education-related variables, level of education and field of study, and Model 4 includes the interactions between the NGS cohort and each of the education-related variables.

[100] Each series of regression models is entered in stages. The sociodemographic variables sex, marital status, region, language, mother's education, father's education, and NGS cohort are entered first. For the analyses that include all four NGS cohorts, a second model is also estimated, adding an interaction between sex and NGS cohort. Since identifying the relationships between the sociodemographic variables and labour market outcomes is not an integral part of this dissertation, the parameter estimates for these variables for all of models estimated for this dissertation are reserved for the appendices.

Model 5 includes the occupation variables, and, lastly, Model 6 adds the fit variables. The model statistics and parameter estimates for models 3 through 6 are provided in Table 4.2. The results for models 1 and 2 are provided and discussed in Appendix A.

When the education variables field of study and level of schooling are included with the sociodemographic variables in Model 3, the R^2 is nearly .26, almost twice as large as the previous model[101]. Thus, the two education variables alone explain nearly as much of the variation in earnings as do the sociodemographic variables (see Model 2 in Appendix A). All of the sociodemographic variables remained statistically significant ($p < .001$), and the individual parameter estimates, for the most part, did not change[102]. Somewhat surprisingly, the parameters for the interaction between NGS cohort and gender did not change dramatically when the education variables were added to the model. Thus, any gender differences in earnings that exist across the four cohorts are not explained away by gender differences in level of schooling or field of study.

Both education variables are statistically significant ($p < .001$). The parameter estimates for the field of study variable suggest that fields of study can be ranked according to earnings. Graduates of the health professions generally earn the most, followed by graduates of 2) engineering, technical and applied sciences, 3) mathematics, 4) commerce, 5) education, 6) social sciences, 7) other

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[101] The R^2 for model 2 is .135.

[102] After including the education variables, graduates in the previously married category now make slightly more than graduates who are single (See Appendix A).

Table 4.2
Ordinary Least Squares Regression: Real Earnings

	Model 3			Model 4			Model 5			Model 6		
	b	Std E	p	b	Std E	p	b	Std E	p	b	Std E	p
Field of Study			***			***			***			***
Education	0.01	0.003		0.01	0.005		0.01	0.004		0.00	0.004	
Fine Arts	-0.07	0.004		-0.06	0.007		-0.05	0.007		-0.04	0.007	
Humanities	-0.05	0.003		-0.06	0.006		-0.05	0.006		-0.03	0.006	
Commerce	0.04	0.002		0.06	0.004		0.03	0.004		0.02	0.004	
Agricultural/Bio Sci	-0.02	0.003		0.00	0.006		-0.03	0.006		-0.04	0.006	
Engineering/Ap Science	0.09	0.003		0.14	0.005		0.07	0.004		0.06	0.004	
Health Professions	0.12	0.003		0.09	0.005		0.05	0.005		0.03	0.005	
Math	0.07	0.004		0.09	0.008		0.04	0.007		0.02	0.007	
Other	-0.01	0.005		-0.04	0.011		-0.03	0.010		-0.03	0.010	
Social Sciences	---	---		---	---		---	---		---	---	
Level of Schooling			***			***			***			***
Trades	-0.18	0.002		-0.18	0.004		-0.14	0.004		-0.14	0.004	
College	-0.09	0.002		-0.11	0.003		-0.08	0.003		-0.08	0.003	
Professional	0.07	0.004		0.03	0.008		0.00	0.007		-0.02	0.007	
Master's	0.11	0.003		0.11	0.005		0.09	0.005		0.09	0.005	
Ph.D.	0.10	0.008		0.09	0.013		0.06	0.012		0.05	0.012	
University Undergrad	---	---		---	---		---	---		---	---	
NGS*Field of Study						***			***			***
NGS 82*FOS Education				0.02	0.008		0.02	0.007		0.01	0.007	
NGS 82*FOS Arts	R-square .2560			-0.02	0.011		-0.01	0.010		-0.02	0.011	
NGS 82*FOS Human	Adj R-square .2554			0.00	0.010		0.01	0.009		0.00	0.009	
NGS 82*FOS Commer	n=88941			-0.04	0.007		-0.01	0.006		-0.02	0.006	
NGS 82*FOS Agricult				-0.01	0.010		0.01	0.009		0.00	0.009	
NGS 82*FOS Engin				-0.06	0.008		-0.04	0.007		-0.03	0.007	
NGS 82*FOS Health				0.04	0.008		0.03	0.008		0.01	0.008	
NGS 82*FOS Math				-0.02	0.012		0.01	0.011		0.01	0.011	
NGS 82*FOS Other				0.02	0.019		0.02	0.018		0.01	0.017	
NGS 86*FOS Education				-0.01	0.007		-0.02	0.007		-0.01	0.007	
NGS 86*FOS Arts				0.00	0.010		0.00	0.010		0.00	0.010	
NGS 86*FOS Human				0.01	0.009		0.02	0.008		0.01	0.008	
NGS 86*FOS Commer				-0.03	0.007		-0.02	0.006		-0.01	0.006	
NGS 86*FOS Agricult				-0.02	0.009		-0.01	0.009		0.00	0.008	
NGS 86*FOS Engin				-0.06	0.007		-0.04	0.007		-0.04	0.006	
NGS 86*FOS Health				0.03	0.008		0.02	0.007		0.03	0.007	
NGS 86*FOS Math				-0.04	0.010		-0.02	0.010		-0.01	0.009	
NGS 86*FOS Other				0.03	0.013		0.02	0.012		0.01	0.012	
NGS 90*FOS Education				0.01	0.007		0.00	0.006		0.01	0.006	
NGS 90*FOS Arts				-0.05	0.011		-0.02	0.010		-0.01	0.010	
NGS 90*FOS Human				-0.01	0.009		0.01	0.008		0.00	0.008	
NGS 90*FOS Commer				-0.02	0.006		-0.01	0.006		0.00	0.006	
NGS 90*FOS Agricult				-0.03	0.010		-0.02	0.009		-0.02	0.009	
NGS 90*FOS Engin				-0.04	0.007		-0.03	0.006		-0.02	0.006	
NGS 90*FOS Health				0.04	0.007		0.04	0.007		0.05	0.007	
NGS 90*FOS Math				-0.03	0.011		-0.02	0.010		-0.01	0.010	
NGS 90*FOS Other				0.02	0.016		0.03	0.014		0.03	0.014	

Table 4.2 Continued

	Model 4			Model 5			Model 6		
	b	Std E	p	b	Std E	p	b	Std E	p
NGS*Level			***			***			***
NGS 82*Trades	-0.02	0.006		-0.01	0.005		-0.01	0.005	
NGS 82*College	0.01	0.005		0.01	0.005		0.00	0.005	
NGS 82*Professional	0.06	0.013		0.07	0.011		0.05	0.012	
NGS 82*Master's	0.01	0.008		0.02	0.008		0.02	0.007	
NGS 82*Ph.D.	0.01	0.023		0.02	0.021		0.02	0.021	
NGS 86*Trades	0.00	0.006		0.00	0.005		-0.01	0.005	
NGS 86*College	0.02	0.005		0.01	0.004		0.01	0.004	
NGS 86*Professional	0.06	0.011		0.07	0.010		0.08	0.010	
NGS 86*Master's	-0.01	0.008		0.00	0.007		0.00	0.007	
NGS*Level Cont									
NGS 86*Ph.D.	0.00	0.021		0.02	0.019		0.02	0.019	
NGS 90*Trades	0.00	0.006		0.01	0.005		0.00	0.005	
NGS 90*College	0.03	0.005		0.02	0.004		0.02	0.004	
NGS 90*Professional	0.05	0.011		0.06	0.010		0.07	0.010	
NGS 90*Master's	0.00	0.008		0.01	0.007		0.01	0.007	
NGS 90*Ph.D.	0.03	0.019		0.04	0.017		0.04	0.017	
Occupation Type						***			***
Manager, admin				0.02	0.003		0.04	0.003	
Natural Sci, Engineering	R-square .2611			0.04	0.004		0.04	0.004	
Religion	Adj R-square .2501			-0.15	0.012		-0.17	0.011	
Teaching & Related	n=88941			0.02	0.003		0.02	0.003	
Medicine & Health				0.05	0.004		0.05	0.004	
Art, Literary, Recreation				-0.01	0.005		-0.01	0.005	
Clerical & Related				-0.05	0.003		-0.02	0.003	
Sales				-0.03	0.004		0.00	0.004	
Service				-0.06	0.004		-0.03	0.004	
Manual Labour				0.00	0.004		0.03	0.004	
Social Science Occup				---	---		---	---	
Occupational status						***			***
Part-time				-0.28	0.002		-0.27	0.002	
Full-time				---	---		---	---	
Overeducation									***
More education				R-square .4109			-0.04	0.001	
Less education				Adj R-square .4100			0.01	0.003	
Indeterminable				n=85707			-0.02	0.003	
Same education							---	---	
Related									***
Closely related							0.07	0.002	
Somewhat related							0.06	0.002	
Not at all related							---	---	
							R-square .4382		
							Adj R-square .4373		
							n=82797		

*** = p < .001
** = p < .01
* = p < .05

Models 1 and 2 are provided in Appendix A
Parameter estimates for the sociodemographic variables are also provided in Appendix A

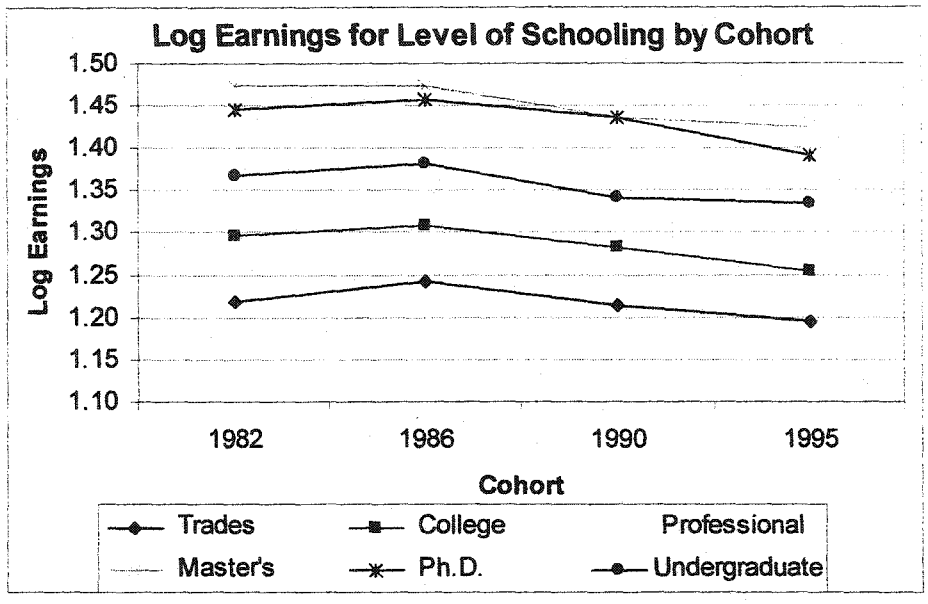
fields of study, 8) agricultural and biological sciences, 9) humanities, and, lastly, graduates of 10) fine arts programs.

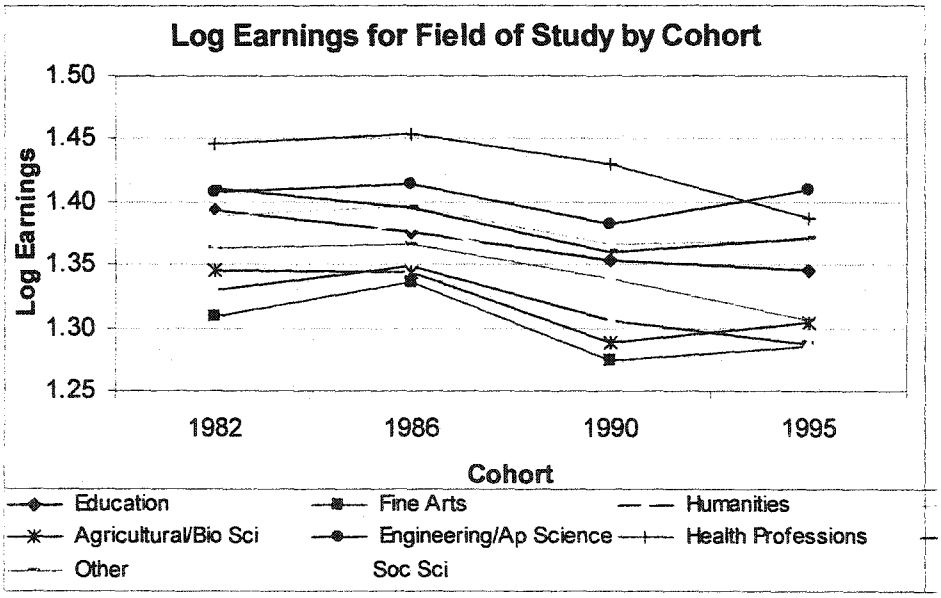
The parameter estimates for level of schooling also suggest a hierarchical pattern. Master's graduates are at the top of the earnings distribution, next come Ph.D. graduates, followed by graduates with professional degrees. University undergraduates, the reference category, are next, above college graduates. Technical and trades graduates are at the bottom of the earnings distribution for all postsecondary graduates.

When adding the interaction terms between NGS cohort and each of the education variables, we get a clearer picture of how postsecondary education is related to earnings over time. The top graph in Figure 4.1 shows the real earnings of graduates of the various levels of postsecondary schooling.

Graduates of each level of schooling experienced an increase in real earnings when the 1982 cohort was compared with the 1986 cohort. It appears that trades graduates experienced the most significant rise, whereas graduates of master's programs did not experience much of an increase at all. Conversely, the real earnings for every level of schooling fell considerably from the 1986 cohort to the 1990 cohort, and then again from the 1990 cohort to the 1995 cohort.

Figure 4.1


Log Earnings for Level of Schooling by Cohort
Log Earnings
1.50
1.45
1.40
1.35
1.30
1.25
1.20
1.15
1.10
1982
1986
1990
1995
Cohort
Trades
College
Professional
Master's
Ph.D.
Undergraduate


Log Earnings for Field of Study by Cohort
Log Earnings
1.50
1.45
1.40
1.35
1.30
1.25
1982
1986
1990
1995
Cohort
Education
Fine Arts
Humanities
Agricultural/Bio Sci
Engineering/Ap Science
Health Professions
Other
Soc Sci

Most surprisingly, professional graduates experienced the most dramatic decline in real earnings when the 1986 and 1990 cohorts are compared, and also when the 1990 and 1995 cohorts are compared. In fact, by the time the 1995 cohort was surveyed in 1997, they earned roughly as much as graduates of undergraduate programs. Graduates of university undergraduate programs experienced the smallest decline in real earnings between the last two cohorts.

When one controls for the sociodemographic variables, along with the field of study variable, there does not appear to be any clear evidence that college and trades graduates have narrowed the earnings gap when compared with graduates of university programs, as might have been suggested by the earnings figures provided in Table 4.1. In fact, the regression results practically contradict the data presented in Table 4.1. Trades, and then college, graduates are clearly at the bottom of the earnings hierarchy for each of the four cohorts. In fact, the gap between them and university undergraduates, appears to have widened, particularly when one considers the graduates who belong to the 1995 cohort.

As can be seen in the bottom graph in Figure 4.1, the real earnings of graduates of all fields, except mathematics, education, and agricultural and biological sciences, increased from 1982 to 1986, while the earnings of graduates of all fields of study declined from 1986 to 1990. Interestingly, 1995 graduates of the fine arts, agricultural and biological sciences, mathematics, and engineering programs all experienced higher earnings relative to the preceding cohort, whereas all other graduates earned less in real terms than their counterparts from the 1990 cohort.

Also in this graph, we can see that the earnings of education graduates have declined consistently over the four-cohort period, a pattern that might have been predicted given the limited opportunities to secure permanent employment in teaching when new hiring was restricted and few teachers were retiring. As well, graduates of health professions programs were at the top of the earnings distribution for the first three cohorts. However, they were surpassed by graduates of engineering programs in the 1995 cohort, and graduates of health professions programs experienced continuing cohorts of earnings decline. Lastly, fine arts, humanities, and agricultural and biological science graduates have consistently been at the bottom of the earnings distribution, whereas social science graduates and graduates of education programs have generally been in the middle.

When comparing the fields of study, there does not appear to be solid evidence that the new economy is favouring one form of credential, at least for the period studied here. Moreover, it is not at all clear that the economy has increasingly favoured graduates with technical and applied skills. While engineering graduates were able to increase their earnings relative to the other fields of study, graduates of health programs have lost much of their earlier earnings advantages over the other fields, perhaps because the "mix" of graduates increasingly included large numbers of nurses as nursing programs were moved from colleges and transformed into university degree programs.

Figure 4.2 shows the patterns for level of schooling over the four cohorts, separately for men (top) and women (bottom)[103] [104]. When one compares the two graphs it is apparent that, despite the statistically significant interaction, the two graphs look quite similar. One subtle, yet noteworthy, difference is that there appears to be a more pronounced decline in real earnings among male graduates of all levels of postsecondary education from the 1986 to the 1990 cohort[105]. The reverse pattern seems to occur when comparing the earnings of female graduates of the 1990 cohort with graduates of the 1995 cohort. During this period it appears that women, with all levels of postsecondary schooling, show a more rapid decline in earnings than do men.

Gender comparisons for field of study can be obtained by comparing the graphs in Figure 4.3. Although the graphs are somewhat more difficult to interpret, they appear to suggest that there is a much more uniform relationship between field of study and earnings over the survey period than was suggested by the descriptive results presented in section one. For both men and women, the relative earnings power of a health professional degree, while controlling for level of schooling, has declined considerably over the survey period. By the time the 1995 cohort was interviewed in 1997, the earnings of male engineering graduates had surpassed the earnings of male graduates of the health professions programs.

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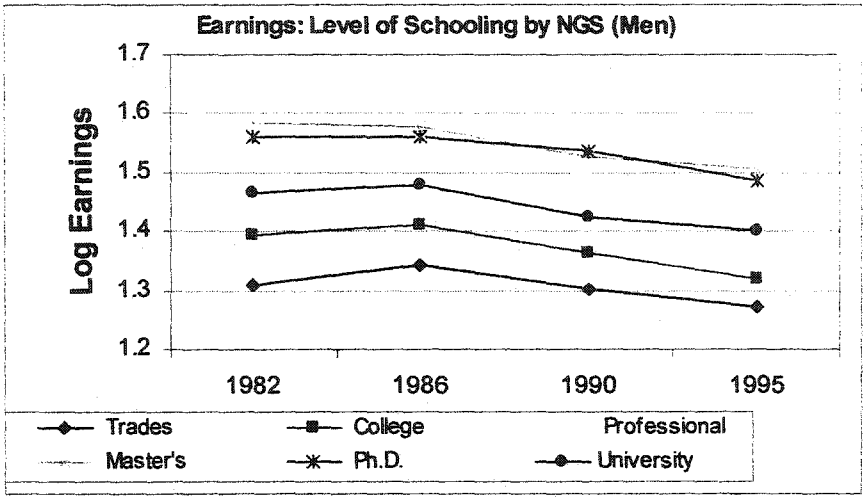
[103] The ideal comparison would be to include all of the plotted coefficients on one graph. Unfortunately, however, due to the sheer number of interaction coefficients, one graph would be very cluttered, and, therefore, difficult to interpret.

[104] The F test for all five interaction terms combined is statistically significant ($p < .001$). The parameter estimates for this model can be found in Appendix B.

[105] In fact, the real earnings of women with Ph.D.'s actually increased from 1986 to 1990.

Figure 4.2


Earnings: Level of Schooling by NGS (Men)
Log Earnings
1.7
1.6
1.5
1.4
1.3
1.2
1982
1986
1990
1995
Trades
College
Professional
Master's
Ph.D.
University

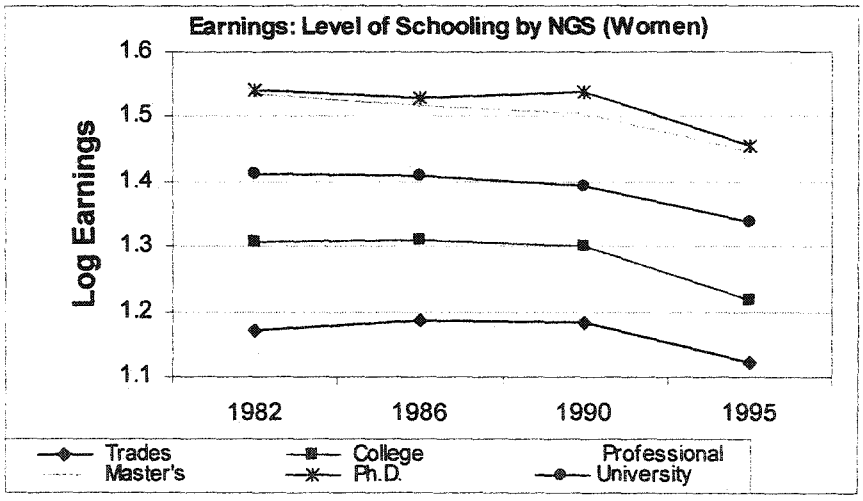
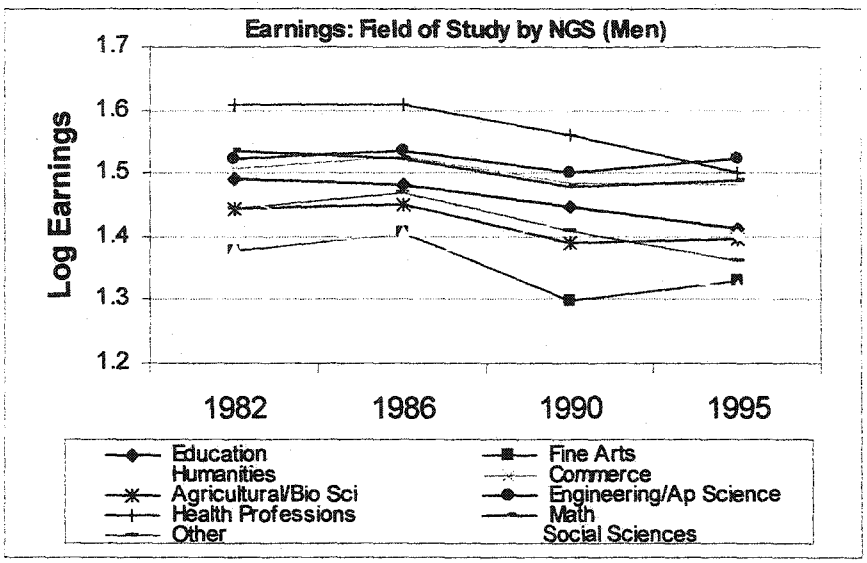
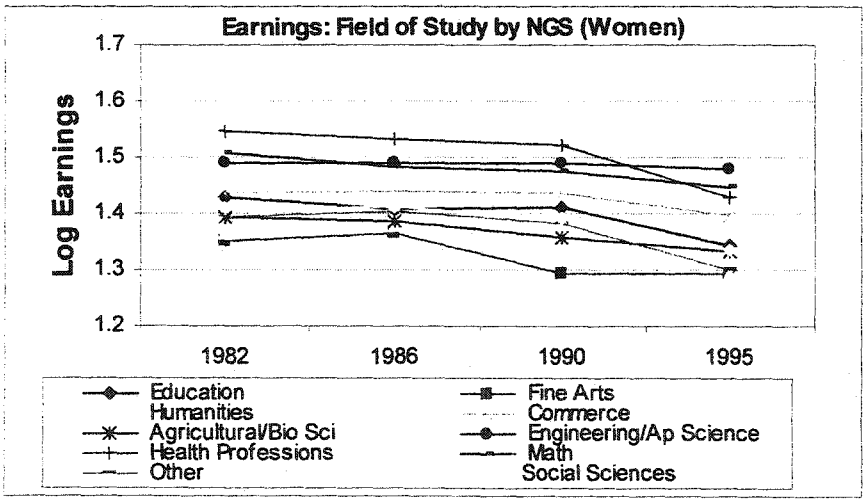

Earnings: Level of Schooling by NGS (Women)
Log Earnings
1.6
1.5
1.4
1.3
1.2
1.1
1982
1986
1990
1995
Trades
College
Professional
Master's
Ph.D.
University

Figure 4.3


Earnings: Field of Study by NGS (Men)
Log Earnings
1.7
1.6
1.5
1.4
1.3
1.2
1982
1986
1990
1995
Education
Humanities
Agricultural/Bio Sci
Health Professions
Other
Fine Arts
Commerce
Engineering/Ap Science
Math
Social Sciences


Earnings: Field of Study by NGS (Women)
Log Earnings
1.7
1.6
1.5
1.4
1.3
1.2
1982
1986
1990
1995
Education
Humanities
Agricultural/Bio Sci
Health Professions
Other
Fine Arts
Commerce
Engineering/Ap Science
Math
Social Sciences

For women, the earnings of graduates of health professional programs have been surpassed by both engineering and mathematics graduates. Interestingly, male graduates of education, biological sciences, and social sciences programs have generally been in the middle of the earnings distribution[106], whereas female graduates of these fields are near to the bottom of the earnings distribution, closer to graduates of the fine arts and humanities programs.

The occupation variables are added in Model 5, and both are statistically significant ($p < .001$). Not surprisingly, postsecondary graduates who work full time earn more money than do graduates who work only part time ($p < .001$). Among the different occupational categories, graduates who enter medicine and health occupations earn more than graduates who enter any other area. They are followed by graduates employed in natural science and engineering occupations, who, in turn, are followed by graduates in teaching and related occupations. Managers are next, followed by graduates in social science and related occupations, who represent the reference category. Below them are manual labourers, workers in arts, literacy, and recreation areas, sales workers, clerical workers, and service workers. Graduates employed in religious occupations are at the bottom of the earnings distribution. They make less than graduates working in any other occupational category.

After adding the occupation variables, the R^2 statistic increased dramatically from .26 to .41, highlighting the major effect that occupational sector has on earnings. Most of the other parameter estimates did not change

[106] One striking exception is male social science graduates of the 1986 cohort. Their earnings were the lowest of all male graduates of that cohort.

dramatically once the occupation variables were included, although it was now apparent that agricultural and biological science graduates earn significantly less than social science graduates. In addition, respondents who were previously married now earn more than respondents who were single at the time of survey (see Appendix A). Nonetheless, F test for most of the variables themselves remain statistically significant at their previous levels. The only variable that was no longer statistically significant is presence of children. This suggests that the effect of children on earnings may manifest itself largely through occupational choices or restrictions (e.g., part-time work).

Model 6 includes the fit-related variables that explore whether graduates have more education than is required for their current jobs (over-education) and whether the respondents feel that their education is related to their schooling. The results from this model make it possible to determine whether the effect of gender on income is partially explained by the fact that men and women differ in the extent to which they find themselves in jobs that are perceived to be more or less related to their schooling.

Both variables are statistically significant ($p < .001$). Overqualified graduates, that is graduates with more education than required for their jobs, earn less than graduates with education levels that meet the expectations of their employers[107].

[107] To avoid losing a substantial number of cases (approximately 5,000), graduates for whom it was not possible to determine whether they had more or less education than was required by their employers were included as a separate category. These graduates earn less than graduates who have educational credentials that meet the educational requirements of their jobs ($p < .001$).

As one would expect, those who feel that their jobs are closely related to their schooling earn more than graduates who feel that their jobs are either somewhat related or completely unrelated to their schooling. The latter constitute the reference category. The significance levels of the other variables in the model are not affected by the addition of the two fit variables, and the parameter estimates for most of the other variables did not appear to be substantially affected either[108]. After adding the education-job fit-related variables to the model, the R^2 statistic increased slightly from .41 to nearly .44.

As mentioned above, the latter two variables are added to the model to see if they reduce the effects of gender and field of study on earnings. However, once added, the significance levels of gender and field of study, and their interaction terms did not change. The parameter estimates for these variables did not change much either.

Section Three: Employment Status

The next series of models in this chapter are estimated using employment status as the dependent variable. The three employment status categories for this variable are: employed full time, employed part time, and unemployed[109]. Since there is a small number of unordered categories the method of analysis is multinomial logistic regression. Once again, the regression models are entered in a series of stages. Model 1 includes the parameter estimates for the

[108] However, the earnings of professional university graduates did fall below the earnings of university undergraduates after the education-job-fit related variables were included. This might suggest that part of the value of a professional degree lies in its ability to help graduates obtain jobs related to their schooling.

[109] Respondents employed full time represent the reference group for the multinomial logistic regressions.

sociodemographic variables sex, age, marital status, region, language of interview, number of children, mother's education, father's education, and NGS graduation cohort (1982, 1986, 1990, and 1995). An interaction between sex and NGS cohort is included in Model 2. Once again, only the coefficients for sex and the interaction between sex and NGS cohort are provided below[110]. Model 3 adds the education variables, and Model 4 includes the interaction terms between NGS cohort and the education variables. The results for models 3 and 4 are provided and they are discussed below.

When including the education-related variables with the sociodemographic variables in Model 3, the pseudo R^2 is .073. The coefficients for both level of schooling and field of study are statistically significant ($p < .001$)[111]. The statistical significance of all of the other variables remained the same for Model 3 as they were in Model 2 (See Appendix B).

Model 4 includes the interactions between the NGS cohort and the education variables. The pseudo R^2 for this model is 0.0775. Both interactions are statistically significant ($p < .001$), suggesting that the effect of education, determined by field of study and by level of schooling, is different for each cohort. To better interpret the relationship between education and subsequent

[110] The entire set of coefficients for these models can be found in Appendix B.

[111] Since the interaction term between each education variable in Model 4 is statistically significant, the parameter estimates for the education variables from Model 3 are not interpreted.

Table 4.3 Employment
Multinomial Logistic Regression

	Model 3						Model 4					
	Part-time			Unemployed			Part-time			Unemployed		
	b	Std E	p	b	Std E	p	b	Std E	p	b	Std E	p
Field of Study						***						***
Education	—	—		—	—		0.45	0.099		-0.42	0.098	
Fine Arts	0.03	0.049		0.65	0.057		0.30	0.126		0.03	0.109	
Humanities	-0.05	0.046		0.72	0.052		0.26	0.123		0.14	0.106	
Commerce	-1.09	0.038		0.05	0.044		-0.44	0.103		-0.50	0.085	
Agricultural/Bio Sci	-0.66	0.054		0.39	0.054		-0.12	0.131		-0.02	0.102	
Engineering/Ap Science	-1.46	0.049		0.18	0.047		-0.53	0.114		-0.19	0.088	
Health Professions	-0.03	0.036		-0.59	0.059		0.25	0.106		-1.22	0.117	
Math	-1.22	0.087		0.07	0.071		-0.56	0.229		-0.26	0.161	
Other	0.06	0.067		0.73	0.072		0.54	0.205		0.07	0.190	
Social Sciences	-0.34	0.037		0.51	0.045		—	—		—	—	
Level of Schooling						***						***
Trades	0.63	0.034		0.83	0.032		0.76	0.074		1.22	0.063	
College	0.20	0.030		0.15	0.031		0.18	0.070		0.35	0.065	
Professional	-0.72	0.075		-0.14	0.075		-1.46	0.296		0.02	0.163	
Master's	-0.30	0.050		-0.43	0.054		-0.48	0.130		-0.25	0.113	
Ph.D.	-0.66	0.161		-0.58	0.154		-0.53	0.428		-0.44	0.371	
Undergraduate	—	—		—	—		—	—		—	—	
Field of Study*NGS												***
NGS 86*FOS Education							0.02	0.135		-0.35	0.142	
NGS 86*FOS Arts	n = 107948						0.16	0.171		-0.05	0.153	
NGS 86*FOS Human	LR (146) = 10418.84						0.04	0.166		0.05	0.141	
NGS 86*FOS Commer	p > chi2 = 0.0000						-0.37	0.143		-0.27	0.116	
NGS 86*FOS Agricult	Pseudo R2 = 0.0730						-0.09	0.183		-0.21	0.142	
NGS 86*FOS Engin	Ll = -66160.184						-0.59	0.170		-0.30	0.120	
NGS 86*FOS Health							0.21	0.140		-0.04	0.166	
NGS 86*FOS Math							-0.46	0.303		-0.32	0.200	
NGS 86*FOS Other							0.01	0.237		-0.01	0.218	
NGS 90*FOS Education							-0.19	0.121		0.16	0.128	
NGS 90*FOS Arts							0.44	0.157		0.43	0.153	
NGS 90*FOS Human							0.25	0.149		0.10	0.141	
NGS 90*FOS Commer							-0.32	0.126		0.21	0.111	
NGS 90*FOS Agricult							-0.12	0.164		-0.12	0.143	
NGS 90*FOS Engin							-0.63	0.147		0.06	0.117	
NGS 90*FOS Health							0.16	0.127		-0.11	0.167	
NGS 90*FOS Math							-0.22	0.275		-0.11	0.207	
NGS 90*FOS Other							-0.29	0.249		0.19	0.240	
NGS 95*FOS Education							-0.17	0.115		-0.30	0.128	
NGS 95*FOS Arts							-0.16	0.152		0.04	0.144	
NGS 95*FOS Human							-0.15	0.146		0.08	0.135	
NGS 95*FOS Commer							-0.43	0.121		0.09	0.106	
NGS 95*FOS Agricult							-0.42	0.164		-0.17	0.138	
NGS 95*FOS Engin							-1.06	0.145		-0.40	0.114	
NGS 95*FOS Health							-0.05	0.123		0.42	0.148	
NGS 95*FOS Math							-0.48	0.275		-0.31	0.207	
NGS 95*FOS Other							-0.24	0.243		0.20	0.240	

Table 4.3 Employment Continued
Multinomial Logistic Regression

	Part-time			Model 4 Unemployed		
	b	**Std E**	**p**	**b**	**Std E**	**p**
Level*NGS						***
NGS 86*Trades	0.01	0.102		-0.49	0.087	
NGS 86*College	-0.18	0.092		-0.35	0.086	
NGS 86*Professional	-0.07	0.401		-1.10	0.278	
NGS 86*Master's	0.19	0.174		-0.35	0.164	
NGS 86*Ph.D.	0.19	0.566		-0.44	0.535	
NGS 90*Trades	-0.01	0.093		-0.44	0.085	
NGS 90*College	0.11	0.085		-0.27	0.085	
NGS 90*Professional	0.96	0.319		-0.56	0.232	
NGS 90*Master's	0.22	0.156		-0.21	0.150	
NGS 90*Ph.D.	-0.29	0.513		-0.58	0.492	
NGS 95*Trades	-0.47	0.092		-0.66	0.083	
NGS 95*College	0.06	0.082		-0.13	0.082	
NGS 95*Professional	0.99	0.317		0.48	0.199	
NGS 95*Master's	0.23	0.152		-0.17	0.149	
NGS 95*Ph.D.	-0.19	0.505		0.25	0.436	

*=p<.05
**=p<.01
***=p<.001

n = 107948
LR (230) = 11061.51
p > chi2 = 0.0000
Pseudo R2 = 0.0775
Ll =-65838.851

Models 1 and 2 are provided in Appendix B
Parameter estimates for the sociodemographic variables are also provided in Appendix B
Note: For model 4, social sciences represent the reference category for the field of study variable

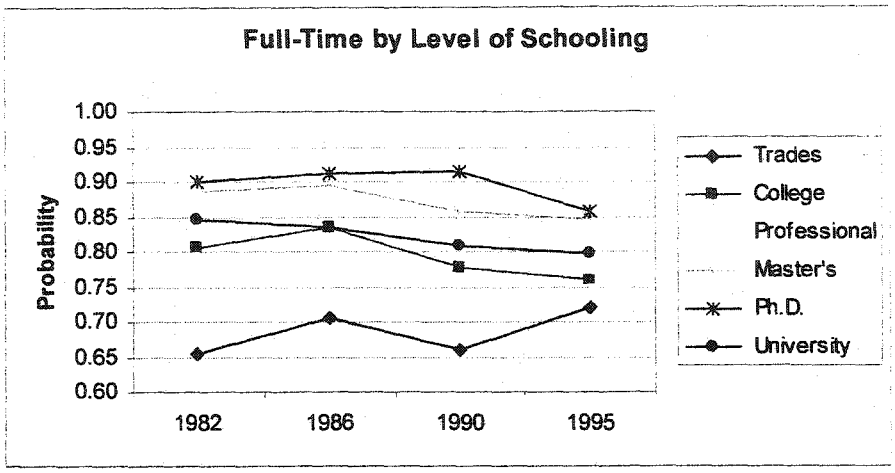
employment, the parameter estimates for these coefficients are converted into predicted probabilities and are plotted in Figure 4.4[112].

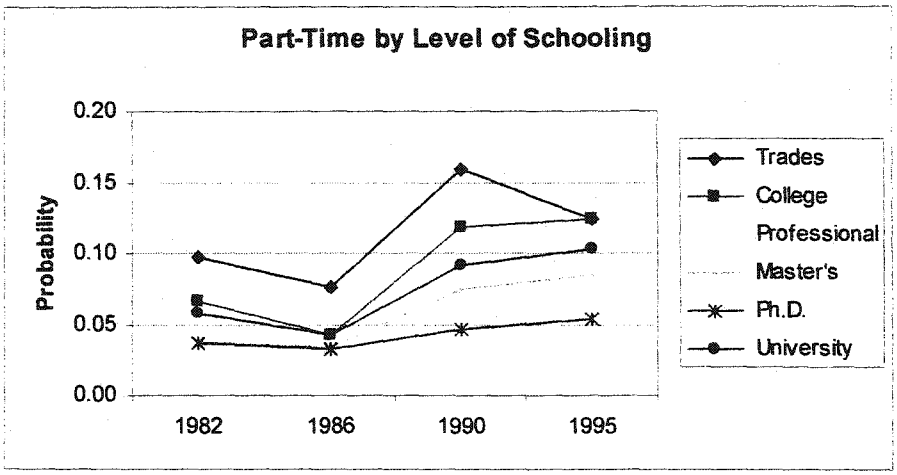
As can be seen in the first graph of Figure 4.4, graduates of university undergraduate programs have a higher probability of being employed full time than do graduates of college programs[113], who, in turn, have a greater probability of being employed full time than do graduates of trades programs. The likelihood of being employed full time for university undergraduates declined steadily over the four cohorts, from .85 in 1982, to .80 in 1995. For college graduates it increased from .81 for the 1982 cohort to .83 for the 1986 cohort, and then fell to .78 for graduates of the 1990 cohort, and then declined again to .76 for the 1995 cohort. For trades graduates, the probability of being employed full time has been much more variable over the four cohort period. Their probabilities were .65 for the 1982 cohort, .70 for the 1986 cohort, a surprising .66 for the 1990 cohort, and .72 for the 1995 cohort.

[112] The predicted probabilities are calculated holding the other variables at their means.

[113] Except for the 1986 cohort, where their respective probabilities of being employed full time are the same.

Figure 4.4


Full-Time by Level of Schooling
Probability
1.00
0.95
0.90
0.85
0.80
0.75
0.70
0.65
0.60
1982
1986
1990
1995
Trades
College
Professional
Master's
Ph.D.
University


Part-Time by Level of Schooling
Probability
0.20
0.15
0.10
0.05
0.00
1982
1986
1990
1995
Trades
College
Professional
Master's
Ph.D.
University

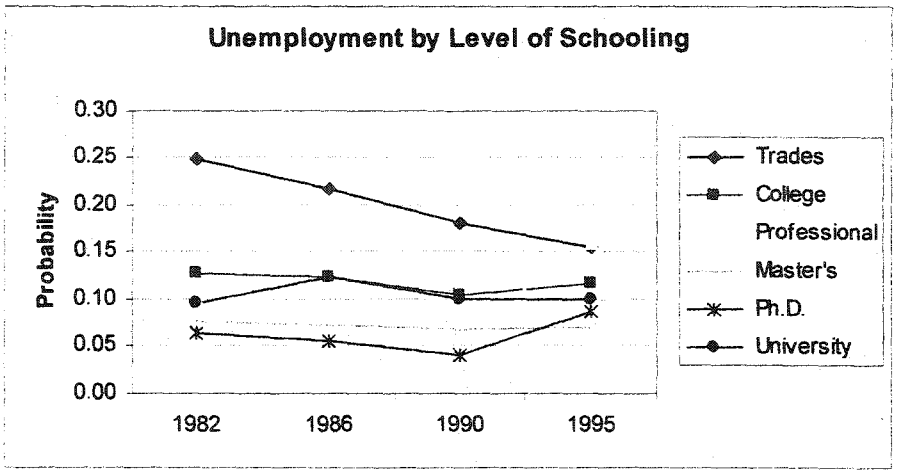
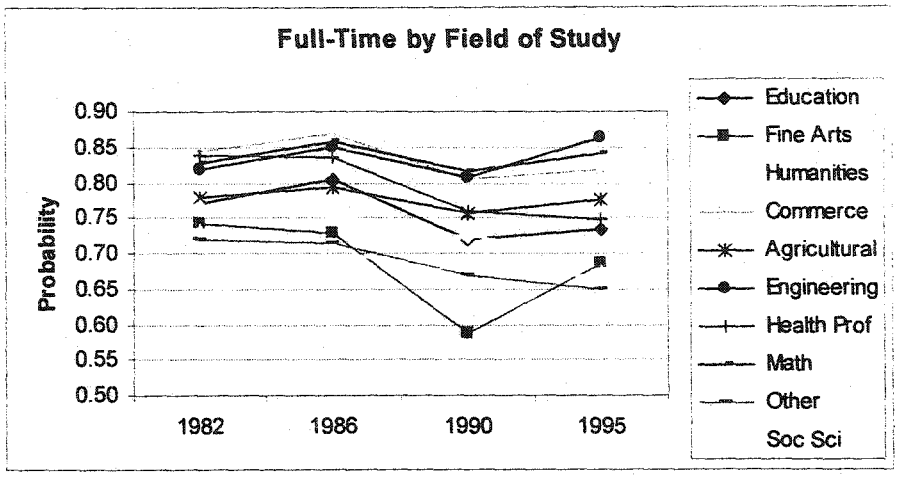
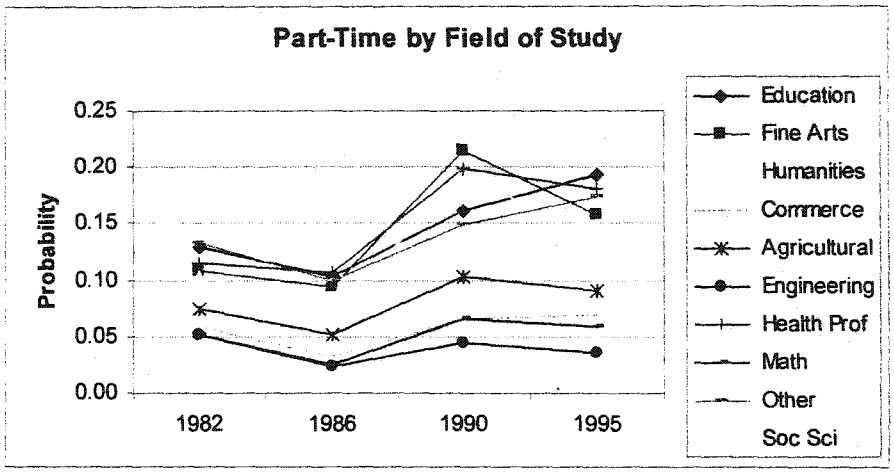
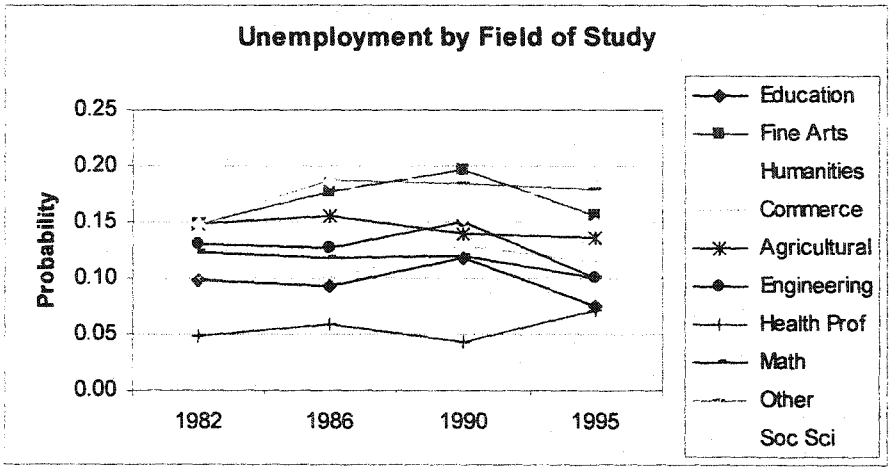

Unemployment by Level of Schooling
Probability
0.30
0.25
0.20
0.15
0.10
0.05
0.00
1982
1986
1990
1995
Trades
College
Professional
Master's
Ph.D.
University

Figure 4.4 Continued







Graduates of professional, Ph.D., and master's programs generally have the highest probability of being employed on a full-time basis. For each of these levels of postsecondary schooling, the probability of being employed full time generally fluctuates between .85 and .95 [114]. Ph.D. graduates have the highest probability of being employed on a full-time basis for every cohort, except for the 1986 cohort, where graduates of professional programs had the highest probability of being employed full time.

For every single cohort, trades graduates have the highest likelihood of being employed part time[115]. College graduates are the second most likely to find themselves employed part time, except for the 1986 cohort, where their probability of being employed part time was roughly the same as for university undergraduates (.04). For every other cohort, university undergraduates have a lower probability of being employed part time. Professional, master's, and Ph.D. graduates generally enjoy the lowest likelihood of being employed part time; professional graduates of the 1982 and 1986 cohorts are the least likely to be employed part time, while Ph.D. graduates belonging to the 1990 and 1995 cohorts are the least likely to be employed part time.

---

[114] An interesting exception is professional graduates of the 1995 cohort Their probability of being employed full-time in 1997 is surprisingly low, .78. For this cohort, graduates of professional programs had a predicted probability of being employed full time that was slightly lower than that of university undergraduates (.80).

[115] Although, the probability of being employed part time is nearly identical for college and trades graduates of the 1995 cohort (.1245) for trades and (.1241) for college.

In all cohorts except for the 1995 cohort, trades graduates have the highest probability of being unemployed[116]. However, the chances of being unemployed declined steadily for graduates of each successive cohort.

For each cohort, college graduates are slightly more likely to be unemployed than are university undergraduates. One exception is the 1986 cohort, where their predicted probabilities of being unemployed are nearly identical, .123 for college and .124 for university undergraduates.

Ph.D. graduates belonging to both the 1982 and the 1990 cohorts have the lowest probability of being unemployed (.056) and (.041), respectively. Professional graduates from the 1986 cohort had the lowest probability of being unemployed (.049), while master's graduates from the 1995 cohort had the lowest probability of being unemployed (.069).

Looking at the graphs that show field of study, it is apparent that the probability of being employed full time, while holding the other variables in the model constant, is higher for graduates of the 1982 cohort than for graduates of the 1986 cohort, and lower for those of the 1990 cohort than for those of the 1986 cohort. As well, there appears to be a greater variability in the predicted probabilities of being employed full time when comparing graduates of different fields of study from the 1990 and 1995 cohorts than from the 1982 and 1986 cohorts.

As one would expect, graduates of the fine arts, humanities, and the "other" programs are least likely to be employed full time, although their

[116] Surprisingly, professional graduates belonging to the 1995 cohort had a probability of being unemployed (.159) that was about the same as trades graduates (.156).

particular relative positions at the bottom fluctuate somewhat from cohort to cohort. The probability of being employed full time is a somewhat higher for both education and social science graduates. However, there is a fairly consistent downward trend over the four cohorts. Graduates of education and the agricultural and biological sciences programs generally have a slightly higher probability of being employed full time than social science graduates and education graduates across the cohorts.

Graduates of engineering, mathematics, and commerce programs generally experience the best full-time employment opportunities. This is consistent over the time period studied. Their probabilities of being employed full time are consistently greater than .80. Health professionals show a similar pattern, but it only holds for members of the 1982 and 1986 cohorts. [117]

Figure 4.4 also shows the predicted probabilities of part-time employment for graduates of different fields of study. It is apparent that the probability of being employed part time, while holding the other variables in the model constant, is higher for graduates who belong to the 1982 cohort than for those who belong to the 1986 cohort, and lower for members of the 1990 cohort than for members of the 1986 cohort. In addition, there appears to be a greater variability in the predicted probabilities of being employed part time when one compares graduates of various fields of study belonging to the 1990 and 1995 cohorts with graduates belonging to the 1982 and 1986 cohorts.

---

[117] The predicted probabilities of being employed full time among graduates of the health professions declined for the 1990 and 1995 cohorts, to .70 and .71, respectively. Change is very little.

We can also see from the graph that graduates of fine arts, humanities, education, and the "other" programs have the greatest likelihood of finding themselves employed part time, for members of all four cohorts. In fact, the likelihood is greater than .10 for these graduates who belong to the 1986 and the 1990 cohorts. Social science graduates have a lower likelihood of being employed part time than graduates of all of the above fields of study. This holds true for every cohort. Graduates of agricultural and biological sciences programs are slightly less likely to be employed part time than social science graduates for each cohort. And for each cohort they are slightly more likely than business graduates to be employed part time. Graduates of engineering, mathematics, and commerce programs are clearly the least likely to find themselves employed part time.

As can be seen in the last graph in Figure 4.4 graduates of the fine arts, humanities, social sciences, and "other" programs have the greatest likelihood of being unemployed. In each cohort, the probability that these graduates would find themselves unemployed is greater than .14[118]. Agricultural and biological sciences graduates have a lower probability of being unemployed than social science graduates. And engineering graduates generally have a lower probability of being unemployed than agricultural and biological sciences graduates (except in the case of the 1990 cohort, when engineering graduates had a slightly higher probability of being unemployed).

[118] These probabilities are quite high in comparison with high school graduates. Between 14% and 15% of high school graduates between the ages of 25 to 29 were found to be unemployed in 1993 (Guppy and Davies, 1998: 153; see also Crompton, 1995).

Commerce graduates generally have a probability of being unemployed that is lower than that of engineering graduates (except in the case of the 1995 cohort). The predicted probability of being unemployed declined steadily for graduates of mathematics programs. By the time the 1990 and 1995 cohorts were interviewed, mathematics graduates had a predicted probability of being unemployed that is slightly lower than that for commerce graduates.

Graduates of education programs generally have the second lowest probability of being unemployed, behind graduates of health programs, who consistently have the lowest probability of being unemployed. The highest probability of being unemployed for graduates of health professions programs is .07, for the 1995 cohort (only slightly below that of education graduates (.08) of the same cohort).

Section Four: "Recycling"

As mentioned earlier, "recycling" refers to the practice of obtaining a second postsecondary credential that is not considered to follow the first credential. The purpose of this section is to determine whether graduates who have "recycled" through the system have earnings outcomes that are different from those of college and university graduates who have not "recycled" through the system.

The "recycling" variable that I derived specifically for this dissertation has six categories: 1) graduates with only a university degree, 2) graduates with only a college diploma, 3) graduates with a college diploma who had previously obtained a different college diploma, 4) graduates with a university undergraduate

degree who had previously obtained a college diploma, 5) graduates with two different undergraduate degrees, and 6) graduates with a college diploma who had previously obtained a university degree. Since this variable is not available for all of the cohorts, the following analysis is based only on graduates belonging to the 1995 cohort[119]. The dependent variable is the log of earnings in 1997 dollars.

Once again, the independent variables are entered into the regression models in a series of stages. The sociodemographic variables are entered first (Model 1), followed by the co-op, "recycling" and field of study variables (Model 2). Model 3 includes the interaction between the "recycling" and field of study variables, and Model 4 incorporates the occupation variables. The parameter estimates and model statistics for the following analysis are provided in Table 4.4. As with the previous analyses, Model 1, which only contains the sociodemographic variables is addressed in Appendix C, along with the coefficients associated with the sociodemographic variables in models 3 and 4.

[119] Since the analysis includes only the 1995 cohort, we are able to add a variable that distinguishes between Native and non-Native Canadians. Furthermore, since the analysis includes only those from university and college programs, a variable that distinguishes between those from co-op and non-co-op programs is also be included.

Table 4.4
Ordinary Least Squares Regression: Recycling

	Model 2			Model 3			Model 4		
	b	Std E	p	b	Std E	p	b	Std E	p
Coop Program			***			***			***
Coop	0.05	0.006		0.05	0.006		0.03	0.006	
No coop	---	---		---	---		---	---	
Field of Study			***			***			***
Fine Arts	-0.02	0.012		-0.14	0.022		-0.11	0.019	
Humanities	-0.04	0.009		-0.06	0.014		-0.07	0.012	
Social Sciences	0.00	0.007		-0.03	0.012		-0.03	0.011	
Commerce	0.08	0.007		0.10	0.013		0.04	0.012	
Agricultural/Bio Sci	0.00	0.011		-0.03	0.015		-0.07	0.014	
Engineering/Ap Science	0.15	0.008		0.15	0.015		0.07	0.014	
Health Professions	0.11	0.009		0.14	0.020		0.06	0.019	
Math	0.10	0.011		0.08	0.016		0.02	0.015	
Other	-0.02	0.016		-0.04	0.025		-0.05	0.022	
Education	---	---		---	---		---	---	
Recycle			***			***			***
College only	-0.11	0.006		-0.12	0.015		-0.11	0.014	
College to college	-0.11	0.010		-0.18	0.034		-0.11	0.029	
Univ after college	0.00	0.008		-0.04	0.015		-0.02	0.013	
Univ to univ	0.06	0.009		0.05	0.015		0.08	0.013	
College after Univ	-0.05	0.013		-0.03	0.038		-0.04	0.034	
University only	---	---		---	---		---	---	
Field of Study*Recycle						***			***
Arts*College				0.15	0.028		0.12	0.025	
Arts*College to college	R-square = 2157			0.23	0.058		0.13	0.049	
Arts*Univ after college	R-square= .2107			0.08	0.046		0.07	0.039	
Arts*Univ to univ	n= 11028			0.15	0.089		0.01	0.078	
Arts*College after univ				0.10	0.066		0.08	0.061	
Humanities*College				0.07	0.030		0.07	0.026	
Humanities*Col to col				0.10	0.075		0.08	0.064	
Humanities*Univ aft c				0.03	0.027		-0.02	0.024	
Humanities*Univ to u				0.06	0.032		0.05	0.028	
Humanities*Col aft u				-0.05	0.059		-0.04	0.052	
Soc Sci*College				0.08	0.019		0.08	0.017	
Soc Sci*Col to col				0.19	0.044		0.10	0.038	
Soc Sci*Univ aft c				0.03	0.020		0.00	0.017	
Soc Sci*Univ to u				0.04	0.023		0.00	0.021	
Soc Sci*Col aft u				-0.06	0.052		-0.02	0.046	
Commerce*College				-0.06	0.018		-0.02	0.016	
Commerce*Col to col				0.03	0.041		-0.01	0.035	
Commerce*Univ aft c				0.01	0.019		0.01	0.017	
Commerce*Univ to u				-0.03	0.027		-0.07	0.024	
Commerce*Col aft u				-0.03	0.045		-0.03	0.040	
Agricultural*College				0.05	0.026		0.08	0.022	
Agricultural*Col to col				0.13	0.054		0.10	0.048	
Agricultural*Univ aft c				0.09	0.039		0.03	0.035	
Agricultural*Univ to u				-0.03	0.047		-0.06	0.040	
Agricultural*Col aft u				-0.03	0.073		-0.01	0.065	
Engineering*College				0.00	0.020		0.02	0.018	
Engineering*Col to col				0.05	0.040		0.00	0.034	
Engineering*Univ aft c				0.03	0.023		-0.02	0.020	
Engineering*Univ to u				-0.03	0.036		-0.04	0.031	

Table 4.4 Continued

	Model 3			Model 4		
	b	Std E	p	b	Std E	p
Field of Study*Recycle Continued						
Engineering*Col aft u	-0.08	0.048		-0.06	0.044	
Health*College	-0.07	0.025		-0.02	0.022	
Health*Col to col	-0.01	0.042		0.01	0.036	
Health*Univ aft c	0.03	0.028		0.04	0.025	
Health*Univ to u	-0.03	0.033		-0.06	0.029	
Health*Col aft u	-0.03	0.051		0.07	0.046	
Math*College	0.08	0.047		0.07	0.041	
Field of Study*Recycle						
Math*col to col	0.11	0.062		0.04	0.055	
Math*Univ aft c	0.04	0.030		0.01	0.026	
Math*Univ to u	-0.05	0.037		-0.08	0.032	
Math*Col aft u	0.11	0.085		0.10	0.073	
Other*College	-0.05	0.044		-0.03	0.039	
Other*Col to col	-0.09	0.161		-0.16	0.137	
Other*Univ aft c	0.10	0.038		0.12	0.033	
Other*Univ to u	0.01	0.056		-0.02	0.049	
Other*Col aft u	0.01	0.225		-0.04	0.191	
Occupation Type						***
Manager, admin				0.03	0.010	
Natural Sci, Engineering	R-square = .2316			0.06	0.011	
Religion	Adj R-square = .2236			-0.14	0.046	
Teaching & Related	n = 11028			0.00	0.010	
Medicine & Health				0.07	0.012	
Art, Literary, Recreation				0.01	0.013	
Clerical & Related				-0.03	0.010	
Sales				-0.02	0.010	
Service				-0.04	0.010	
Manual Labour				-0.01	0.010	
Social Science occup				---	---	
Occupational Status						***
Part-time				-0.31	0.005	
Full-time				---	---	
				R-square = .4537		
*=p<.05				Adj R-square = .4470		
**=p<.01				n = 10205		
***=p<.001						

Model 1 is provided in Appendix C
Parameter estimates for the sociodemographic variables are also provided in Appendix C

When including the education variables, co-op, field of study, and "recycling," with the sociodemographic variables (Model 2), the R^2 increases to .216[120]. Each of the three variables is statistically significant ($p < .001$). Not surprisingly, those who graduate from co-op programs earn more than graduates of non-co-op programs[121]. The parameter estimates for the "recycling" variable show that graduates who went from one university undergraduate program to another university undergraduate program are at the top of the earnings distribution. They earn more than the reference category, graduates with only one postsecondary undergraduate degree ($p < .001$). Graduates who obtained a college diploma, and then earned a university undergraduate degree are next, ahead of graduates with only an undergraduate degree ($p < .001$). Perhaps the most fascinating finding is that graduates who attend college after university, earn less (when surveyed two years after graduation from college) than graduates with only a university degree ($p < .001$). Graduates with two college diplomas earn less than university undergraduates ($p < .001$) and graduates who went to university and then to college, but only slightly more than graduates with only one college certificate. Graduates who completed only one college program earn the least.[122]

The interaction between the "recycling" variable and the field of study variable is included in Model 3 in order to determine whether "recycling" has any

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[120] The R^2 for the model with only the sociodemographic variables is .125. See Appendix C.
[121] One explanation could be that co-op programs only except the "best and the brightest" students.
[122] Since the interaction term between the "recycling" variable and the field of study variable in Model 3 is statistically significant ($p < .001$), the parameter estimates from Model 2 for the field of study variable are not interpreted. They are interpreted for Model 3.

advantages or disadvantages for graduates of various fields of study. As one would expect, the interaction between the "recycling" variable and the field of study variable is statistically significant ($p < .001$), suggesting that the effect of "recycling" depends on field of study. After including the interaction term between the field of study variable and the "recycling" variable, the R^2 increased to .232. The parameter estimates for the variables included in the interaction term are plotted in Figure 4.5 in order to provide a visual representation of the relationship between education and earnings for college and university graduates.

The regression coefficients are plotted in Figure 4.5, and can be used to compare the earnings of university undergraduates of various fields of study with their counterparts from community colleges. Social science graduates have the highest earnings of all liberal arts graduates, and only college graduates of mathematics and engineering programs earn more than social science graduates. In fact, college graduates of engineering and mathematics programs also earn more than university undergraduates of education, the biological and agricultural sciences, and graduates of the "other" programs[123]. The earnings of social science university undergraduates are roughly in the middle of all university undergraduates, while the earnings of humanities, and in particular, fine arts graduates are the lowest of all university undergraduates. The earnings of humanities graduates are also exceeded by community college graduates in the health related-fields, while university graduates of fine arts programs earn less than college graduates of programs in every field, except "other" programs.

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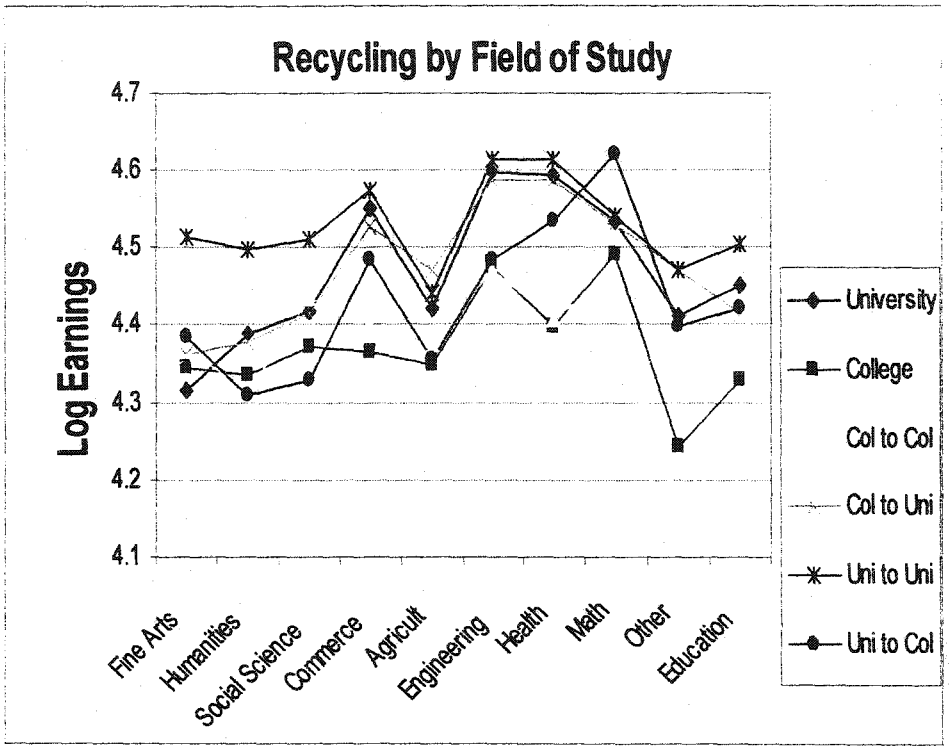
[123] Independent F-tests reveal that all of these respective differences are statistically significant ($p<.001$).

Figure 4.5


Recycling by Field of Study
Log Earnings
4.7
4.6
4.5
4.4
4.3
4.2
4.1
Fine Arts
Humanities
Social Science
Commerce
Agricult
Engineering
Health
Math
Other
Education
University
College
Col to Col
Col to Uni
Uni to Uni
Uni to Col

The information in Figure 4.5 also shows that college graduates, and college graduates with two diplomas, are either at or near the bottom of the earnings distribution for every field of study. Conversely, university graduates who previously had obtained a different type of university undergraduate degree are at the top of the earnings distribution for nearly every field of study. The only major exception is for graduates with postsecondary credentials in mathematics. In this instance, graduates with college diplomas in mathematics, who had previously earned university degrees, had the highest salaries.

With the exception of fine arts graduates, graduates with only a university undergraduate degree earn more than college graduates, regardless of whether college graduates have earned one or two college credentials. Graduates who went to college after receiving a university degree earn more than their counterparts with the equivalent (field of study) university credential in only two instances: if they earn a fine arts or a mathematics diploma. In fact, graduates who had earned university undergraduate degrees prior to earning a college diploma make more money than social science graduates if their college diploma is in commerce, engineering, health, or mathematics. "Recycling" of this kind might be more advantageous for the other liberal arts graduates, because "recycled" graduates in this category, in the majority of the fields of study, earn more than humanities graduates, and in particular, fine arts graduates [124].

[124] Without information on the respondents' fields of study and majors from their first postsecondary program, it is not possible to test for a three-way interaction. Nonetheless, the 1995 NGS data indicate that most graduates who continue their schooling are from agricultural and biological sciences, or one of the liberal arts fields (Statistics Canada, Applied Research Bulletin, 2001: 27). Thus, we expect most "recycled" graduates to be from these fields.

When adding the occupation variables in Model 4, the R^2 increased to .454, once again suggesting that occupational decisions have a substantial impact on earnings. Not unexpectedly, the occupational status variable is statistically significant ($p < .001$), and the parameter estimate for this variable clearly shows that those who work full time earn considerably more than those who work part time.

The variable that distinguishes between various types of occupations is also statistically significant ($p < .001$). The parameter estimates for this variable indicate that graduates working in health fields and in medicine earn the most. Graduates working in natural sciences and engineering occupations are next, followed by graduates employed as managers and administrators. Graduates working in arts, literary, or recreation occupations also earn more than graduates working in social science occupations. Those working as manual labourers earn less than graduates of the reference category, but this difference is not statistically significant. Graduates employed in sales jobs earn slightly less than graduates employed in social science occupations. Clerical workers have even lower salaries. However, service workers and workers employed in occupations related to religion have the lowest incomes of all.

Summary of Results

Earnings

Much of the analysis reported in the previous chapters was designed to evaluate the extent to which the results support the human capital and credentialist assertions regarding the relationship between education and work. The results

provide mixed support for each perspective. Our regression results for earnings do support the human capital assertion that graduates with the most formal education still obtain the most lucrative jobs. More specifically, the results show that graduates with Ph.D., master's, and professional degrees generally have the highest earnings, followed by university undergraduates. In contrast, trades are generally at the bottom, below college graduates. At the same time, the results for earnings do not provide any clear evidence that the earnings of graduates of the more generalist programs have declined relative to the earnings of graduates of the more applied fields of study, or that the earnings of university undergraduates have declined relative to those of trades and college graduates.

It is important at this point to note that the analyses used to test the human capital and credentialist perspectives are limited to issues related to underemployment and skill utilization. Thus, it should be made clear that the purpose of this dissertation is not to test the assertion that education increases worker productivity[125]. Unfortunately, when using individual-level cross-sectional data, and without controlling for ability, it is not possible to determine whether education increases productivity, or whether it simply acts as a signal to employers[126].

Earlier it was explained that past researchers have reasonably inferred that the earnings outcomes are better for graduates of applied and technical programs

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[125] However, some might argue that graduates who use their skills on the job are more productive than those who do not.

[126] In fact, it has been argued that the only way to test these competing arguments, without violating ethical principles, is to use aggregate-level data (Rubinson and Browne, 1994). However, it should be mentioned that a convincing identical-twin study conducted in the early 1990's found among twins with identical abilities but different levels of education that education did increase earnings by 14 percent (Ashenfelter and Krueger, 1992).

because these graduates experience a closer correspondence between the skills learned in school and those later used in the labour force (Davies and Guppy, 1997a). However, the results do not suggest that graduates of the more technical and applied fields of study earn more because their programs provide them with a closer correspondence between school and work. After controlling for the variable used to assess the extent to which education is related to the respondents' jobs, the effects of field of study and level of schooling did not change. This might suggest that there are other factors (i.e. prestige, value, motivation etc.) that could be responsible for graduates' wages, rather than the linkage between education and work.

There was another surprise. After controlling for whether or not graduates are in jobs that are related to their schooling, no strong evidence was found to suggest that gender differences in earnings are explained. Thus, contrary to expectations, gender differences in earnings are probably not attributable to gender-specific labour market advantages or preferences associated with a correspondence between education and work. This, of course, lends further evidence that other factors (i.e. gender discrimination) are probably responsible for the remaining gender differences in earnings.

Employment Outcomes

Consistent with the earnings analysis, and in support of the human capital theory, graduates with higher levels of postsecondary schooling generally have the most favourable employment outcomes. At the same time, no evidence that or college graduates have improved their employment opportunities relative to

university undergraduates was found[127]. Nor was any systematic evidence found to suggest that graduates of master's, Ph.D., or professional programs have improved their employment prospects relative to university undergraduates.

With respect to field of study, the analysis of employment patterns revealed that graduates of technical and applied programs also have the highest levels of employment and lowest levels of unemployment and part-time employment[128]. This picture is generally reversed for graduates of the liberal arts, particularly the humanities and fine arts, who generally experience the least favourable employment outcomes. Social science graduates, for the most part, generally have a probability of being employed part time or unemployed that lies between those of graduates of technical and applied programs and graduates of humanities and fine arts programs. Also consistent with the earnings patterns, findings relating to the relative chances of being employed or unemployed, when comparing graduates of technical and applied programs with graduates of liberal arts programs, did not change markedly over the thirteen-year period. The policy implications of this finding will be addressed shortly.

"Recycling" and Postsecondary Education

This dissertation makes a unique contribution to the existing research on the transitions from work to school through its examination of the financial implications of "recycling" postsecondary credentials, an issue that has not been thoroughly addressed in the research literature. The popular belief that a

[127] Trades graduates, however, did experience higher full time employment rates, and lower unemployment rates over this period, relative to university undergraduates.
[128] One exception is graduates of the health programs, who are more likely to be employed part time than are social science graduates.

university degree provides knowledge while a college diploma provides certain specific skills that are especially valuable in the modern labour market has led to a number of university graduates to enroll in shorter-term technical programs at community colleges following graduation. However, our findings suggest that this may not be an economically rewarding path. For example, university undergraduates who later obtain a college diploma, when surveyed two years after having received the college diploma, generally do not earn more than university undergraduates with an undergraduate degree in the social sciences, no matter what field of study they choose at college[129]. This illustrates the importance of educating students regarding their postsecondary options following graduation, possibly to prevent them from squandering valuable time and money on unrewarding endeavors[130].

[129] College graduates in mathematics with a previous university degree are somewhat of an exception; they earn marginally more than university social science graduates.
[130] Unfortunately, there is a potential selection-bias issue that could not be addressed in this analysis. The implications of this potential selection-bias are addressed later in Chapter 6.

Chapter 5
Regression Results: Skill Utilization

Chapter Outline

This chapter will present the regression models that deal with inappropriate utilization of skills. The dependent variables are measures of mismatch, as well as both objective and subjective underemployment. Since these variables are not truly continuous, the statistical analysis cannot be done by OLS regression. Binary logistic regression will be used for the regression models involving the over-education variables, and ordered logistic regression is used for the models in which the dependent variable is an assessment of whether the respondent's education is related to his/her schooling.

Over-Education (Underemployment)

The models below are assessed using the objective measure of over-education[131]. Since this variable is available for all of the surveys, the analysis will include the respondents from all four NGS cohorts. The sequence through which the models are specified is similar to the sequence specified in the models from the previous chapter. The sociodemographic variables are entered first (Model 1), then the interaction between gender and NGS cohort (Model 2), followed by the education variables field of study and level of schooling (Model 3), then by interactions between the education variables and NGS cohort (Model

[131] The coefficients for these models are derived coding graduates who have more education than was requested by their employers as 0, and graduates who have the same level of education as requested by their employers as 1.

4), and by the occupation variables (Model 5). The model statistics and corresponding parameter estimates for each model are provided in Table 5.1.[132]

When including the education variables with the sociodemographic variables (Model 3), the pseudo R^2 more than doubled to .08 from the previous model.[133] Both education variables, field of study and level of schooling, are statistically significant ($p<.001$)[134]. Except for the statistical significance levels of the father's education and the language variable, which are now statistically significant at ($p<.01$), all other variables remained statistically significant at their previous levels ($p<.001$). Most of the parameter estimates did not change, although now, in addition to the Western region, the difference between the Eastern region and Ontario, the reference category, is not statistically significant (See Appendix D).

Model 4 includes the interactions between the two education variables and the NGS cohort variable. The model statistics changed slightly from the previous model (pseudo $R^2 = .09$) as the two interaction terms are statistically significant ($p<.001$). To make the regression results for these variables more easily interpretable, the parameter estimates for the variables included in the interaction terms are transformed into predicted probabilities. These predicted probabilities are plotted in Figure 5.1[135].

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[132] Once again, the models for each of the subsequent analyses that only include the sociodemographic variables are relegated to the appendices.

[133] The pseudo R^2 for the model with only the sociodemographic variables (model 2) is .03. See Appendix D for models 1 and 2.

[134] Since the interactions between the education variables and the NGS cohort variable included in Model 4 are statistically significant, the education parameter estimates in Model 3 are not interpreted.

[135] The predicted probabilities are reverse scored for the figure. They should be interpreted as if 1 equals a 100% probability of being overeducated.

Table 5.1
Objective Overeducation
Binary Logistic Regression

	Model 3			Model 4			Model 5		
	b	Std E	p	b	Std E	p	b	Std E	p
Field of Study						***			***
Education	0.67	0.027		0.57	0.049		0.30	0.056	
Fine Arts	-0.37	0.041		-0.33	0.084		-0.25	0.092	
Humanities	-0.23	0.033		-0.36	0.065		-0.32	0.072	
Commerce	0.20	0.024		0.13	0.045		0.27	0.050	
Agricultural/Bio Sci	0.01	0.035		-0.06	0.070		0.00	0.077	
Engineering/Ap Science	0.63	0.027		0.66	0.050		0.62	0.056	
Health Professions	1.19	0.029		0.88	0.054		0.52	0.064	
Math	0.73	0.040		0.85	0.081		0.57	0.090	
Other	-0.07	0.049		-0.19	0.115		-0.20	0.127	
Social Sciences	---	---		---	---		---	---	
Level of Schooling			***			***			***
Trades	-0.98	0.023		-1.08	0.043		-0.57	0.047	
College	-0.26	0.019		-0.57	0.034		-0.28	0.037	
Professional	0.59	0.047		0.94	0.099		0.87	0.112	
Master's	-0.72	0.031		-0.80	0.056		-1.18	0.061	
Ph.D.	0.55	0.081		0.47	0.142		-0.16	0.151	
Undergraduate	---	---		---	---		---	---	
NGS*Field of Study						***			***
NGS 82*FOS Education				0.08	0.078		-0.03	0.088	
NGS 82*FOS Arts	n = 98150			-0.02	0.119		0.13	0.132	
NGS 82*FOS Human	LR (73) = 11016.36			0.14	0.099		0.25	0.111	
NGS 82*FOS Commer	p > chi2 = 0.0000			0.05	0.071		0.08	0.079	
NGS 82*FOS Agricult	Pseudo R2 = 0.0811			0.02	0.103		0.29	0.117	
NGS 82*FOS Engin	Ll = -62400			-0.14	0.077		-0.07	0.087	
NGS 82*FOS Health				0.65	0.085		0.50	0.095	
NGS 82*FOS Math				-0.22	0.122		-0.01	0.141	
NGS 82*FOS Other				-0.12	0.201		0.05	0.226	
NGS 86*FOS Education				0.01	0.073		-0.21	0.082	
NGS 86*FOS Arts				-0.01	0.111		-0.11	0.122	
NGS 86*FOS Human				0.20	0.090		0.16	0.101	
NGS 86*FOS Commer				0.07	0.065		0.00	0.071	
NGS 86*FOS Agricult				0.02	0.095		0.06	0.106	
NGS 86*FOS Engin				-0.01	0.071		-0.07	0.079	
NGS 86*FOS Health				0.34	0.077		0.10	0.085	
NGS 86*FOS Math				-0.15	0.106		-0.14	0.119	
NGS 86*FOS Other				0.35	0.135		0.32	0.151	
NGS 90*FOS Education				0.19	0.075		0.08	0.081	
NGS 90*FOS Arts				-0.17	0.122		0.05	0.130	
NGS 90*FOS Human				0.14	0.094		0.21	0.101	
NGS 90*FOS Commer				0.06	0.066		0.13	0.071	
NGS 90*FOS Agricult				0.21	0.100		0.22	0.108	
NGS 90*FOS Engin				-0.05	0.074		-0.04	0.080	
NGS 90*FOS Health				0.26	0.081		0.21	0.087	
NGS 90*FOS Math				-0.11	0.117		-0.13	0.126	
NGS 90*FOS Other				-0.27	0.162		-0.16	0.175	

Table 5.1 Continued

	Model 4			Model 5		
	b	Std E	p	b	Std E	p
NGS*Level of School			***			***
NGS 82*Trades	-0.22	0.062		0.05	0.069	
NGS 82*College	0.67	0.051		0.70	0.057	
NGS 82*Professional	-1.11	0.138		-1.19	0.152	
NGS 82*Master's	0.09	0.086		0.19	0.093	
NGS 82*Ph.D.	0.11	0.231		0.18	0.248	
NGS 86*Trades	0.13	0.058		0.40	0.064	
NGS 86*College	0.39	0.046		0.38	0.051	
NGS 86*Professional	-0.39	0.133		-0.72	0.146	
NGS 86*Master's	0.13	0.081		0.16	0.086	
NGS 86*Ph.D.	0.03	0.217		0.07	0.229	
NGS 90*Trades	0.53	0.061		0.66	0.065	
NGS 90*College	0.24	0.050		0.25	0.054	
NGS 90*Professional	0.05	0.149		-0.25	0.158	
NGS 90*Master's	0.05	0.081		0.18	0.084	
NGS 90*Ph.D.	0.16	0.213		0.33	0.220	
Occupation Type						***
Manager, admin				-0.69	0.040	
Natural Sci, Engineering	n = 98150			-0.11	0.045	
Religion	LR (115) = 11878.29			0.58	0.150	
Teaching & Related	p > chi2 = 0.0000			0.22	0.042	
Medicine & Health	Pseudo R2 = 0.0875			-0.30	0.051	
Art, Literary, Recr	Ll = -61969.035			-1.04	0.056	
Clerical & Related				-1.61	0.041	
Sales				-1.60	0.046	
Service				-1.63	0.045	
Manual Labour				-1.62	0.044	
Social Science occup				—	—	
Occupational Status						***
Part-time				-0.54	0.025	
Full-time				—	—	
				n = 87010		
				LR (126) = 16183.48		
				p > chi2 = 0.0000		
				Pseudo R2 = 0.1343		
				Ll = -52178.235		

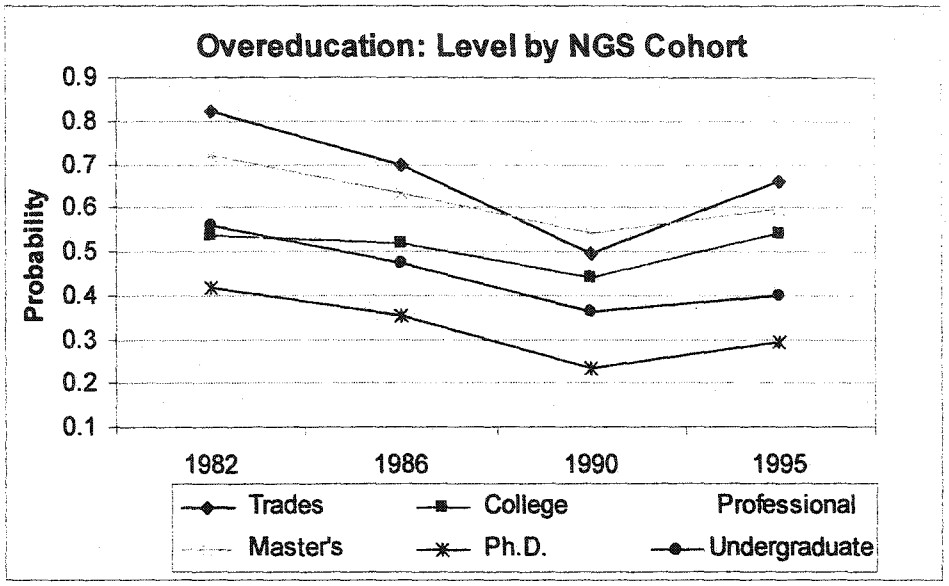
*** = p < .001
** = p < .01
* = p < .05

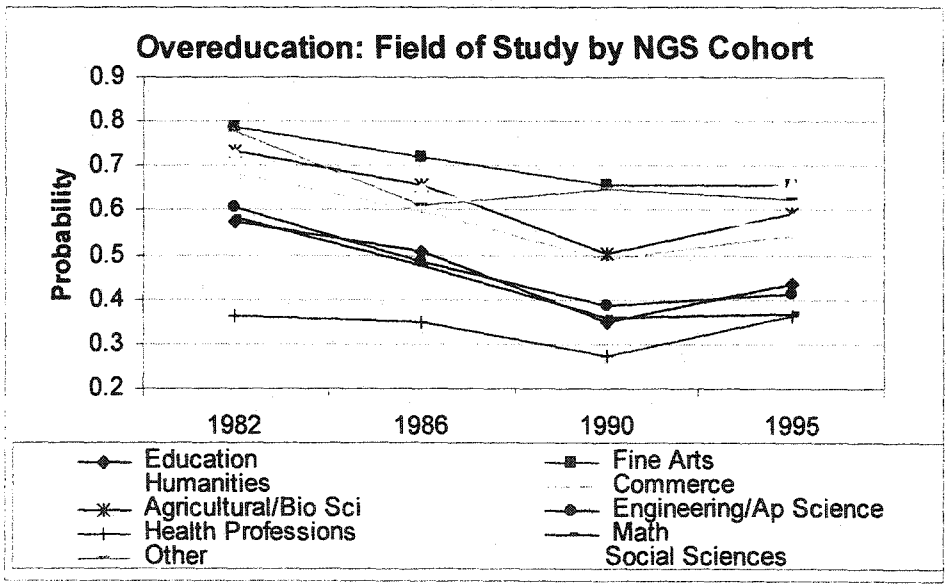
Models 1 and 2 are provided in Appendix D
Parameter estimates for the sociological variables are also provided in Appendix D

The top graph of Figure 5.1 shows the predicted probabilities for level of schooling. Looking at the graph, graduates of each level of postsecondary schooling are less likely to be overeducated if they are from the 1986 cohort than if they are from the 1982 cohort. They are also less likely to be overeducated if they are from the 1990 cohort than if they are from the 1986 cohort. Graduates of professional programs, followed by trades graduates experienced the sharpest decline during these periods. Conversely, graduates of each level of schooling are more likely to be overeducated if they are in the 1995 cohort than if they are in the 1990 cohort, with trades graduates experiencing the sharpest increase.

Professional graduates are clearly the least likely to be overeducated, for all of the cohorts except 1982. For that cohort, university undergraduates, college graduates, and graduates with a Ph.D. were less likely to be overqualified than were graduates of professional programs. Ph.D. graduates are the least likely to be overqualified for their jobs in 1982. University undergraduates are generally next – they are slightly more likely to be overqualified than Ph.D. graduates in that group. The only exception was the 1982 cohort, where college graduates had a slightly lower probability of being overqualified than university undergraduates. Trades graduates are the most likely to be overeducated for three of the four cohorts. The only exception is for the 1990 cohort, where master's graduates had a slightly greater chance of being overeducated than did trades graduates. Somewhat surprisingly, for every other cohort, master's graduates had the second highest probability (behind trades) of finding themselves underemployed.

Figure 5.1


Overeducation: Level by NGS Cohort
Probability
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
1982
1986
1990
1995
Trades
College
Professional
Master's
Ph.D.
Undergraduate


Overeducation: Field of Study by NGS Cohort
Probability
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
1982
1986
1990
1995
Education
Fine Arts
Humanities
Commerce
Agricultural/Bio Sci
Engineering/Ap Science
Health Professions
Math
Other
Social Sciences

As can be seen in the bottom graph of Figure 5.1, for every cohort graduates of the health programs have the lowest probability of finding themselves overqualified. Other graduates who are least likely to be over-educated include those in the areas of mathematics, engineering, and education. Conversely, graduates who are consistently the most likely to be overqualified for their jobs graduated from the fine arts, humanities, agricultural and biological sciences, commerce, social sciences, and "other" programs. With the exception of graduates of "other" programs, graduates of all fields of study showed a general decline in their levels of over-education from 1982 through 1990, with a reverse pattern, an increase in their levels of over-education, from 1990 to 1995[136]. Graduates of every field of study, except health professionals, were less likely to be overqualified if they belonged to the 1995 cohort rather than the 1982 cohort. If any particular patterns emerge from the data in Figure 5.1 the most obvious is that the advantage of heath professional graduates relative to other graduates (particularly graduates of engineering, mathematics, and education programs) has deteriorated over the four-cohort period. On the other hand, the disadvantage of graduates of the more generalist programs, such as the arts, humanities, and social sciences, relative to the more technically oriented disciplines, has changed minimally, if at all, during the four-cohort period. Liberal arts graduates do not appear to have become any more or less likely to be over-educated, relative to their counterparts from the applied and technical programs, over the 13-year period.

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[136] Although, the proportion of fine arts graduates who found themselves overqualified for their jobs remained relatively constant at .56 for both the 1990 and 1995 cohorts.

The inclusion of the occupation variables in Model 5 has a dramatic effect on the model statistics. The pseudo R^2 increased to .134. After including the occupation-related variables, the number of children and language variables are no longer significant. The interaction between gender and NGS cohort is now only just barely statistically significant ($p<.05$), while all of the other variables remain statistically significant at their previous levels ($p<.001$).

Not surprisingly, graduates employed part time at the time of the survey are much more likely to be overqualified than are graduates employed full time at the time of the survey, when controlling for the other variables in the model ($p<.001$). Regarding the coefficients for the different occupations, graduates in occupations related to religion are least likely to find themselves overqualified for their current jobs, when controlling for all of the other variables in the model. They are followed by graduates in teaching and related occupations, and then, surprisingly, by graduates in social science and related occupations (the reference category). They, in turn, are followed closely by engineers, graduates working in the area of medicine and health, graduates who are managers or administrators, and those working in the arts, literacy, and recreation. Those most likely to be overqualified work in sales, clerical or related occupations, manual labour, or service occupations.

In the top half of Figure 5.2. are the predicted probabilities for level of schooling, after the occupation variables had been included in the model. They show that master's graduates are now the most likely, of all postsecondary graduates, and for each cohort, to be overqualified for their jobs. In fact, the

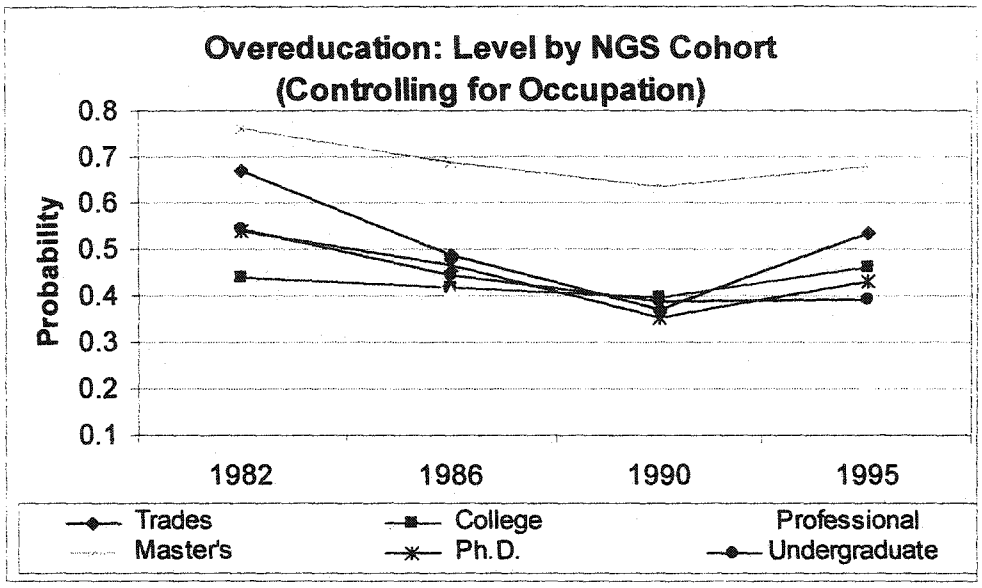
likelihood of being overqualified for master's graduates is greater than .65 for each cohort[137]. This is somewhat surprising, considering that master's graduates were found to be near the top of the earnings distribution in Chapter 4. Interestingly, when controlling for occupation, we find that graduates of professional programs remain the least likely to find themselves in jobs where they have a higher level credential than that requested by the employer for each of the last three cohorts; but the difference between them and graduates of other levels of postsecondary schooling has become greater for each successive cohort. In fact, for each cohort, both graduates of professional programs and university undergraduates have a declining probability of being overqualified. When making comparisons between graduates who belong to the 1995 cohort, the likelihood of being overqualified, from the order of most likely to least likely, is as follows: 1) master's graduates; 2) trades graduates; 3) college graduates; 4) Ph.D.; 5) university undergraduates; and 6) graduates of professional programs.

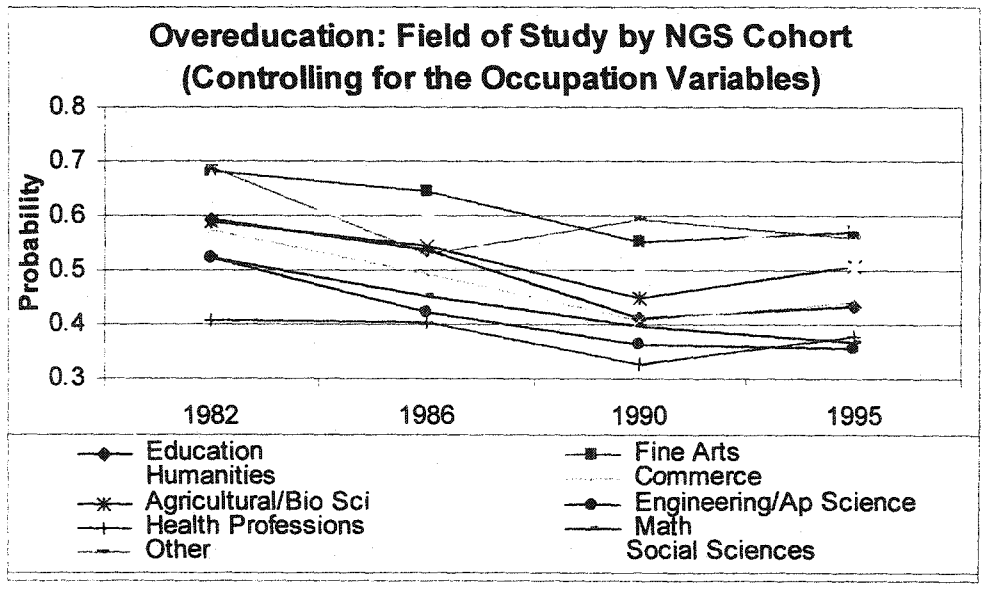
The bottom graph in Figure 5.2. shows the predicted probabilities for field of study, when controlling for the occupation variables. The pattern shown in the bottom graph in Figure 5.2 is similar to the pattern in the bottom graph of Figure 5.1, only as with the level of schooling results above, the differences between fields of study are much smaller once one has controlled for occupation. One small exception worth mentioning is that, in the case of the 1995 cohort only,

[137] The predicted probability is calculated holding the other variables at their means.

graduates of the health programs have a slightly higher probability of being overqualified for their jobs than mathematics and engineering graduates.

Figure 5.2





Subjective Over-Education

This section examines underemployment as it pertains to the respondents' perceptions of whether they feel overqualified for their current jobs. We are not looking at whether they have more education than was requested by their employer. The reader will recall that we described in chapter 3 how the respondents were asked whether they felt overqualified for their current job (yes or no). This question is used as the dependent variable in this section. Unfortunately, since it is only asked of graduates of the 1995 survey, the following analysis could only be conducted using this cohort.

Only three models are estimated in this section. As in the previous series, the first model includes only the sociodemographic variables. The second model adds the education variables, and the third model incorporates the occupation variables. Since there are only two response options for the dependent variable, the method of statistical analysis is binary logistic regression. The parameter estimates and model statistics are provided in Table 5.2. Model 1, including only the sociodemographic variables, is presented in Appendix E.

After adding the education variables (Model 2), the pseudo R^2 increased to .0316.[138] Quite expectedly, the effects of both the level of schooling and field of study variables on the likelihood of feeling over qualified are each statistically significant ($p < .001$).

[138] The pseudo R^2 for the model 1 is only 0.01. See Appendix E.

Table 5.2
Subjective Overeducation
Binary Logistic Regression

	Model 2			Model 3		
	b	Std E	p	b	Std E	p
Constant	-0.87	0.194		-1.47	0.223	
Field of Study			***			***
Education	-0.37	0.051		-0.20	0.058	
Fine Arts	0.29	0.078		0.23	0.085	
Humanities	0.23	0.063		0.18	0.069	
Commerce	-0.26	0.045		-0.25	0.051	
Agricultural/Bio Sci	-0.07	0.068		0.02	0.074	
Engineering/Ap Science	-0.56	0.051		-0.39	0.060	
Health Professions	-0.69	0.058		-0.22	0.076	
Math	-0.76	0.089		-0.39	0.099	
Other	0.18	0.114		0.24	0.122	
Social sciences	---	---		---	---	
Level of Schooling			***			***
Trades	0.12	0.046		-0.26	0.052	
College	0.05	0.038		-0.12	0.041	
Professional	-1.02	0.107		-1.05	0.118	
Master's	-0.24	0.062		-0.04	0.066	
Ph.D.	-0.60	0.169		-0.25	0.179	
Undergraduate	---	---		---	---	
Occupational Type						***
Manager, admin				0.11	0.084	
Natural Sci, Engineering	n = 25424			-0.33	0.099	
Religion	LR (68) = 1023.13			0.27	0.289	
Teaching & Related	p > chi2 = 0.0000			-0.19	0.087	
Medicine & Health	Pseudo R2 = 0.0316			-0.28	0.103	
Art, Literary, Recreation	Ll = -15668.206			0.68	0.109	
Clerical & Related				0.93	0.082	
Sales				0.84	0.087	
Service				0.58	0.083	
Manual Labour				0.80	0.085	
Social Science occup				---	---	
Occupational Status						***
Part-time				0.51	0.043	
Full-time				---	---	

*** = p < .001
** = p < .01
* = p < .05

n = 23262
LR (79) = 1907.15
p > chi2 = 0.0000
Pseudo R2 = 0.0643
Ll = -13874.556

Model 1 is provided in Appendix E
Parameter Estimates for the sociodemographic variables are also provided in Appendix E

University undergraduates represent the reference category. The parameter estimate for college graduates is above that of the reference category, but it is not statistically significant. Graduates of trades programs are slightly more likely than are university undergraduates to feel that they are overqualified for their current job, when surveyed two years after graduation ($p < .05$). Graduates with a master's degrees are less likely than are graduates of undergraduate programs to feel that they are overqualified for their jobs ($p < .001$). This is a stark contrast with the results presented in the previous section. Ph.D. graduates are even less likely than are master's graduates to feel overqualified, while graduates of professional programs are the least likely of all postsecondary graduates to feel this way.

The predicted probabilities for level of schooling, displayed in Figure 5.3, show that the probability of professional graduates feeling that they are overqualified for their jobs is .11. They, indeed, are the least likely of all postsecondary graduates to feel overqualified for their jobs. Graduates of Ph.D. programs are the second least likely to feel that they are overqualified for their jobs, but their likelihood is only marginally higher (.16). The probability of master's graduates feeling overqualified for their jobs (.22) is slightly higher than that of Ph.D. graduates. But it is slightly lower than that of university undergraduates (.26). College graduates have a slightly greater predicted probability of feeling underemployed (.27), whereas trades graduates are the most likely to feel this way (.29).

Figure 5.3

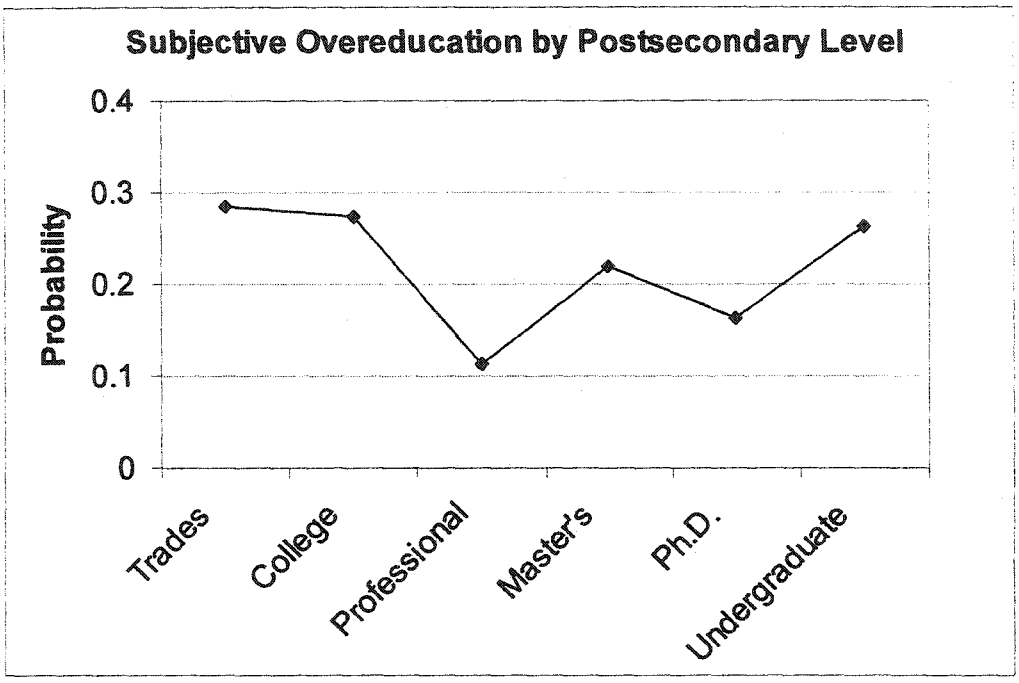
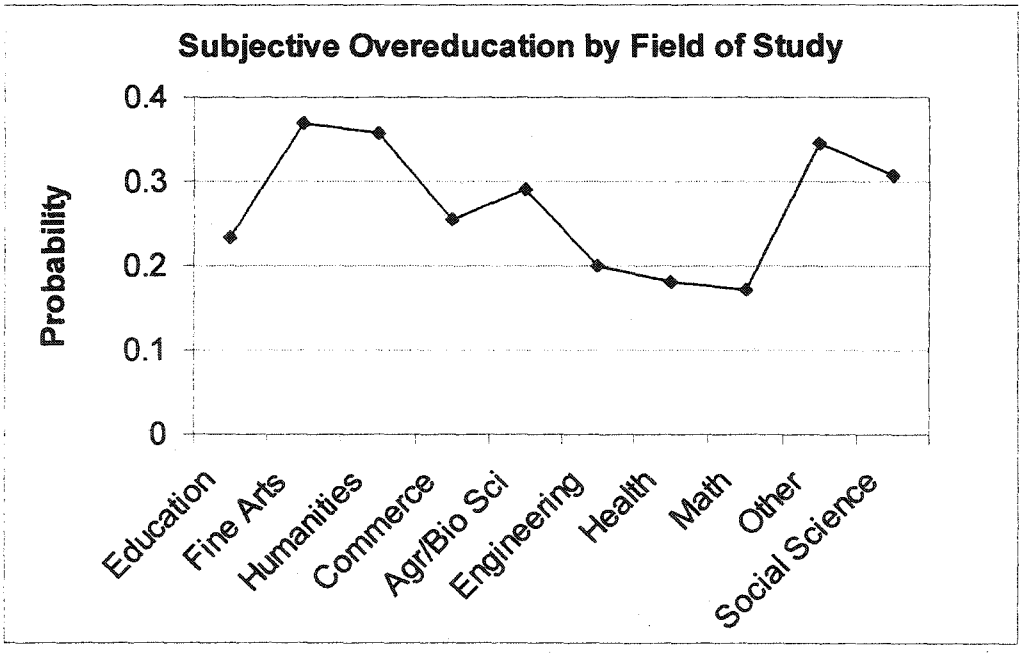


Figure 5.4



The parameter estimates for the field of study variable are interpreted relative to the reference category, social science graduates. The differences between graduates of social science programs and graduates of all of the other programs, except those from agricultural and biological sciences, are statistically significant ($p < .001$). The information from Figure 5.4 shows that graduates of fine arts, humanities, and "other" programs are the most likely to feel that they are overqualified for their jobs. The probabilities that graduates of each of these fields of study would feel this way are .37, .36, and .35, respectively. Social science graduates are slightly less likely (.31) to feel overqualified for their job. The respective probabilities for agricultural/biological science, commerce, and education graduates are .29, .25, and .23. Graduates of engineering, the health professions, and mathematics have the lowest likelihood of being overqualified for their jobs. For these groups, the probabilities of feeling overeducated were .20, .18, and .17, respectively.

The two occupation variables are added in Model 3. Both variables are statistically significant ($p < .001$), improving the pseudo R^2 to .064. Including the two occupation variables did slightly modify the effects of two of the sociodemographic variables. For example, the language variable is now no longer statistically significant, and the significance level of the sex coefficient is reduced ($p < .01$). No substantive changes were made to any of the other variables in the model.

The significance levels of all parameter estimates for the field of study variable, except those from the "other" category, declined after including the

occupation variables[139] [140]. This implies that some of the relative differences between graduates of social science programs and graduates of each of the other fields of study have been explained by occupational placement.

After controlling for occupation, some of the parameter estimates for the level of schooling variable did change substantially. For example, master's and Ph.D. graduates are no longer any less likely than graduates of university undergraduate programs to feel that they are overqualified for their jobs. This could suggest that the lower levels of underemployment for graduates of these higher levels of postsecondary schooling is largely attributable to their tight connections with the labour market.

As one would expect, graduates working full time are much less likely to feel overqualified for their jobs than are graduates who work part-time ($p < .001$). Also as expected, graduates working in clerical and sales positions, and in manual labour jobs, are most likely to feel that they are overqualified. The difference between each of these three groups and the reference group, graduates working in social science occupations, is statistically significant ($p < .001$). Graduates working in arts and service occupations are also more likely than are graduates working in social science occupations to feel that they are overqualified ($p < .001$). Graduates working in social science occupations are slightly less likely to feel overqualified than are graduates working in religious occupations and

[139] Graduates who fit in the "other" category are now slightly more likely than are social science graduates to feel that they are overqualified for their current jobs.
[140] The statistical significance of the arts, humanities, and health professions parameter estimates changed to ($p < .01$), as opposed to ($p < .001$) from the previous model.

graduates who are managers, but these differences are not large enough to be statistically significant.

Graduates working in teaching and related occupations are slightly less likely than graduates in social science occupations to feel overqualified ($p < .05$), while graduates working in health professions are considerably less likely than are graduates in social science jobs to feel overqualified ($p < .001$). Of all graduates, those employed as engineers are the least likely, to feel that they have more qualifications than their jobs require ($p < .001$).

Mismatch Between Education and Work

The dependent variable for the following analysis is a subjective assessment of the extent to which respondents feel that their education is related to their schooling. The response options for this variable are: 1) closely related, 2) somewhat related, and 3) not at all related?[141] Since there is a small number of ordered categories, the method of analysis is ordered logistic regression[142].

Once again, the sociodemographic variables gender, age, marital status, region, language of interview, native Indian, number of children, mother's education, father's education are included in Model 1. The education variables field of study and level of schooling are added in Model 2, and Model 3 includes the occupation variables. A matching variable, which represents whether a postsecondary education from a specific field of study was required for the

[141] Unfortunately, there is no equivalently worded variable available in the earlier surveys.
[142] As a precautionary measure, models were estimated using both ordered and multinomial logistic regression models. After comparing the Bayesian Information Criterion (BIC) full name statistics that were generated for each model, it was determined that there was relatively little difference between the two models. The BIC for the ordered logit model is 51171, whereas the BIC for the multinomial logistic regression model is 51202. Thus, the ordered logit model is selected for efficiency.

respondent's job is added in Model 4. This variable is included so that we can determine whether the request for a specific postsecondary credential by the employer is justified, at least according to the respondents' perceptions regarding whether the skills they acquired in the course of their programs were actually being used on the job. The model statistics and parameter estimates are found in Table 5.3.

After adding the level of schooling and the field of study variables in Model 2, the pseudo R^2 increased to .055.[143] The effects of both field of study and level of schooling are statistically significant ($p < .001$). With the exception of mathematics, the difference between each field of study coefficient and the reference category, education, is statistically significant ($p < .001$). Figure 5.5 shows the predicted probabilities for both level of schooling (top) and field of study (bottom).[144] Graduates of professional programs are clearly the most likely to feel that they are in jobs that are related to their schooling. They have a likelihood of .80 of feeling that they are in jobs that are closely related to their schooling, while their respective likelihoods of feeling that they are in jobs that are somewhat or unrelated to their education are .12 and .08. Right behind them are Ph.D. graduates, who have a likelihood of .79 of feeling that their jobs are closely related to their education. Their chances of feeling that their jobs are somewhat or unrelated to their education are .13 and .8, respectively.

---

[143] Incidentally, the significance levels of some of the variables do change slightly. See Appendix F. The pseudo R^2 for the previous model is .02.

[144] All predicted probabilities are calculated holding the other variables at their means.

Table 5.3
Dependent Variable: Whether Education is Related to Job
Ordered Logistic Regression

	Model 2			Model 3			Model 4		
	b	Std E	p	b	Std E	p	b	Std E	p
Cut 1	0.10	0.173		0.63	0.200		-0.74	0.211	
Cut 2	1.18	0.173		1.77	0.201		0.60	0.211	
Sex			*			*			**
Women	0.05	0.028		0.08	0.031		0.10	0.033	
Men	---	---		---	---		---	---	
Field of Study			***			***			***
Fine Arts	0.92	0.075		0.74	0.082		0.55	0.086	
Humanities	1.34	0.063		1.21	0.069		0.88	0.072	
Social Sciences	0.93	0.048		0.77	0.054		0.56	0.056	
Commerce	0.39	0.046		0.12	0.054		-0.02	0.056	
Agricultural/Bio Sci	0.58	0.066		0.42	0.073		0.24	0.076	
Engineering/Ap Science	0.23	0.052		0.07	0.061		0.17	0.063	
Health Professions	-0.38	0.058		-0.06	0.075		0.07	0.078	
Math	0.11	0.078		0.02	0.088		0.06	0.093	
Other	1.31	0.107		1.19	0.113		1.05	0.120	
Education	---	---		---	---		---	---	
Level of Schooling			***			***			***
Trades	0.11	0.042		-0.22	0.046		-0.71	0.050	
College	-0.21	0.034		-0.38	0.037		-0.64	0.040	
Professional	-1.08	0.094		-0.95	0.101		-0.78	0.104	
Master's	-0.41	0.055		-0.25	0.059		0.01	0.062	
Ph.D.	-1.00	0.154		-0.57	0.162		-0.17	0.166	
University Undergrad	---	---		---	---		---	---	
Occupation						***			***
Manager, admin				0.50	0.075		0.30	0.078	
Natural Sci, Engineering				0.34	0.085		0.32	0.088	
Religion				-0.35	0.274		-0.27	0.302	
Teaching & Related				-0.15	0.080		-0.15	0.083	
Medicine & Health				-0.19	0.095		-0.13	0.099	
Art, Literary, Rec				0.45	0.103		0.13	0.107	
Clerical & Related				1.12	0.075		0.71	0.078	
Sales				1.20	0.079		0.81	0.083	
Service				0.98	0.076		0.63	0.080	
Manual Labour				1.14	0.078		0.73	0.081	
Social Sciencs / Rel				---	---		---	---	
Occupational Status						***			***
Part-time				0.45	0.041		0.36	0.043	
Full-time				---	---		---	---	
Education-Job Match									***
Match 2							-1.02	0.038	
Match 3							-2.16	0.036	
Match 1							---	---	

n = 25665
LR (68) = 2840.31
p = 0.0000
Pseudo R2 = 0.0547
Ll = -24542.376

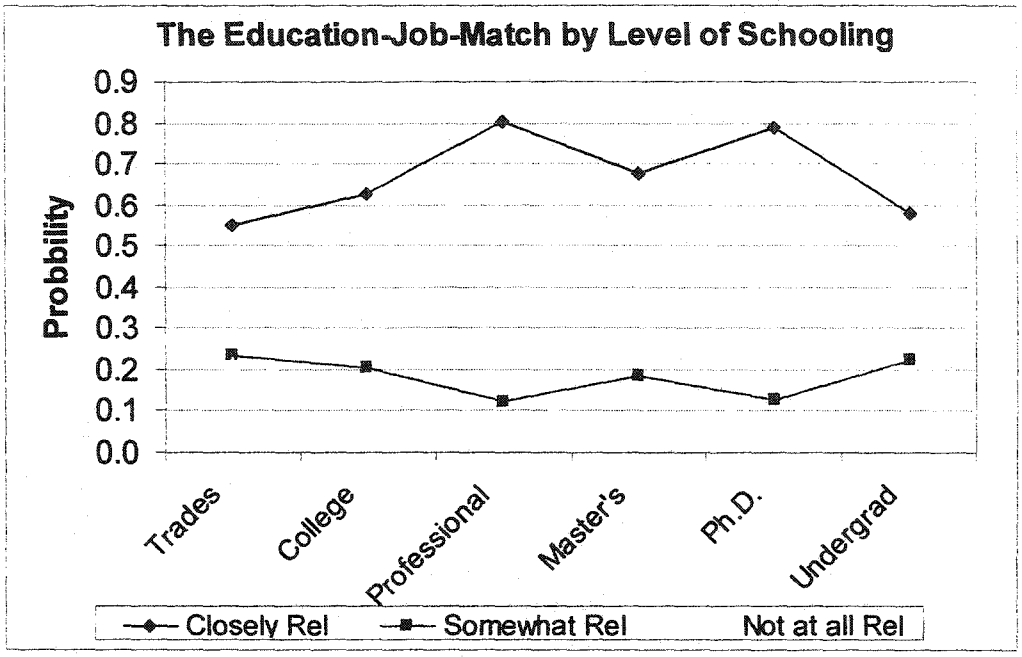
n = 23475
LR (79) = 3899.44
p = 0.0000
Pseudo R2 = 0.0817
Ll = -21911.581

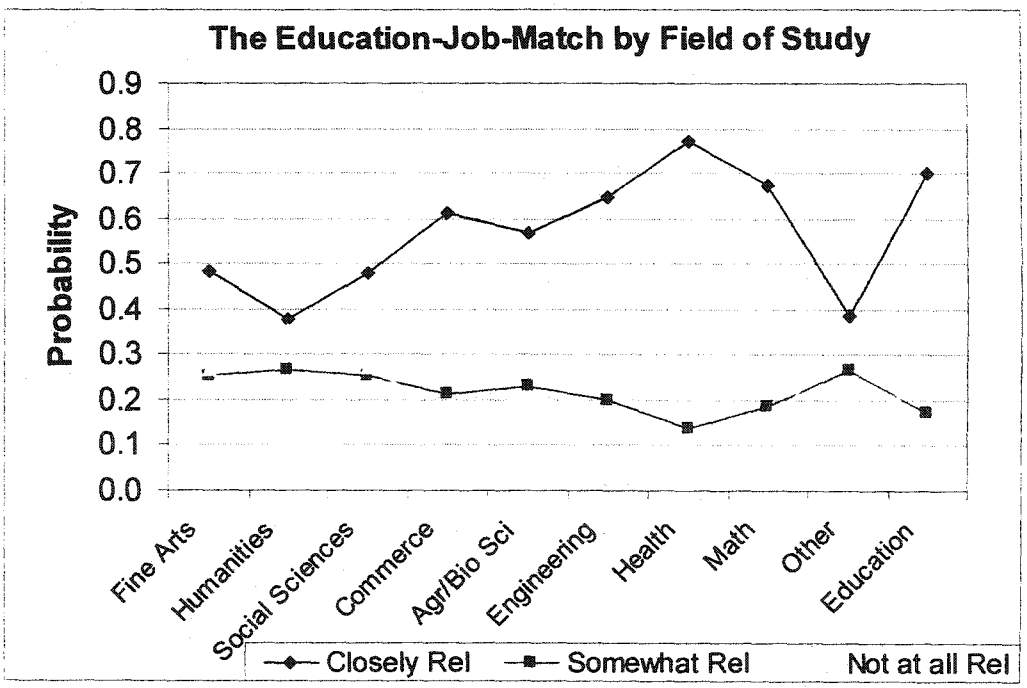
n = 23474
LR (81) = 7928.88
p = 0.0000
Pseudo R2 = 0.1662
Ll = -19895.563

*** = p < .001
** = p < .001
* = p < .01

Model 1 is provided in Appendix F
Parameter estimates for the sociodemographic variables are also provided in Appendix F

Figure 5.5


The Education-Job-Match by Level of Schooling
Probbility
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
Trades
College
Professional
Master's
Ph.D.
Undergrad
Closely Rel
Somewhat Rel
Not at all Rel


The Education-Job-Match by Field of Study
Probability
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
Fine Arts
Humanities
Social Sciences
Commerce
Agr/Bio Sci
Engineering
Health
Math
Other
Education
Closely Rel
Somewhat Rel
Not at all Rel

Master's graduates have a slightly lower predicted probability of feeling that their jobs are closely related to their education (.68), and their respective probabilities of feeling that their jobs are somewhat or unrelated to their education are .19 and .14.

College graduates are slightly less likely to feel that their jobs are closely related to their schooling. They have a predicted probability of .63 of feeling like their jobs are closely related to their schooling, and probabilities of .21 and .17 of feeling that they are in jobs that are somewhat related or not at all related to their schooling. The probability that university undergraduates find themselves in jobs that they feel are closely related to their schooling is .58. Their probabilities of being in positions that they feel to be somewhat or unrelated to their schooling are .22 and .20, respectively.

Lastly, trades graduates are the least likely of all postsecondary graduates to feel that their education is related to their schooling. They are the least likely (.55) to feel that their education is related to their work. They are the most likely to feel that their education is somewhat related (.23) or unrelated (.22) to their jobs.

When looking at the field of study estimates, graduates of the humanities and the "other" programs have the highest probability of feeling that they are in jobs that are unrelated to their schooling. Social science and fine arts graduates are next; their probabilities of being in jobs related to their schooling, while holding constant the other variables in the model, are identical. Graduates of the agricultural and biological sciences programs have slightly better chances of

being in jobs related to their schooling. The probability that they are in jobs closely related, somewhat related, or unrelated to their schooling is .57, .23, and .20 respectively. The probability that commerce graduates will find themselves in jobs closely related to their schooling is .61, while their respective likelihoods of being in jobs somewhat related or unrelated to their schooling are.21 and .18.

Engineering and mathematics graduates both have an even greater probability of being in jobs that are closely related to their work than do commerce graduates. Education graduates, the reference category, have a likelihood of being employed in jobs that they feel to be closely related to their schooling of .70. Their likelihood of being in jobs that are somewhat related and unrelated to their schooling is .17 and .13, respectively.

Graduates of the health programs clearly have the greatest likelihood of being employed in jobs related to their schooling. The probability that these graduates find a job closely related to their schooling is .77. Their respective probabilities of finding themselves in jobs they feel to be somewhat related or unrelated are .14 and .09.

Model 3 includes the occupation variables, which are both statistically significant ($p < .001$). The pseudo R^2 for this model improves to .082. Most expectedly, graduates who are employed full time are more likely than are graduates employed part time to feel that their jobs are related to their schooling ($p < .001$). Among the occupational categories, graduates working in religious occupations report the greatest fit between their education and their work. Those working in health-related occupations are next, followed closely by those who

teach. Workers in social science and related fields, the reference category, are less likely than the above groups to feel that their jobs are related to their schooling, but the differences are not statistically significant. Somewhat surprisingly, graduates working in natural science related occupations are less likely than graduates working in social science related occupations to feel that they are in jobs related to their schooling ($p < .001$). Graduates working in the arts are even slightly less likely to feel that they are in occupations related to their education than are natural science graduates, but they are slightly more likely to feel this way than managers and administrators. Both managers and workers in the arts are less likely than social science graduates to feel that they are in jobs related to their schooling. Among the white-collar occupations, graduates in service, clerical, and sales jobs respectively, are most likely to feel that they are not in jobs that are related to their education. Surprisingly, manual workers are slightly more likely than sales workers to feel that their education is related to their job. The differences between graduates in all of these occupations and graduates in social science occupations, the reference category, are statistically significant ($p < .001$).

Upon adding the occupation variables, the parameter estimates for the sociodemographic variables did not change dramatically. The two most noticeable changes among the parameter estimates for the education variables are for graduates of engineering and the health programs. Both coefficients are no longer statistically significant, because as the likelihood of finding a job related to schooling has declined for both sets of graduates.

Model 4 includes the variable that distinguishes between graduates who are in jobs that require their particular postsecondary credential and those who are in jobs that require either any postsecondary credentials or no postsecondary credential at all. The pseudo R^2 for this model more than doubled from the previous model to 0.167, suggesting that the matching of credentials with job requirements has a strong effect on whether graduates feel that their educations are related to their work. As expected, the relationship between this variable and the outcome variable is statistically significant ($p < .001$).

The significance levels of most of the independent variables and parameter estimates did not change dramatically when the matching variable was added to the model. However, there were some interesting modifications. Once the matching variable is added to the model, the significance level of the gender coefficient improved to ($p < .01$). As well, the number of children variable, which was not statistically significant in Model 3, is statistically significant ($p < .01$) in Model 4, and the father's education variable, which was also not statistically significant in Model 3, is also now statistically significant ($p < .01$). See Appendix F.

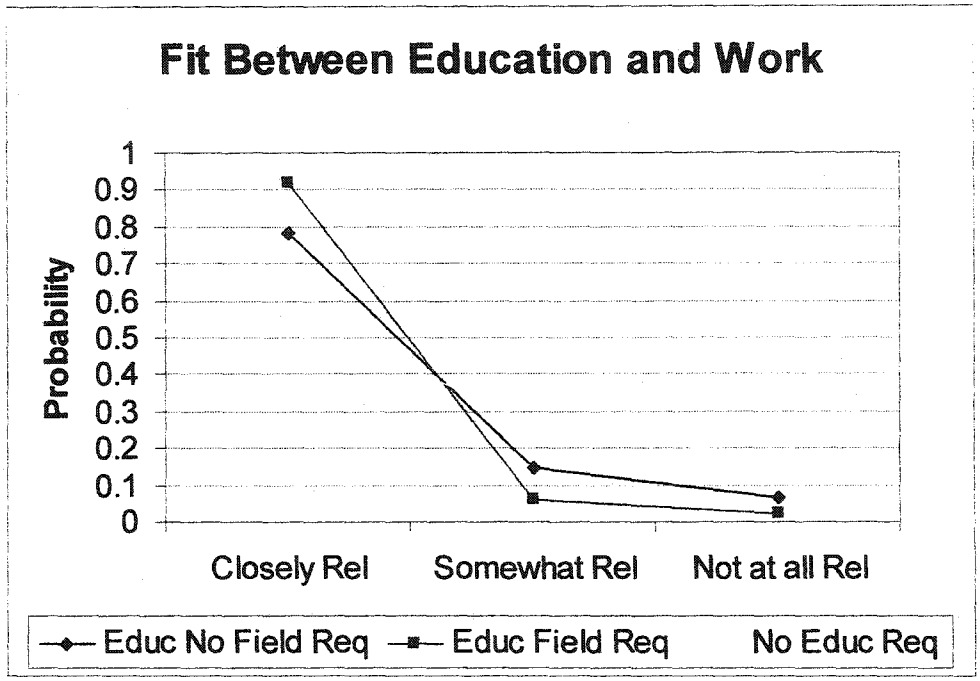
Both the education and occupation variables remain statistically significant at their previous levels ($p < .001$), but there are a few changes to some of the parameter estimates associated with these variables. For example, the coefficient for commerce graduates is no longer statistically significant, while the coefficient for engineering graduates achieved statistical significance ($p < .01$). The most notable changes occur for the parameter estimates for the master's and

Ph.D. graduates. After including the matching variable, graduates of the master's and Ph.D. programs are less likely to feel that their jobs are related to their schooling than they are when compared to the estimates from the previous model. Moreover, their respective parameter estimates are no longer statistically significant, suggesting that the differences that previously existed between them and university undergraduates are explained by the matching variable.

The parameter estimates for the matching variable are converted into the predicted probabilities and can be found in Figure 5.6. They illustrate that graduates who find themselves in jobs that require a postsecondary credential in their particular field of study have the highest likelihood of finding themselves in jobs that are directly related to their education (.92) and the lowest likelihood of being in jobs they feel are somewhat related (.06) and not at all related (.02). Graduates whose employers requested a postsecondary credential, but not in a specific area, also have a high probability (.78) of being employed in jobs that they feel to be directly related to their education. Their respective likelihoods of being employed in jobs they feel are somewhat related and unrelated to their education are .15 and .07. For graduates in jobs where the employer does not request a postsecondary credential, the likelihood of being employed in an occupation these graduates feel to be closely related to their education is fairly

low (.56). Conversely, their chances of finding themselves in jobs only somewhat related or unrelated to their work are .27 and .17, respectively. Thus, it is quite apparent that the requests made by employers for employees with specific academic credentials is a very powerful predictor of respondents' perceptions of the fit between their education and their work.

Figure 5.6


Fit Between Education and Work
Probability
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Closely Rel
Somewhat Rel
Not at all Rel
Educ No Field Req
Educ Field Req
No Educ Req

Summary of Results

Underemployment (Over-Education)

As was discussed at the beginning of this dissertation, underemployment is a problematic issue because it lowers expectations regarding the potential benefits of a postsecondary education, while at the same time raising a genuine concern in the minds of students, parents, and policy makers regarding the future of higher education. In general, the probability of becoming overeducated (as measured by comparing the level of schooling requested by employers relative to the level obtained by the graduates surveyed) is quite high for all graduates. The high level of over-qualification is probably attributable to the large numbers of postsecondary graduates, particularly those from college and trades programs, who find themselves in jobs that do not require any postsecondary credentials.

When looking at changes over time, the probability of having a higher level credential than requested by an employer actually declined for all postsecondary graduates who declared a field of study between 1984 and 1992. This is probably attributable to the fact that employers are beginning to request postsecondary credentials for jobs that previously did not require such credentials, simply in response to heightened attainment levels (see Livingstone, 1998: 213). On the other hand, this form of over-education increased for all graduates who declared a field of study between 1992 and 1997. This might suggest that employers have become more lax in their job requirements, or that graduates are earning advanced qualifications at a rate that exceeds the needs of employers. The first explanation is perhaps the most likely, since recent postsecondary

enrollment levels do not favour the latter interpretation (see Guppy and Davies, 1998).

Among the different levels of schooling, the results showed that graduates of professional programs are generally the least likely to be overeducated, while Ph.D. graduates are a distant second. Those with university undergraduate degrees are more likely than Ph.D. graduates to be overeducated, but less likely than college and trades graduates. Graduates with master's degrees are the most likely to find themselves in jobs that require less education than they have obtained. Interestingly other researchers have also reported that master's graduates experience high levels of overqualification (Lavoie and Finnie, 1997; Frenette, 2000). Not surprisingly, graduates of technical programs are less likely than are fine arts graduates to find themselves in jobs in which their credentials exceed those requested by their employers. However, the respective chances of being overeducated did not change much over the four-cohort period when comparing graduates of liberal arts programs with graduates of more applied fields such as engineering[145]. The latter finding is particularly important because it suggests that the employment demands, relative to the demands for highly educated labour, have not changed so that one skill set is being favoured over another.

Subjective Over-Education

The analysis of credentials is complemented by data on both objective and subjective assessments of over-education. Our findings for subjective

[145] However, in the most recent cohort the probability of health graduates feeling over-educated increased more dramatically than it has among graduates of other fields of study.

underemployment are largely consistent with the above results. Graduates of advanced and more technically oriented programs are generally the least likely to feel overqualified for their jobs[146]. The most startling finding is that a substantial number of postsecondary graduates feel overqualified for their current jobs, with liberal arts graduates being the most likely to feel this way. For example, about one-third of all social science graduates feel overqualified for their jobs, while an even higher proportion of fine arts and humanities graduates feel this way. At the same time, approximately one-quarter to one-fifth of the graduates of technical and applied programs feel overqualified for their jobs. This is still a significant minority. These high levels of over-education provide strong support for the credentialist assertion that the postsecondary system works against the interests of a large number of graduates.

However, this finding does not represent as serious challenge to the human capital theory as is suggested in the research literature (see Livingstone, 1998: 167, 170)[147]. Why not? Because, according to the human capital theory, underemployment is a function of supply and demand. As more and more individuals pursue higher levels of education the returns on postsecondary schooling begin to decline (Becker, 1975: 5). Therefore, according to this interpretation, underemployment is merely a by-product of the supply and demand relationship for higher education, highlighting the consequences of the

[146] The one noteworthy exception is that master's graduates are much less likely to feel over-educated than they are to be over-qualified. Perhaps this is because master's graduates are generally employed in the more desirable positions for which a university degree is a basic requirement.

[147] Livingstone (1998) argues that the growing credential gap is a major limitation of the human capital theory.

changing demand for postsecondary credentials over time. Furthermore, according to human capital theorists, underemployment is conceptualized as a temporary phenomenon that will persist until adjustments take place bringing the education-work relationship back into equilibrium once again.

Livingstone (1999: 223) believes underemployment is an important issue that will not be solved by a "frictional adjustment." However, the evidence on this issue is far from conclusive. While it was never the intention to test this assertion in this dissertation, the objective over-education regression results show that the extent of over-education clearly declined between 1982 and 1990, suggesting that the levels of postsecondary credentials obtained by graduates were declining relative to the credentials demanded employers. Conversely, a reverse pattern is observed when comparing graduates of the 1990 cohort with graduates of the 1995 cohort, where the credentials of graduates generally increased from the previous cohort, relative to those demanded by employers. Therefore, these results suggest that there was no clear upward or downward trend with respect to objective over-education during the period studied here. At the same time, these results neither support nor refute the assertion that objective over-education oscillates around an equilibrium, as is asserted by Becker (1974). It is simply too early to tell whether these changes reflect some underlying pattern.

Education-Job Mismatch

The results of our analysis of education-job mismatch provide some support for the human capital theory, given that they show that there is a strong connection between schooling and the needs of the labour market. Postsecondary

graduates with credentials that match those requested by their employers report a closer fit between their education and work than do graduates whose credentials do not directly match those recommended for their job, or graduates in jobs that do not require postsecondary credentials. In fact, the use of academic credentials by employers as job prerequisites clearly has a greater impact on whether respondents feel that their jobs are related to their occupations than the education and occupation variables combined. This implies that, contrary to what the credentialist theory might suggest, the educational qualifications recommended by employers for jobs are justified when one examines the subjective feelings of the respondents. It also suggests that employers are in tune with their employment needs, and that they are using education credentials to channel those with relevant skills into suitable jobs.

On the other hand, there are a large number of graduates, particularly graduates of liberal arts programs, who are in jobs that are not related to their schooling. While this does not refute the human capital theory, it does suggest that there is widespread mismatching of credentials in the labour market, leaving the talents of many educated people underutilized during the transition from school to work.

Chapter 6: Discussion and Conclusions

A major limitation of past research on the transitions from school to work is that studies have focused primarily on earnings and employment as labour market outcomes, and have paid much less attention to the utilization of skills. A central purpose of this dissertation was to build on past research in the area by exploring a variety of different labour market outcomes for trades, college, and university graduates of various fields of study, using four waves of National Graduates Surveys.

This chapter is broken down into four sections. The first section discusses the value of this dissertation to the existing body of research and its potential contribution to social policy. The next three sections successively address the potential limitations of this dissertation, outline suggestions for future research, and present the major conclusions.

Section One: Contribution to the Literature and Social Policy

A major limitation of the past research on earnings and employment is that there has been little emphasis on making comparisons over time, taking into account differences in levels of schooling and fields of study. By investigating the effects of both level of schooling and field of study on a number of labour market outcomes over time, while also controlling for the possible spurious effects of sociodemographic factors, this study is able to make a unique and valuable contribution to the research on transitions from school to work. A key issue identified at the beginning of this dissertation is whether or not college and

trades graduates have improved their employment opportunities relative to university undergraduates during a period when many argue that the economy requires increasing numbers of graduates with technical and applied expertise. Furthermore, questions remain regarding whether employers in the evolving knowledge-based economy have experienced changes over time in their needs for graduates with certain fields of study. As has been discussed in the literature review, there are two competing arguments. One is that the evolving economy requires graduates with technical and applied skills. Therefore, those who graduate from programs that provide these skills will be increasingly rewarded. The other position is that graduates with communication, and critical thinking skills, such as those acquired in liberal arts programs, will be increasingly needed in the emerging economy because their skills are more transferable. These issues and concerns were addressed in the statistical analysis, and the implications of the results are discussed below.

While others have recently strongly endorsed the economic benefits of a liberal arts postsecondary education (Allan, 1996; Axelrod et al., 2001), the results of this dissertation clearly suggest that the evolving "knowledge-based" economy favours graduates of the more applied and technical programs, particularly those in the fields of health and engineering, a finding that is consistent with those of other researchers (Finnie, 2001). While these results do not support the assertion that the demand for graduates in the social sciences and humanities is growing rapidly (see Allen, 1999b: 1), they do not suggest that the labour market outcomes for these graduates have deteriorated. In other words,

while graduates of professional and applied programs have clear labour market advantages on almost every outcome addressed here, this analysis did not present any evidence that the advantages of these graduates in comparison with liberal arts graduates have changed over time. [148] Therefore, these results do not suggest that the labour market needs of the 1980's and 1990's have shifted to markedly favour graduates with one form of skill set over graduates with another. Instead, they suggest that the late-twentieth-century economy needed a "mix" of graduates with both general and technical skills at various times to work in various capacities.

Recall that one objective of this study involved comparing the earnings of college and university undergraduates of different fields of study while controlling for possible background influences. Particular emphasis was placed on comparing community college graduates of technical and applied programs with graduates of liberal arts undergraduate programs. The regression results showed that graduates of college programs in two different fields, engineering and mathematics, earn more money than university undergraduates of social science programs. The results also illustrated that it is important to distinguish between liberal arts fields, because social sciences graduates earn significantly more than graduates of most community college programs, while the earnings of fine arts undergraduates, and to a lesser extent, humanities undergraduates, were outstripped by those of community college graduates with diplomas in a number of different fields.

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[148] While the descriptive earnings information suggests that the earnings of graduates of the liberal arts programs experienced a general decline relative to their counterparts in the more applied and

There are a number of other possible factors that may help to explain why graduates in certain fields differ in their labour market outcomes. For example, it is possible that these different outcomes are attributable to "gate-keeping" mechanisms used by many programs, especially professional programs, in order to enhance their status (Collins, 1979: 185)[149]. For example, some fields might be more selective than others, and, thus, be able to attract high quality applicants. Therefore, some fields may be able to raise the average wage and employment levels of their graduates simply by keeping their enrolment numbers low. Unfortunately, it is not possible to adequately test this assertion with the NGS data, as the appropriate variables are not available.

It is also possible that graduates of health and engineering, and professional programs, might have had clearer plans for their future careers when they first entered their programs. Those who enter liberal arts programs may have general rather than specific plans for their careers. If this is the case, it might shed some light on why liberal arts graduates are less likely to find themselves in jobs that are related to their academic credentials[150].

When addressing the analyses that involve time comparisons, it is also important to note that the employment situations and outcomes experienced by graduates of different cohorts are complex, and greatly affected by the volatility

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technically oriented programs, these findings are not supported by the regression results.

[149] "Gate-keeping" might also be used to ensure that the salaries of professionals are not undermined by allowing the supply of recently trained professionals in a field (for example, law or social work) to far outstrip the demand for these professionals

[150] At the same time, others might view this as an advantage of liberal arts programs. For example, part of the value of liberal arts undergraduate programs might lie in their ability to offer young adults the opportunity to have a "moratorium" period without deep, long-term commitments, so that they can be exposed to various options and figure out what to do with their lives and their careers.

of the economy. For example, recessions affect employment patterns (Krahn, 1991: 32). Thus, graduates belonging to the 1982 and 1990 cohorts experienced very different labour market conditions than did graduates belonging to the 1986 and 1995 cohorts. In addition, it is also possible that colleges and universities may change their admission policies during periods of recession, for example, by increasing enrolments to certain programs to meet the increased demand. This, in turn, may have subsequent effects on the labour market outcomes of graduates who entered their postsecondary programs during a time of recession. For example, most graduates of the 1995 cohort began their programs during the recession of the early 1990's. Therefore, their employment outcomes may have been affected to some extent by a possible increase in the supply of recent postsecondary graduates[151].

Nevertheless, the results from this dissertation suggest that when considering the high costs of a university education, not to mention the lengthier program requirements (relative to college or trades programs), many parents and potential postsecondary students may be unsure about the employment prospects of liberal arts graduates, and may favour a technical college education instead. However, it is important to point out that the true potential of a university undergraduate education in the liberal arts is underemphasized when one compares the labour market outcomes of university undergraduates with those of college and trades graduates. This is due to the fact that earning an undergraduate degree opens up additional opportunities to pursue further studies in graduate and

[151] Unfortunately, information regarding whether the enrolment practices of colleges and universities were changed during this period could not be obtained.

professional programs, where the labour market outcomes are generally better. In fact, graduates of liberal arts programs are more likely to stay in school and pursue higher level degrees than graduates of other fields (Statistics Canada, Applied Research Bulletin, 2001: 27)[152].

College and trades graduates, on the other hand, do not have the opportunity to continue on to medical school, graduate school, or law school. Moreover, while the knowledge and skills obtained in liberal arts programs do not appear to be directly rewarded in the labour market, they are in fact very useful. For example, liberal arts graduates can apply to law and graduate school and graduate programs, where critical thinking skills and the ability to write well and make clear presentations are essential. Thus, the modest labour market outcomes of liberal arts graduates, while a matter for concern, should not have a major impact on social policy, especially since the benefits of these programs may not be immediately obvious or observable (Axelrod et al., 2001).

The impact of "recycling" of postsecondary credentials is an important issue that has remained largely unexplored in the empirical research literature. The most interesting finding from this analysis is that university undergraduates who later obtain a college diploma generally earn less than university undergraduates who have not "recycled" through the system[153]. When these results are broken down according to field of study, a clearer understanding of the

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[152] The only exception is for biological and agricultural science graduates, who have slightly higher odds (1.5) of continuing their education (see Statistics Canada, Applied Research Bulletin, 2001: 27). The odds of continuing to a higher level for fine arts/humanities and social science graduates are 1.2 and 1.0, respectively. It does not seem surprising that graduates of university programs with the lowest earnings are most likely to continue on with their schooling.

[153] This, of course, is likely attributable to the high earnings of those with university undergraduate degrees in health and engineering.

financial implications of various types of "recycling" is gained. In general, it makes little sense for graduates with an applied or technical university degree to "recycle" through the system, as their earnings are already high. However, it seems that obtaining a college diploma may have advantages for university undergraduates in certain fields. For example, the earnings of those with university undergraduate degrees who later obtain college diplomas generally earn more than fine arts undergraduate degrees, and, to a lesser extent, those with humanities undergraduate degrees, regardless of the field of study chosen while in college. On the other hand, only "recycled" graduates of this category with college diplomas in engineering, mathematics, health, and commerce earn more than those with only university undergraduate social science degrees.

While the statistical analysis provides limited explanations for these results, an intuitive explanation can be offered regarding why those with university undergraduate degrees who later obtain technical college diplomas generally have lower earnings than their counterparts with only applied university degrees. For example, it might be that earnings are not completely related to technical skills, because the "recycled" students would have acquired these skills while in college. Instead, it might also suggest that the premium associated with higher education may indeed have something to do with innate ability or motivation, rather than just skill. Presumably, the most capable and highly motivated university graduates tend to apply for and be accepted by advanced level postsecondary programs. This is one reason why it is important to control for ability when investigating the transitions from school to work. Unfortunately,

due to the nature of the data and the variables available in the NGS, these arguments cannot be tested. Nonetheless, these results show that it is important for students to be informed about the potential advantages associated with obtaining an additional postsecondary credential. Given that thousands of graduates "recycle" their postsecondary credentials each year, people need to be better informed about the repercussions of such decisions.

These results also suggest that researchers and policy makers that should no longer conceptualize underemployment as a general problem of the postsecondary education system. Instead, it should be viewed as an issue that has different implications for graduates of various fields of study and levels of schooling. While underemployment is higher among some groups of graduates than among others, it is not inevitable. Underemployment can be most effectively reduced if more effort is made, perhaps through administrative workshops, tutorials, and even program restructuring, to help channel students with particular skill sets into jobs that require those very skills. At the same time, policy makers might also try to educate employers about the advantages of hiring the graduates of certain types programs.

These results clearly illustrate that even more attention should be paid to gender differences in the transition from school to work. Our results are consistent with those of earlier research (Finnie, 2000, 2001), and show that the earnings distribution becomes much more equitable as men and women move up the academic ladder. The results of this study suggest that this phenomenon is probably not attributable to gender differences in underemployment or the

perceived fit between education and work. However, it is possible that there is even greater gender differentiation of academic programs at the college and trades levels than at the university level. Counselors might investigate how male and female enrollment patterns vary by types of programs. The case of engineering, is especially important as the results convincingly illustrate that the female college engineering graduates earn considerably less than their male counterparts. However, women engineering graduates are the best paid women university graduates.

Section Two: Limitations

There are a number of limitations to this study that should be addressed. Most of these are a function of the NGS data. One of the most central concerns is that a number of important variables were not included in the NGS datasets. For example, it was not possible to control for whether the respondents are employed in unionized jobs. This may be a critical factor in determining earnings. In addition, there are no variables available that directly distinguish between private and public sector jobs. This may be important in explaining some of the differences between men and women in employment outcomes.

One particular problem with the NGS is that there are no variables that tap into ability, making it impossible to rule out the possibility of selection effects. Thus, it is not known whether higher education actually develops skill, as proponents of the human capital theory argue, or whether it merely filters individuals into their appropriate locations according to innate ability. Graduates of some selective postsecondary programs are probably inherently somewhat

more intelligent, motivated, and productive than graduates of other programs, simply because some programs have high admission criteria and reject many applicants, while others accept all applicants who qualify to enter university. This means that the effect of education on labour market outcomes, identified here, is probably partly attributable to some unmeasured inherent differences in ability and motivation. Without measures of ability, this distinction cannot be made. Unfortunately, this problem plagues most sociological research in the area.

Another limitation of the NGS is that some variables are not available in all surveys, or are not worded consistently across the four surveys. Since relevant data are not available in the previous NGS surveys, it is still not known whether levels of subjective underemployment have changed over time. This would enable us to determine differences in the experiences of various types of postsecondary graduates. In addition, there is an "ethnicity" variable that captured a wide range of ethnic groups and minorities; however this was not used as a control variable in the analysis because it was not available in the earlier surveys. Moreover, unlike other Statistics Canada surveys, the National Graduates Survey did not distinguish between first, second, and third responses, making it very difficult to appropriately recode ethnicity into mutually exclusive usable categories. Let us hope that future versions of the National Graduates Surveys will address this problem.

One other concern about the data is not so much a limitation of the NGS. Rather, it relates to the design of the survey. Since the NGS is a survey of postsecondary graduates, it is not possible to directly compare the labour market

outcomes of college and university graduates with those of high school graduates. The analysis could have been more comprehensive if the labour market outcomes of postsecondary graduates could be compared directly with those of high school graduates. This would providing us with a much better assessment of the general labour market advantages of postsecondary education.

More precise information regarding the "recycled" graduates' programs, accompanied by more sophisticated, even longitudinal, statistical analysis is required for a more detailed examination of the financial implications of "recycling." Additional program information, in particular, would help provide further explanations for the "recycling" results. For example, are there some college programs that tend to restrict enrolment to students with undergraduate university degrees? [154] It is quite reasonable that these types of selective college programs would have better labour market outcomes for their graduates than other less selective college programs[155]. Our inability to extract this information from the NGS data limits the generalizations that can be made from our results [156].

Another limitation is that the NGS does not include variables that adequately address social class. Therefore, trends related to social class in the labour market outcomes of recent postsecondary graduates could not be explored in this analysis. The impact of social class on educational attainment and outcomes has been a growing concern among policy makers over the last few

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[154] It is also not uncommon to find colleges and universities working together to offer joint degrees in certain programs, or to find some of the more attractive college programs to be taken over by universities (For example, nursing).

[155] Although these graduates would not qualify to be "recycled," as classified in this study.

[156] Furthermore, in light of the increasingly close linkages between college and university undergraduate programs, it will be all the more important to account for the growing diversity of joint programs in future analyses.

decades as the costs of education have increased and have shifted from the public sector to the students (Statistics Canada, Applied Research Bulletin, 2001: 28; see also Finnie and Gameau, 1996)[157]. This is a genuine concern since students of higher class families are more likely to have family support than are students of lower class families.

Finally, this dissertation is limited primarily to an empirical evaluation of transitions from school to work. Thus, there are some substantive and theoretically important issues related to schooling and work that were not addressed. For example, critical assertions that the real purpose of schooling is to shape and values, attitudes, and habits and to certify individuals rather than to provide skills are prevalent in the literature (see Davies 1996 for a review; see also Hunter, 1988: 753). However, these could not be empirically assessed or empirically evaluated in this dissertation. Instead, our discussion of theory is limited to the central debates between the human capital and credentialist theorists[158].

Section Three: Future research

It is to be hoped that future research will explore issues that could not be fully addressed in this dissertation. Below are suggestions as to how researchers can build on the results of this study and continue to analyze the National

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[157] In fact, the amount of student debt has increased substantially. For example, college and university undergraduates alone owed 65% more (at the time of graduation) in 1990 than they did in 1982 (Statistics Canada's Applied Research Bulletin, 2001: 28; see also Finnie and Gameau, 1996).

[158] While a greater emphasis on critical interpretations of the various functions of schooling would be enlightening and theoretically interesting, these issues were never central to this dissertation Moreover, as interesting as they are, Marxian theories are difficult to challenge because they often cannot be empirically tested (Davies, 1995).

Graduates Surveys in order to further develop the body of research on the transition from school to work.

First, the supplementation of descriptive earnings results with multivariate analyses could be utilized far more extensively by researchers, especially since the results obtained here using the two approaches are inconsistent. For example, when looking at the mean earnings of graduates with different levels of schooling, it appears that the earnings gap between those with university undergraduate degrees and the graduates of trades programs has increased over time, and that the earnings gap between college graduates and university graduates, particularly males, has also increased. However, the regression results suggest the opposite. They suggest that university undergraduates have, in fact, strengthened their earnings advantage over time. These discrepancies indicate why it is extremely important to control for all possible explanations when investigating transitions from school to work.

Second, the results also suggest that gender issues should be a central focus in future research on the transition from school to work. The surprising finding of increasing gender disparities in earnings between 1992 and 1997 could suggest that earlier policies and efforts to curb gender differences in earnings may no longer be working. Future research on this issue will help determine whether this is an anomaly or whether this is some underlying trend that requires further policy intervention. The next version of the NGS, which involves interviews to be conducted in 2002 with those who graduated in 2000, will be particularly useful and will allow researchers to make further comparisons.

Third, while research seems to focus on overqualification and the mismatch of postsecondary graduates, this study surprisingly found that very little of the variation in earnings of postsecondary graduates could be explained by these factors. This might suggest that over-education is not as problematic (at least in terms of its financial implications) as earlier investigators have suggested. However, the implications of mismatch and under-employment for quality of life issues, for example, one's ability to fulfill life goals, and level of job satisfaction, are important matters and they remain largely unexplored. Therefore, a more thorough effort should be made to understand the broader implications of underemployment and mismatch.

Fourth, comparisons of postsecondary graduates over a longer period of time would be extremely valuable. Fortunately, the two-year follow-up survey of 2000 graduates is under way, and when the data become available, researchers will be able to compare the employment outcomes of the 2000 graduates with those of earlier cohorts. The 2000 NGS will be particularly valuable to those conducting research on the changing needs of the economy, given that the graduates of this cohort are more likely to have been affected by the recent rapid expansion of the Internet and other forms of information technology.

In addition to the new economy, there are a number of other factors that will affect the labour market outcomes of graduates of different fields of study in the future. For example, the demographic shift will have major implications for future graduates, especially those of teaching and health-related fields. For example, the retirement of teachers and other public service employees will

certainly affect the employment opportunities of large numbers of postsecondary graduates in the near future. David Foot and Daniel Stoffman (1997: 52) argue that, beginning in 1997 health fields will rapidly expand because of the greater need for health care services given the aging of the Canadian population. Furthermore, implications of this demographic shift will probably be different for men and women, particularly if postsecondary programs and occupational sectors continue to be segregated by gender.

Lastly, while some researchers have examined the longitudinal files for earlier versions of the National Graduates Surveys (Finnie and Frenette, 2000; Finnie, 2001), we still know very little about the earnings trajectories of postsecondary graduates, particularly those belonging to recent cohorts. When the five-year follow-up for the 1995 NGS becomes available, it will be possible to determine whether the earnings trajectories of 1995 graduates of different fields of study from college and university programs have changed between 1997 and 2002. This is an intriguing issue because earlier research, drawing on data from a sample of university graduates surveyed in 1993 and 1997, suggests that it takes some time before the more transferable skills obtained by the graduates of liberal arts programs actually translate into labour market advantages (Drewes, 2002; see also Finnie and Frenette, 2000: 15). However, further research is needed before any definitive conclusions can be drawn. The analysis of the five-year follow-up for the 1995 NGS will help us to answer this question.

The longitudinal file for the 1995 cohort will also enable us to compare the earnings trajectories of male and female graduates. Using only the 1982,

1986, and 1990 NGS, Finnie (2000) found that men's earnings profiles were steeper than women's profiles for every set of university graduates. The extent of the gender differences that he observed remained relatively constant over the eight-year period. However, our findings suggest that the gender gap in earnings as experienced by 1995 graduates (surveyed in 1997) has widened. It would be interesting to see whether the earnings trajectories of male and female graduates belonging to this cohort differ from those of previous cohorts.

We need to have a comprehensive assessment of the returns on postsecondary schooling. It is clear that the different costs of various postsecondary programs must be taken into account. Such a project would involve tracking individuals over long periods. Detailed information on the tuition costs of various programs would also be required. While this kind of longitudinal analysis would be quite costly and time-consuming, it would be invaluable to students and policy makers.

Section Four: Concluding Comments

The regression results provide some support for both the human capital and the credentialist positions. On the one hand, when one controls for other possible factors, one finds that graduates with higher levels of schooling generally have better labour market outcomes, and that this has not changed over the four cohorts. The relative returns on higher education do not seem to have declined over time. As well, graduates who find themselves in jobs that are related to their schooling are likely to earn more than graduates in jobs where there is little correspondence between job requirements and schooling. This further highlights the importance of skill utilization. At the same time, it shows that education is

particularly valuable if students can be channeled according to their credentials into suitable occupations. Lastly, the results suggest that there is a close correspondence between education and labour market outcomes because the credential requirements used by employers are actually found to be useful when selecting graduates with the necessary skills. All of these findings support the human capital approach. On the other hand, the high levels of underemployment and job mismatch, particularly among the graduates of liberal arts programs, support the credentialists' concerns about the negative consequences of rampant credentialism. While this does not undermine the human capital theory (as some have suggested), it does demonstrates that the workings of the credentials market can be detrimental for a substantial minority of postsecondary graduates.

It is unfortunate that many young students find themselves in a "catch-twenty-two situation." They are being forced to upgrade their credentials in order to improve their employment prospects, but, at the same time, their upgrading creates credential inflation and underemployment among large numbers of postsecondary graduates (Collins, 1979). However, our study suggests that underemployment is not so much a general problem resulting from the over-enrolment in the postsecondary sector. Rather, the problem is that certain programs do not meet the changing needs of the economy.

At the same time, this study clearly shows that the majority of postsecondary graduates do not feel overqualified for their jobs. For example, while one-third of undergraduates of social science programs feel overqualified for their current jobs, the remaining two-thirds of them are likely to feel that they

have jobs that meet their expectations, given their credentials. Thus, for the majority of students, even liberal arts programs can lead to fulfilling occupations. This finding has not been emphasized in the research literature.

If directed properly, these postsecondary graduates who are unaware of the potential usefulness of their credentials can be shown how they can improve their labour market outcomes. More effort should be made to publicize these patterns. Students and their parents should be better informed, perhaps through newspaper and magazine articles and television programs. Postsecondary administrators and policy makers should better channel students in appropriate directions, so that, in addition to satisfying their intellectual curiosity, they will be more likely to be able to fulfill their occupational aspirations.

Appendix A

Appendix A includes all of the parameter estimates for the ordinary least squares regression results for earnings in chapter 4, as well as a discussion of the parameter estimates for the sociodemographic variables in models 1 and 2.

The Appendix Table 4.2 provides the complete ordinary least squares results for the earnings analysis in chapter 4. In Model 1, all of the sociodemographic variables in the model are all statistically significant ($p < .001$), and explain just over 13 percent ($R^2 = .134$) of the variation in earnings. The parameter estimates show that most of the variables from Model 1 are related to earnings in a predictable way. For example, when controlling for the other sociodemographic variables, men earn considerably more than women ($p < .001$)[1]. Married respondents earn more than respondents who were single at the time of the survey, as well as those who were previously married (separated, divorced or widowed). However, the difference between those who are single and those previously married is not statistically significant.

Graduates residing in Ontario (the reference category) at the time of the survey have the highest earnings. They earn more than graduates residing in the Western provinces, who in turn, earn more than those from Quebec.

In general, postsecondary graduates earn more if their parents (mother or father) have higher levels of education. Although, graduates whose mothers have a professional degree actually earned less than graduates whose mothers did not even graduate from high school. The parameter estimates for the number of children variable indicate that graduates without children earn the most ($p>.001$).

[1] When not otherwise stated, the relationships between the dependent variable and each independent variable are to be interpreted as controlling for all of the other variables included in the respective models.

Interestingly, graduates with two children actually earn more than graduates with one child. Not surprisingly, graduates with three or more children earn the least.

The 1986 graduates have the highest real earnings of all four cohorts. They are followed by 1982 graduates, and then by 1990 graduates. Graduates from the 1995 cohort, those surveyed in 1997, had the lowest real earnings. The difference between them and graduates belonging to each of the other three cohorts is statistically significant ($p < .001$). This pattern is not all that surprising, because graduates from the 1982 cohort were probably greatly affected by the recession of the early 1980's, whereas graduates from the 1986 cohort were surveyed in 1988, during more prosperous economic times. At the same time, the 1990 graduates were surveyed during the recession period of the early 1990's, and this would explain their lower earnings. The significantly lower earnings of the 1995 graduates is somewhat unexpected, but it might reflect a prolonged labour market adjustment to the inflated earnings of the late 1980's.

When one controls for the other sociodemographic variables, the effect of age on earnings remains statistically significant ($p < .001$). As was discussed in Chapter 3, the age variable is entered into the models as a series of dummy variables, representing each year of age from 21 to 45. The age coefficients are plotted against age in the top left-hand corner of Figure A1.

Model 2 includes the interaction between sex and the variable used to distinguish between the four different NGS cohorts. The interaction term is statistically significant ($p < .001$), suggesting that the relationship between gender and earnings depends on cohort membership. The inclusion of the interaction

term does not change any of the coefficients that are not involved in the interaction. As can see from the graph in Figure A2, when one controls for sociodemographic variables, the real earnings for men increased quite substantially from 1982 cohort to the 1986 cohort. For women, on the other hand, the increase was much less dramatic. However, when one compares the experiences of the 1986 cohort with those of the 1990 cohort, one sees almost the reverse pattern. The real earnings of men decline dramatically, whereas the real earnings decline for women is slight. In fact, the gender earnings ratio is smallest for graduates belonging to the 1990 cohort. When one compares the experiences of members of 1990 cohort with those of members of the 1995 cohort, one sees further declines in real earnings. However, this time it is much more pronounced for women than for men. The gender earnings ratio is highest among graduates from the most recent (1995) cohort.

Appendix Table 4.2
Ordinary Least Squares Regression: Real Earnings

	Model 1			Model 2			Model 3			Model 4			Model 5			Model 6		
	b	Std E	p	b	Std E	p	b	Std E	p	b	Std E	p	b	Std E	p	b	Std E	p
Constant	1.204	0.0080	***	1.219	0.0081	***	1.338	0.0079	***	1.321	0.0084	***	1.335	0.0082	***	1.335	0.0082	***
Sex			***			***			***			***			***			***
Women	-0.082	0.0015	***	-0.111	0.0027	***	-0.104	0.0026	***	-0.086	0.0028	***	-0.062	0.0026	***	-0.060	0.0026	***
Men	---	---		---	---		---	---		---	---		---	---		---	---	
Marital Status			***			***			***			***			***			***
Married	0.034	0.0018	***	0.034	0.0018	***	0.025	0.0017	***	0.025	0.0016	***	0.021	0.0015	***	0.019	0.0015	***
Separated/Divorced/Wid	-0.005	0.0043		-0.006	0.0043		0.010	0.0040	*	0.011	0.0039	**	0.005	0.0036		0.003	0.0035	
Single	---	---		---	---		---	---		---	---		---	---		---	---	
Region			***			***			***			***			***			***
Eastern Provinces	-0.070	0.0029	***	-0.070	0.0029	***	-0.064	0.0027	***	-0.066	0.0027	***	-0.063	0.0024	***	-0.063	0.0024	***
Quebec	-0.044	0.0033	***	-0.044	0.0033	***	-0.047	0.0031	***	-0.051	0.0031	***	-0.038	0.0028	***	-0.036	0.0028	***
Western Provinces	-0.020	0.0019	***	-0.020	0.0019	***	-0.014	0.0017	***	-0.016	0.0017	***	-0.012	0.0016	***	-0.013	0.0016	***
Ontario	---	---		---	---		---	---		---	---		---	---		---	---	
Mother's Education			***			***			***			***			***			***
High school	0.021	0.0021	***	0.021	0.0021	***	0.012	0.0020	***	0.011	0.0020	***	0.008	0.0018	***	0.006	0.0017	***
Some post-secondary	0.017	0.0036	***	0.018	0.0036	***	0.008	0.0034	*	0.008	0.0033	*	0.007	0.0030	*	0.010	0.0030	***
Trade	0.025	0.0049	***	0.026	0.0049	***	0.015	0.0045	***	0.016	0.0045	***	0.007	0.0041		0.007	0.0041	
College	0.022	0.0028	***	0.022	0.0028	***	0.006	0.0026	*	0.006	0.0026	*	0.003	0.0024		0.001	0.0023	
University	0.027	0.0033	***	0.026	0.0033	***	0.008	0.0030	**	0.008	0.0030	*	0.007	0.0028	**	0.007	0.0027	*
Master's	0.033	0.0067	***	0.033	0.0067	***	0.017	0.0062	**	0.017	0.0062	**	0.012	0.0056		0.013	0.0055	*
Professional	-0.019	0.0170		-0.019	0.0170		-0.030	0.0158		-0.031	0.0157	*	-0.018	0.0142		-0.017	0.0140	
Ph.D.	0.077	0.0148	***	0.078	0.0148	***	0.045	0.0138	***	0.044	0.0137	***	0.039	0.0125	**	0.045	0.0124	***
Don't Know	-0.036	0.0040	***	-0.036	0.0040	***	-0.014	0.0037	***	-0.012	0.0037	***	-0.012	0.0034	***	-0.010	0.0033	**
Less than High school	---	---		---	---		---	---		---	---		---	---		---	---	
Father's Education			***			***			***			***			***			***
High school	0.007	0.0022	***	0.007	0.0022	***	0.003	0.0021		0.003	0.0021		0.003	0.0019		0.003	0.0018	
Some post-secondary	0.013	0.0038	***	0.013	0.0038	***	0.010	0.0036	**	0.010	0.0036	**	0.011	0.0032	***	0.010	0.0032	***
Trade	0.011	0.0039	**	0.011	0.0039	**	0.008	0.0036	*	0.007	0.0036	*	0.007	0.0032	*	0.005	0.0032	
College	0.011	0.0036	**	0.011	0.0036	**	0.004	0.0034		0.003	0.0033		0.000	0.0030		0.000	0.0030	
University	0.021	0.0030	***	0.021	0.0030	***	0.003	0.0028		0.004	0.0028		0.002	0.0025		0.001	0.0025	
Master's	0.032	0.0047	***	0.032	0.0047	***	0.008	0.0044		0.009	0.0043	*	0.007	0.0040		0.005	0.0039	
Professional	0.029	0.0061	***	0.029	0.0061	***	-0.001	0.0057		0.000	0.0057		-0.002	0.0052		-0.002	0.0051	
Ph.D.	0.013	0.0064	*	0.012	0.0064		-0.020	0.0060	***	-0.017	0.0060	**	-0.013	0.0054	*	-0.014	0.0054	**
Don't Know	-0.016	0.0034	***	-0.017	0.0034	***	-0.004	0.0032		-0.005	0.0032		-0.005	0.0029		-0.005	0.0028	
Less than High school	---	---		---	---		---	---		---	---		---	---		---	---	

Appendix Table 4.2 Continued

	Model 1			Model 2			Model 3			Model 4			Model 5			Model 6		
	b	Std E	p	b	Std E	p	b	Std E	p	b	Std E	p	b	Std E	p	b	Std E	p
Number of Children			***			***			***			***						
One child	-0.034	0.0028	***	-0.033	0.0028	***	-0.016	0.0026	***	-0.016	0.0026	***	-0.001	0.0024		-0.001	0.0023	
Two children	-0.029	0.0032	***	-0.029	0.0032	***	-0.009	0.0030	**	-0.010	0.0030	***	0.002	0.0027		0.003	0.0027	
Three or more children	-0.040	0.0045	***	-0.040	0.0045	***	-0.013	0.0042	**	-0.013	0.0042	***	0.001	0.0038		0.003	0.0037	
No children	---	---		---	---		---	---		---	---		---	---		---	---	
Language			***			***			***			***			***			***
French	0.017	0.0033	***	0.016	0.0033	***	0.015	0.0031	***	0.016	0.0031	***	0.014	0.0028	***	0.010	0.0027	***
English	---	---		---	---		---	---		---	---		---	---		---	---	
Age			***			***												
NGS Cohort			***			***			***			***			***			***
1982	0.061	0.0022	***	0.040	0.0030	***	0.032	0.0028	***	0.062	0.0063	***	0.033	0.0057	***	0.038	0.0057	***
1986	0.072	0.0020	***	0.056	0.0029	***	0.049	0.0027	***	0.074	0.0058	***	0.046	0.0053	***	0.043	0.0052	***
1990	0.049	0.0020	***	0.021	0.0030	***	0.008	0.0028	**	0.019	0.0056	***	0.006	0.0051		-0.001	0.0051	
1995	---	---		---	---		---	---		---	---		---	---		---	---	
Sex*NGS Cohort						***			***			***			***			***
Sex*NGS 82				0.040	0.0042	***	0.039	0.0039	***	0.011	0.0044	*	0.005	0.0041		0.006	0.0040	
Sex*NGS 86	R-square .0140			0.030	0.0039	***	0.025	0.0037	***	0.001	0.0041		-0.003	0.0038		-0.008	0.0037	
Sex*NGS 90	Adj R-square .0135			0.052	0.0040	***	0.057	0.0038	***	0.037	0.0042	***	0.029	0.0038	***	0.026	0.0037	***
Field of Study	n=89278								***			***			***			***
Education							0.011	0.0027	***	0.007	0.0047		0.010	0.0045	*	-0.001	0.0044	
Fine Arts				R-square .1358			-0.070	0.0039	***	-0.058	0.0071	***	-0.050	0.0067	***	-0.044	0.0069	***
Humanities				Adj R-square .1353			-0.055	0.0033	***	-0.056	0.0061	***	-0.048	0.0057	***	-0.034	0.0057	***
Commerce				n=89278			0.043	0.0024	***	0.063	0.0043	***	0.034	0.0040	***	0.017	0.0040	***
Agricultural/Bio Sci							-0.017	0.0035	***	-0.003	0.0064		-0.031	0.0060	***	-0.037	0.0059	***
Engineering/Ap Science							0.095	0.0027	***	0.136	0.0047	***	0.075	0.0045	***	0.057	0.0044	***
Health Professions							0.117	0.0028	***	0.090	0.0051	***	0.052	0.0052	***	0.033	0.0051	***
Math							0.066	0.0040	***	0.086	0.0075	***	0.036	0.0071	***	0.021	0.0070	**
Other							-0.014	0.0051	**	-0.036	0.0110	***	-0.029	0.0101	**	-0.026	0.0100	**
Social Sciences							---	---		---	---		---	---		---	---	
Level of Schooling									***			***			***			***
Trades							-0.182	0.0023	***	-0.175	0.0039	***	-0.140	0.0037	***	-0.135	0.0037	***
College							-0.091	0.0019	***	-0.105	0.0033	***	-0.082	0.0031	***	-0.083	0.0030	***
Professional							0.069	0.0042	***	0.029	0.0077	***	0.004	0.0070		-0.017	0.0070	*
Master's							0.110	0.0030	***	0.108	0.0053	***	0.090	0.0049	***	0.095	0.0049	***
Ph.D.							0.098	0.0077	***	0.087	0.0133	***	0.056	0.0123	***	0.047	0.0123	***
University Undergrad							---	---		---	---		---	---		---	---	

Appendix Table 4.2 Continued

	Model 3	Model 4			Model 5			Model 6		
		b	Std E	p	b	Std E	p	b	Std E	p
NGS*Field of Study				***			***			***
NGS 82*FOS Education		0.016	0.0078	*	0.016	0.0071	*	0.012	0.0070	
NGS 82*FOS Arts	R-square 2560	-0.015	0.0112		-0.009	0.0102		-0.018	0.0105	
NGS 82*FOS Human	Adj R-square 2554	-0.003	0.0098		0.010	0.0089		0.002	0.0088	
NGS 82*FOS Commer	n=88941	-0.038	0.0071	***	-0.014	0.0065	*	-0.019	0.0064	**
NGS 82*FOS Agricult		-0.012	0.0101		0.008	0.0093		0.000	0.0092	
NGS 82*FOS Engin		-0.064	0.0077	***	-0.035	0.0070	***	-0.028	0.0070	***
NGS 82*FOS Health		0.044	0.0083	***	0.026	0.0077	***	0.012	0.0076	
NGS 82*FOS Math		-0.015	0.0123		0.007	0.0112		0.006	0.0110	
NGS 82*FOS Other		0.019	0.0193		0.024	0.0176		0.013	0.0173	
NGS 86*FOS Education		-0.007	0.0074		-0.015	0.0067	*	-0.011	0.0065	
NGS 86*FOS Arts		0.002	0.0104		0.004	0.0095		0.004	0.0095	
NGS 86*FOS Human		0.010	0.0091		0.015	0.0083		0.007	0.0081	
NGS 86*FOS Commer		-0.031	0.0065	***	-0.018	0.0059	**	-0.013	0.0058	*
NGS 86*FOS Agricult		-0.018	0.0094	*	-0.007	0.0086		0.000	0.0084	
NGS 86*FOS Engin		-0.064	0.0071	***	-0.042	0.0065	***	-0.036	0.0064	***
NGS 86*FOS Health		0.030	0.0076	***	0.020	0.0070	**	0.028	0.0068	***
NGS 86*FOS Math		-0.035	0.0104	***	-0.022	0.0096	*	-0.015	0.0094	
NGS 86*FOS Other		0.028	0.0135	*	0.015	0.0123		0.015	0.0121	
NGS 90*FOS Education		0.013	0.0071		0.002	0.0064		0.007	0.0063	
NGS 90*FOS Arts		-0.050	0.0112	***	-0.017	0.0101		-0.014	0.0102	
NGS 90*FOS Human		-0.005	0.0090		0.012	0.0082		0.001	0.0081	
NGS 90*FOS Commer		-0.016	0.0064	*	-0.009	0.0058		-0.001	0.0058	
NGS 90*FOS Agricult		-0.029	0.0095	**	-0.021	0.0087	*	-0.021	0.0085	*
NGS 90*FOS Engin		-0.043	0.0071	***	-0.033	0.0065	***	-0.024	0.0064	***
NGS 90*FOS Health		0.038	0.0075	***	0.038	0.0069	***	0.047	0.0067	***
NGS 90*FOS Math		-0.026	0.0108	*	-0.017	0.0098		-0.006	0.0097	
NGS 90*FOS Other		0.025	0.0156		0.027	0.0142		0.028	0.0140	*
NGS*Level				***			***			***
NGS 82*Trades		-0.021	0.0059	***	-0.010	0.0055		-0.008	0.0054	
NGS 82*College		0.015	0.0051	**	0.011	0.0047	*	0.005	0.0046	
NGS 82*Professional		0.060	0.0125	***	0.070	0.0113	***	0.048	0.0121	***
NGS 82*Master's		0.013	0.0082		0.017	0.0075	*	0.016	0.0075	*
NGS 82*Ph.D.		0.009	0.0231		0.022	0.0211		0.023	0.0210	
NGS 86*Trades		-0.005	0.0057		0.001	0.0052		-0.008	0.0051	
NGS 86*College		0.018	0.0046	***	0.009	0.0042	*	0.006	0.0041	
NGS 86*Professional		0.059	0.0115	***	0.068	0.0104	***	0.078	0.0102	***
NGS 86*Master's		-0.005	0.0078		0.004	0.0071		0.004	0.0070	

Appendix Table 4.2 Continued

	Model 4			Model 5			Model 6		
	b	Std E	p	b	Std E	p	b	Std E	p
NGS*Level Cont									
NGS 86*Ph.D.	0.000	0.0213		0.021	0.0194		0.024	0.0189	
NGS 90*Trades	0.003	0.0058		0.013	0.0053	*	0.002	0.0052	
NGS 90*College	0.026	0.0048	***	0.023	0.0044	***	0.019	0.0043	***
NGS 90*Professional	0.047	0.0108	***	0.056	0.0098	***	0.072	0.0096	***
NGS 90*Master's	0.000	0.0076		0.006	0.0069		0.006	0.0068	
NGS 90*Ph.D.	0.031	0.0190		0.039	0.0172	*	0.040	0.0169	*
Occupation Type						***			***
Manager, admin				0.023	0.0032	***	0.036	0.0032	***
Natural Sci, Engineering	R-square .2611			0.038	0.0037	***	0.041	0.0036	***
Religion	Adj R-square .2501			-0.154	0.0117	***	-0.169	0.0113	***
Teaching & Related	n=88941			0.024	0.0034	***	0.020	0.0033	***
Medicine & Health				0.054	0.0042	***	0.055	0.0041	***
Art, Literary, Recreation				-0.015	0.0046	***	-0.007	0.0046	
Clerical & Related				-0.053	0.0033	***	-0.024	0.0033	***
Sales				-0.027	0.0038	***	0.005	0.0038	
Service				-0.064	0.0036	***	-0.032	0.0036	***
Manual Labour				-0.003	0.0035		0.030	0.0035	***
Social Science Occup				---	---		---	---	
Occupational status						***			***
Part-time				-0.277	0.0021	***	-0.265	0.0020	***
Full-time				---	---		---	---	
Overeducation									***
More education				R-square .4109			-0.037	0.0014	***
Less education				Adj R-square .4100			0.006	0.0034	
Indeterminable				n=85707			-0.020	0.0028	***
Same education							---	---	
Related									***
Closely related							0.073	0.0019	***
Somewhat related							0.057	0.0019	***
Not at all related							---	---	
							R-square .4382		
							Adj R-square .4373		
							n=82797		

*** = p < .001
** = p < .01
* = p < .05

Figure A1

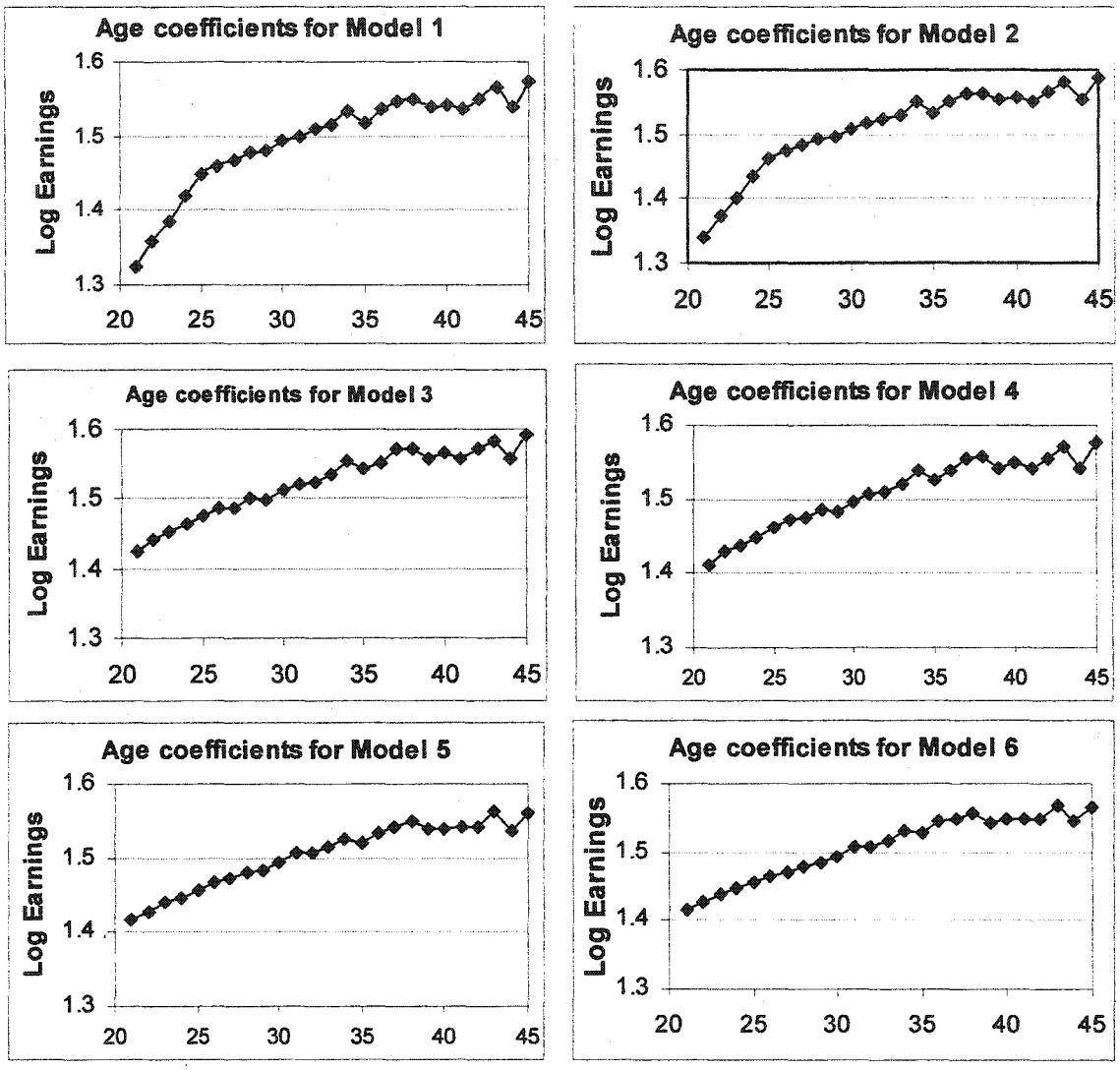
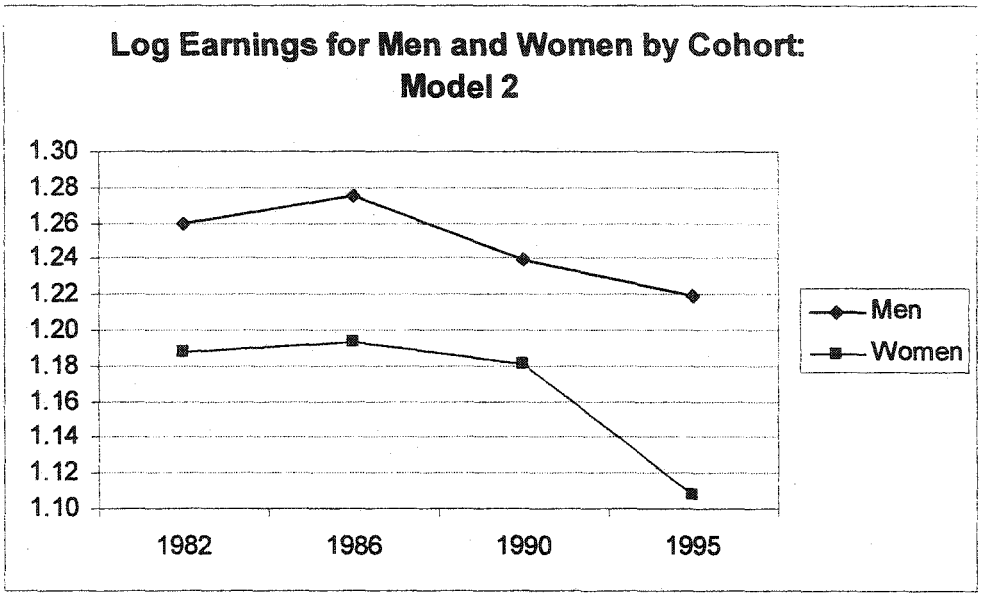
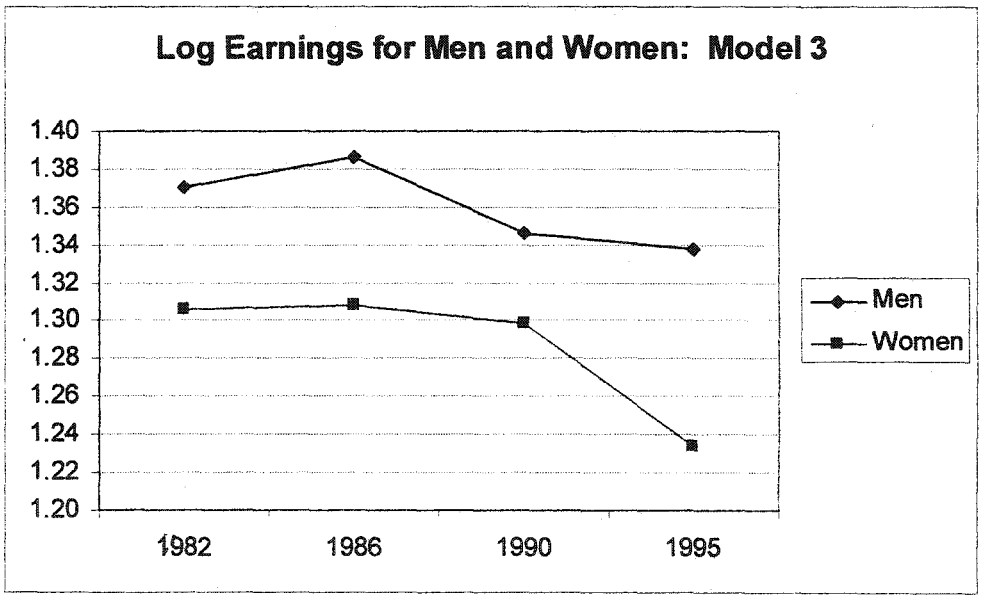

Age coefficients for Model 1
Log Earnings
1.6
1.5
1.4
1.3
20 25 30 35 40 45
Age coefficients for Model 2
Log Earnings
1.6
1.5
1.4
1.3
20 25 30 35 40 45
Age coefficients for Model 3
Log Earnings
1.6
1.5
1.4
1.3
20 25 30 35 40 45
Age coefficients for Model 4
Log Earnings
1.6
1.5
1.4
1.3
20 25 30 35 40 45
Age coefficients for Model 5
Log Earnings
1.6
1.5
1.4
1.3
20 25 30 35 40 45
Age coefficients for Model 6
Log Earnings
1.6
1.5
1.4
1.3
20 25 30 35 40 45

Figure A2


Log Earnings for Men and Women by Cohort: Model 2
1.30
1.28
1.26
1.24
1.22
1.20
1.18
1.16
1.14
1.12
1.10
1982
1986
1990
1995
Men
Women


Log Earnings for Men and Women: Model 3
1.40
1.38
1.36
1.34
1.32
1.30
1.28
1.26
1.24
1.22
1.20
1982
1986
1990
1995
Men
Women

Appendix B

Appendix B includes all of the parameter estimates for logistic results for employment status in chapter 4, as well as a discussion of the parameter estimates for sociodemographic variables in models 1 and 2 of this analysis.

The Appendix Table 4.3, presents the logistic regression results for the employment analysis in chapter 4. The pseudo R^2 for Model 1 is .041. Except for the language variable, the relationships between each of the independent variables and the dependent variable are statistically significant ($p < .001$)[1]. The parameter estimates for the gender variable suggest that women are more likely than are men to be employed part time rather than full time ($p < .001$)[2]. They are also more likely than men to be unemployed rather than employed full time, but this difference is not statistically significant. Somewhat surprisingly, respondents who were single at the time of the survey are most likely to be employed part time as opposed to full-time. Previously married respondents are least likely to be employed part-time ($p < .01$). And married respondents are only slightly more likely than single respondents to be employed part time ($p < .05$). The marital status parameter estimates show a slightly different picture for the "unemployed" response category. Single respondents are most likely to be unemployed, but the difference between them and previously married respondents is not statistically significant. The married respondents were least likely to be unemployed at the time of the interview; the difference between them and the reference category (single respondents) is statistically significant ($p < .001$).

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[1] Wald tests were made using the parameter estimates for both the employed-part-time and unemployed categories of the dependent variable.

[2] All significance tests are interpreted relative to the base-line category (employed full-time) for the dependent variable.

In comparison with graduates from Ontario, graduates from Quebec are most likely to be employed part time rather than full time ($p < .001$). As well, graduates from the Western and Eastern provinces, respectively, are more likely than Ontario graduates to be employed part time ($p < .001$). Graduates surveyed in Ontario are also least likely to be unemployed as opposed to being employed full time, whereas graduates from the Eastern provinces have the greatest likelihood of being unemployed ($p < .001$). Graduates from Quebec are also more likely than are graduates from Ontario to be unemployed ($p < .001$), as are graduates from the Western provinces ($p < .01$).

While the parental education variables are both statistically significant, the parameter estimates do not suggest that there is a clear pattern for the relationship between parental education and employment outcomes. Somewhat surprisingly, graduates whose mothers have a professional degree are most likely to be unemployed or employed part-time, rather than full-time. Graduates whose fathers have doctorates are the group most likely to be unemployed or to be employed part time rather than full time.

The likelihood of being employed part-time increases for respondents with more children. The difference between graduates in the reference category, childless respondents, and graduates in each of the other three categories is statistically significant ($p < .001$). A similar pattern can be observed when one examines the likelihood of being unemployed. Childless postsecondary graduates have the lowest probability of being unemployed, while graduates with three or more children are the most likely to be unemployed. Those who have two

children are slightly less likely to be unemployed than are graduates with only one child. The difference between childless graduates and graduates in each of the other categories is statistically significant ($p < .001$).

The results for the NGS cohort parameter estimates suggest that graduates belonging to the 1986 cohort have the greatest likelihood of being employed part time, while graduates belonging to the 1995 cohort are least likely to be employed part time, when one has controlled for the other sociodemographic variables in the model. The differences between these two cohorts and the reference cohort (1995 graduates) are statistically significant ($p < .001$). Graduates who belong to the 1990 cohort are also more likely to be employed part-time than are graduates who belong to the 1992 cohort ($p < .001$).

Of all four cohorts, graduates who belong to the 1982 cohort are least likely to be unemployed. Graduates belonging to the 1995 cohort are most likely to be unemployed, and graduates belonging to the 1990 cohort are the second most likely to be unemployed, even when controlling for the other variables in the model. Respondents who belong to the 1986 cohort are also more likely than graduates belonging to the 1982 cohort to be unemployed. All coefficients, as compared to the reference category, are statistically significant ($p < .001$).

Graduates who speak French as their first language and English-speaking respondents are equally likely to be unemployed or employed part time. While the language variable is not statistically significant, the age variable is ($p < .001$). The parameter estimates for each age coefficient can be converted into the

predicted probabilities of being employed full time, part time, and unemployed[3]. These predicted probabilities are plotted in Figure B1.

The pseudo R^2 is increased to .042 after adding the interaction between gender and NGS cohort in Model 2. The interaction variable itself is statistically significant ($p < .001$), suggesting that the relative employment status of men and women is different for each cohort. After including the interaction variable, the significance levels of the other variables in the model did not change, and the parameter estimates remained stable. Interpretation of the parameter estimates and corresponding significance tests can be informative. However, interpretations must be based on predicted probabilities (Long and Freese, 2001). Thus, the predicted probabilities of falling into one of the three employment categories for men and women were calculated for each of the four cohorts. These predicted probabilities are provided in Figure B2 [4] [5].

When we examine Figure B2 we can see that for each cohort the likelihood of being employed full time is greater for men than it is for women. Moreover, the likelihood of being employed part-time is greater for women in every cohort than it is for men. The probability of being unemployed, when onr has controlled for the other sociodemographic variables, is greater for female graduates than for male graduates belonging to every cohort except the 1982 cohort. In that cohort, the probability of being unemployed is slightly higher for men (.12) than it is for women (.11).

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[3] Predicted probabilities are calculated all of the other variables in the model at their means.
[4] Predicted probabilities are calculated using the means for all of the other variables in the model.
[5] Unfortunately, it would be much too time-consuming to present the predicted values for all variables in the models. Therefore, with the exception of age, the predicted probabilities are only estimated for the variables that are relevant to this dissertation.

There appears to be a noticeable increase in the likelihood of being employed full time for both men (.82 versus .87) and women (.74 versus .80) when comparing graduates belonging to the 1982 cohort with graduates belonging to the 1986 cohort. The increases for both men and women are captured mainly by a decline in rates of unemployment. The employment levels of both men and women declined slightly when one compares graduates belonging to the 1986 cohort and graduates belonging to the 1990 cohort. The probability of being employed full time increased slightly for male graduates from the 1995 cohort, while the probability of being employed full-time decreased slightly for female graduates from the 1995 cohort, when compared to their counterparts from the previous cohort. For female graduates belonging to the 1995 cohort, the slight increased probability of being employed full time is offset by a slightly higher probability of being unemployed, and a slightly higher likelihood of being employed part time, in comparison with their 1990 counterparts.

Appendix Table 4.3 Employment

	Part-time			Model 1 Unemployed			Part-time			Model 2 Unemployed		
	b	Std E	p	b	Std E	p	b	Std E	p	b	Std E	p
Constant	-2.69	0.101	***	-1.50	0.090	***	-2.61	0.106	***	-1.48	0.091	***
Sex						***						***
Women	1.10	0.023	***	0.04	0.020		0.98	0.051	***	0.02	0.039	
Men	---	---		---	---		---	---		---	---	
Marital Status						***						
Married	-0.06	0.025	*	-0.47	0.026	***	-0.06	0.025	*	-0.47	0.026	***
Separated/Divorced/Wid	-0.16	0.055	**	-0.02	0.052		-0.16	0.055	**	-0.02	0.052	
Single	---	---		---	---		---	---		---	---	
Region						***						***
Eastern Provinces	0.15	0.041	***	0.78	0.033	***	0.15	0.041	***	0.77	0.034	***
Quebec	0.34	0.046	***	0.44	0.044	***	0.34	0.046	***	0.44	0.044	***
Western Provinces	0.20	0.027	***	0.09	0.028	**	0.20	0.027	***	0.09	0.028	**
Ontario	---	---		---	---		---	---		---	---	
Mother's Education						***						***
High school	-0.10	0.030	***	-0.21	0.030	***	-0.10	0.030	***	-0.21	0.030	***
Some post-secondary	0.07	0.049		-0.21	0.053	***	0.07	0.049		-0.21	0.053	***
Trade	-0.11	0.068		-0.16	0.067	*	-0.11	0.068		-0.16	0.067	*
College	0.04	0.039		-0.14	0.040	***	0.04	0.039		-0.14	0.040	***
University	0.01	0.046		-0.26	0.048	***	0.01	0.046		-0.26	0.048	***
Master's	-0.13	0.095		0.11	0.087		-0.13	0.095		0.11	0.087	
Professional	0.43	0.207	*	0.20	0.219		0.42	0.207	*	0.21	0.219	
Ph.D.	0.09	0.203		-0.35	0.234		0.09	0.203		-0.36	0.234	
Don't Know	0.14	0.053	**	0.12	0.048	*	0.14	0.053	**	0.11	0.048	*
Less than high school	---	---		---	---		---	---		---	---	
Father's Education						***						***
High school	0.04	0.031		0.04	0.031		0.04	0.031		0.04	0.031	***
Some post-secondary	0.10	0.053		0.04	0.055		0.10	0.053		0.04	0.055	
Trade	-0.03	0.055		0.00	0.054		-0.02	0.055		0.00	0.054	
College	-0.11	0.052	*	-0.09	0.054		-0.11	0.052	*	-0.09	0.054	
University	-0.05	0.042		0.06	0.043		-0.05	0.042		0.06	0.043	
Master's	0.01	0.067		0.04	0.068		0.01	0.067		0.04	0.068	
Professional	-0.07	0.090		-0.05	0.092		-0.07	0.090		-0.05	0.092	
Ph.D.	0.14	0.088		0.22	0.088	*	0.15	0.088		0.22	0.088	*
Don't Know	0.01	0.047		0.21	0.043	***	0.01	0.047		0.21	0.043	***
Less than high school	---	---		---	---		---	---		---	---	
Number of Children						***						***
One child	0.59	0.035	***	0.38	0.037	***	0.58	0.035	***	0.38	0.037	***
Two children	0.59	0.041	***	0.37	0.043	***	0.60	0.041	***	0.37	0.043	***
Three or more children	0.66	0.055	***	0.43	0.058	***	0.66	0.055	***	0.43	0.058	***
No children	---	---		---	---		---	---		---	---	
Language												
French	-0.02	0.045		0.06	0.042		-0.02	0.045		0.07	0.042	
English	---	---		---	---		---	---		---	---	
Age						***						
NGS Cohort						***						***
1986	-0.28	0.034	***	-0.41	0.029	***	-0.56	0.065	***	-0.32	0.039	***
1990	0.33	0.031	***	-0.17	0.029	***	0.31	0.056	***	-0.19	0.040	***
1995	0.24	0.030	***	-0.30	0.028	***	0.12	0.055	*	-0.40	0.040	***
1982	---	---		---	---		---	---		---	---	
Sex*NGS Cohort	**Model 1**			**Model 2**								***
Sex*NGS 86	n = 108363			n = 108363			0.37	0.076	***	-0.19	0.057	***
Sex*NGS 90	LR (112) = 5981.89			LR (118) = 6060.14			0.03	0.066		0.04	0.056	
Sex*NGS 95	p > chi2 = 0.0000			p > chi2 = 0.0000			0.17	0.065	*	0.18	0.055	***
	Pseudo R2 = 0.0417			Pseudo R2 = 0.0423								
	Ll = -68650.743			Ll = -68611.619								

Appendix Table 4.3 Employment Continued

	Model 3						Model 4					
	Part-time			Unemployed			Part-time			Unemployed		
	b	Std E	p	b	Std E	p	b	Std E	p	b	Std E	p
Constant	-2.14	0.116	***	-2.44	0.103	***	-2.74	0.139	***	-2.25	0.119	***
Sex						***						***
Women	0.56	0.053	***	0.18	0.042	***	0.76	0.061	***	0.30	0.049	***
Men	---	---		---	---		---	---		---	---	
Marital Status						***						***
Married	-0.07	0.026	**	-0.42	0.027	***	-0.07	0.026	*	-0.42	0.027	***
Separated/Divorced/Wid	-0.19	0.056	***	-0.09	0.053		-0.20	0.056	***	-0.10	0.053	
Single	---	---		---	---		---	---		---	---	
Region						***						***
Eastern Provinces	0.10	0.042	*	0.66	0.035	***	0.10	0.042	*	0.68	0.035	***
Quebec	0.40	0.047	***	0.42	0.044	***	0.45	0.047	***	0.48	0.045	***
Western Provinces	0.14	0.027	***	0.06	0.028	*	0.15	0.027	***	0.08	0.028	**
Ontario	---	---		---	---		---	---		---	---	
Mother's Education						***						***
High school	-0.08	0.031	**	-0.17	0.030	***	-0.08	0.031	**	-0.16	0.030	***
Some post-secondary	0.06	0.050		-0.18	0.054	***	0.06	0.050		-0.17	0.054	***
Trade	-0.11	0.069		-0.09	0.068		-0.11	0.070		-0.09	0.068	
College	0.05	0.040		-0.06	0.041		0.05	0.040		-0.05	0.041	
University	0.01	0.047		-0.19	0.049	***	0.01	0.047		-0.19	0.049	***
Master's	-0.12	0.097		0.17	0.088	*	-0.14	0.097		0.16	0.088	
Professional	0.40	0.209		0.23	0.222		0.43	0.209	*	0.23	0.222	
Ph.D.	0.20	0.206		-0.23	0.234		0.19	0.206		-0.25	0.235	
Don't Know	0.12	0.054	*	-0.02	0.049		0.10	0.055		-0.05	0.049	
Less than high school	---	---		---	---		---	---		---	---	
Father's Education						***						***
High school	0.04	0.032		0.07	0.032	*	0.03	0.032		0.07	0.032	*
Some post-secondary	0.10	0.054		0.07	0.056		0.10	0.054		0.05	0.056	
Trade	-0.01	0.056		0.02	0.055		-0.01	0.056		0.02	0.055	
College	-0.11	0.053	*	-0.03	0.054		-0.11	0.053	*	-0.03	0.054	
University	0.01	0.043		0.13	0.043	**	-0.01	0.043		0.10	0.043	*
Master's	0.05	0.068		0.15	0.069	*	0.03	0.068		0.13	0.070	
Professional	0.00	0.091		0.07	0.094		-0.01	0.092		0.06	0.094	
Ph.D.	0.25	0.090	**	0.36	0.090	***	0.23	0.090	**	0.31	0.090	***
Don't Know	-0.02	0.048		0.16	0.044	***	-0.01	0.048		0.17	0.044	***
Less than high school	---	---		---	---		---	---		---	---	
Number of Children						***						***
One child	0.55	0.036	***	0.29	0.038	***	0.55	0.036	***	0.29	0.038	***
Two children	0.56	0.042	***	0.29	0.044	***	0.56	0.042	***	0.29	0.044	***
Three or more children	0.56	0.057	***	0.32	0.059	***	0.56	0.057	***	0.31	0.059	***
No children	---	---		---	---		---	---		---	---	
Language												
French	-0.04	0.046		0.09	0.043	*	-0.06	0.046		0.06	0.043	
English	---	---		---	---		---	---		---	---	
Age						***						***
NGS Cohort						***						***
1986	-0.62	0.066	***	-0.28	0.040	***	-0.32	0.127	**	0.28	0.098	
1990	0.28	0.056	***	-0.12	0.041	**	0.50	0.110	**	0.11	0.096	*
1995	0.07	0.056		-0.38	0.041	***	0.63	0.107	***	0.10	0.093	
1982	---	---		---	---		---	---		---	---	
Sex*NGS Cohort						***						***
Sex*NGS 86	0.45	0.077	***	-0.21	0.058	***	0.24	0.087	**	-0.34	0.068	***
Sex*NGS 90	0.08	0.067		-0.02	0.057		-0.13	0.077		-0.11	0.068	
Sex*NGS 95	0.24	0.066	***	0.14	0.056	**	-0.05	0.075		-0.13	0.065	*

Appendix Table 4.3 Employment Continued

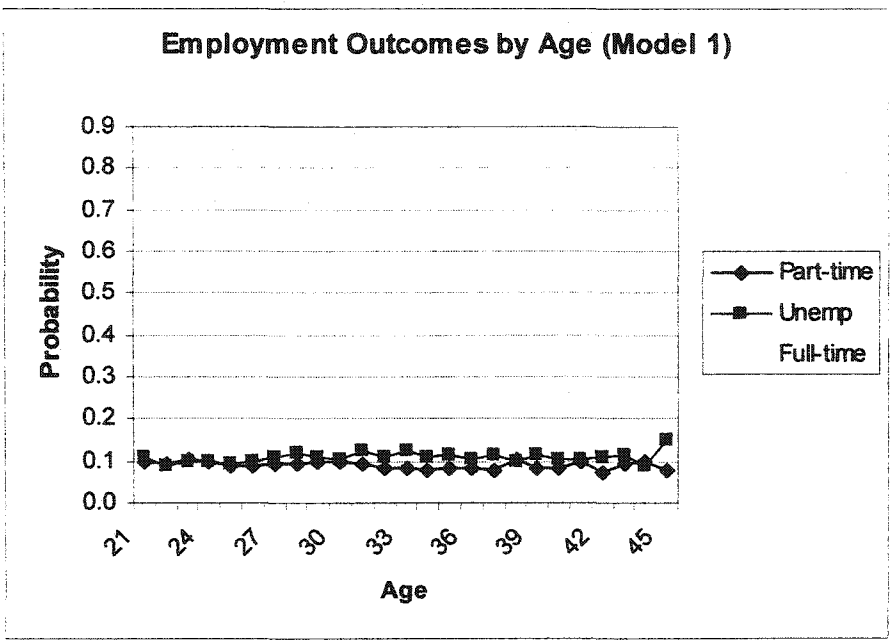
	Model 3						Model 4					
	Part-time			Unemployed			Part-time			Unemployed		
	b	Std E	p	b	Std E	p	b	Std E	p	b	Std E	p
Field of Study						***						***
Education	—	—		—	—		0.45	0.099		-0.42	0.098	***
Fine Arts	0.03	0.049		0.65	0.057	***	0.30	0.126		0.03	0.109	***
Humanities	-0.05	0.046		0.72	0.052	***	0.26	0.123		0.14	0.106	***
Commerce	-1.09	0.038	***	0.05	0.044		-0.44	0.103		-0.50	0.085	
Agricultural/Bio Sci	-0.66	0.054	***	0.39	0.054	***	-0.12	0.131		-0.02	0.102	***
Engineering/Ap Science	-1.46	0.049	***	0.18	0.047	***	-0.53	0.114		-0.19	0.088	*
Health Professions	-0.03	0.036		-0.59	0.059	***	0.25	0.106		-1.22	0.117	***
Math	-1.22	0.087	***	0.07	0.071		-0.56	0.229		-0.26	0.161	
Other	0.06	0.067		0.73	0.072	***	0.54	0.205		0.07	0.190	*
Social Sciences	-0.34	0.037	***	0.51	0.045	***	—	—		—	—	
Level of Schooling						***						***
Trades	0.63	0.034	***	0.83	0.032	***	0.76	0.074	***	1.22	0.063	***
College	0.20	0.030	***	0.15	0.031	***	0.18	0.070	**	0.35	0.065	***
Professional	-0.72	0.075	***	-0.14	0.075		-1.46	0.296	***	0.02	0.163	
Master's	-0.30	0.050	***	-0.43	0.054	***	-0.48	0.130	***	-0.25	0.113	*
Ph.D.	-0.66	0.161	***	-0.58	0.154	***	-0.53	0.428		-0.44	0.371	
Undergraduate	—	—		—	—		—	—		—	—	
Field of Study*NGS												***
NGS 86*FOS Education							0.02	0.135		-0.35	0.142	
NGS 86*FOS Arts	n = 107948						0.16	0.171		-0.05	0.153	*
NGS 86*FOS Human	LR (146) = 10418.84						0.04	0.166		0.05	0.141	*
NGS 86*FOS Commer	p > chi2 = 0.0000						-0.37	0.143	**	-0.27	0.116	
NGS 86*FOS Agricult	Pseudo R2 = 0.0730						-0.09	0.183		-0.21	0.142	
NGS 86*FOS Engin	Ll = -66160.184						-0.59	0.170	***	-0.30	0.120	
NGS 86*FOS Health							0.21	0.140		-0.04	0.166	
NGS 86*FOS Math							-0.46	0.303		-0.32	0.200	
NGS 86*FOS Other							0.01	0.237		-0.01	0.218	
NGS 90*FOS Education							-0.19	0.121	***	0.16	0.128	
NGS 90*FOS Arts							0.44	0.157	***	0.43	0.153	
NGS 90*FOS Human							0.25	0.149		0.10	0.141	
NGS 90*FOS Commer							-0.32	0.126		0.21	0.111	
NGS 90*FOS Agricult							-0.12	0.164		-0.12	0.143	
NGS 90*FOS Engin							-0.63	0.147	**	0.06	0.117	
NGS 90*FOS Health							0.16	0.127	**	-0.11	0.167	
NGS 90*FOS Math							-0.22	0.275		-0.11	0.207	
NGS 90*FOS Other							-0.29	0.249		0.19	0.240	
NGS 95*FOS Education							-0.17	0.115		-0.30	0.128	*
NGS 95*FOS Arts							-0.16	0.152		0.04	0.144	*
NGS 95*FOS Human							-0.15	0.146		0.08	0.135	*
NGS 95*FOS Commer							-0.43	0.121	*	0.09	0.106	***
NGS 95*FOS Agricult							-0.42	0.164		-0.17	0.138	
NGS 95*FOS Engin							-1.06	0.145	***	-0.40	0.114	
NGS 95*FOS Health							-0.05	0.123		0.42	0.148	***
NGS 95*FOS Math							-0.48	0.275		-0.31	0.207	
NGS 95*FOS Other							-0.24	0.243		0.20	0.240	*

Appendix Table 4.3 Employment Continued

	Part-time			Model 4 Unemployed		
	b	Std E	p	b	Std E	p
Level*NGS						***
NGS 86*Trades	0.01	0.102		-0.49	0.087	***
NGS 86*College	-0.18	0.092	*	-0.35	0.086	***
NGS 86*Professional	-0.07	0.401		-1.10	0.278	***
NGS 86*Master's	0.19	0.174		-0.35	0.164	*
NGS 86*Ph.D.	0.19	0.566		-0.44	0.535	
NGS 90*Trades	-0.01	0.093		-0.44	0.085	***
NGS 90*College	0.11	0.085		-0.27	0.085	**
NGS 90*Professional	0.96	0.319	**	-0.56	0.232	*
NGS 90*Master's	0.22	0.156		-0.21	0.150	
NGS 90*Ph.D.	-0.29	0.513		-0.58	0.492	
NGS 95*Trades	-0.47	0.092	***	-0.66	0.083	***
NGS 95*College	0.06	0.082		-0.13	0.082	
NGS 95*Professional	0.99	0.317	**	0.48	0.199	*
NGS 95*Master's	0.23	0.152		-0.17	0.149	
NGS 95*Ph.D.	-0.19	0.505		0.25	0.436	

n = 107948
LR (230) = 11061.51
p > chi2 = 0.0000
Pseudo R2 = 0.0775
Ll =-65838.851

Figure B1


Employment Outcomes by Age (Model 1)
Probability
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
21
24
27
30
33
36
39
42
45
Age
Part-time
Unemp
Full-time

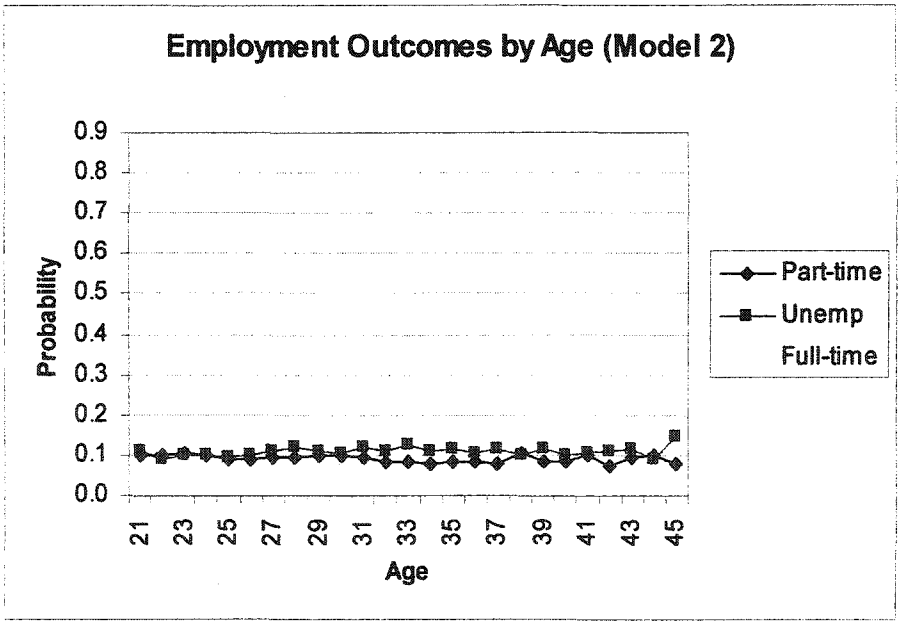
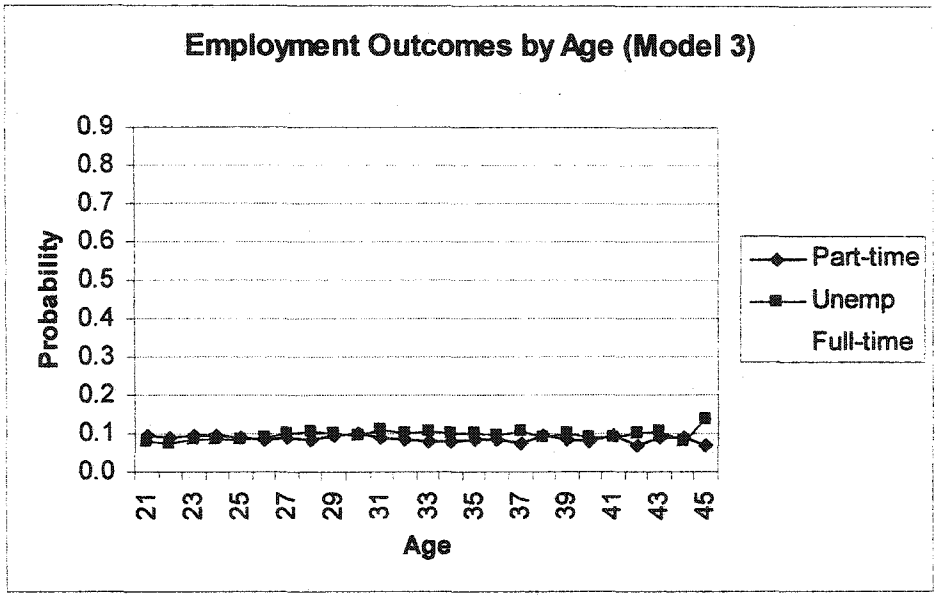

Employment Outcomes by Age (Model 2)
Probability
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
21
23
25
27
29
31
33
35
37
39
41
43
45
Age
Part-time
Unemp
Full-time

Figure B1 Continued



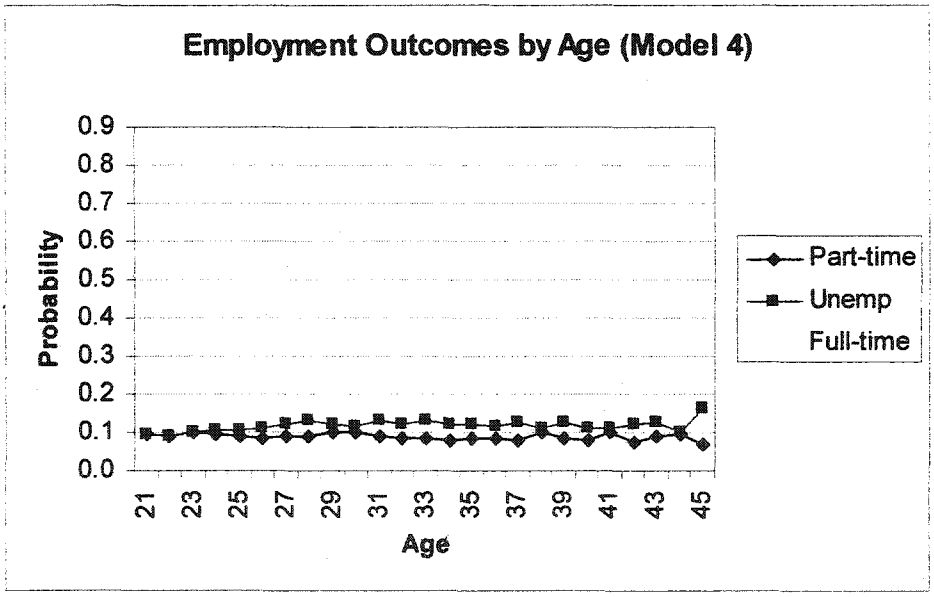
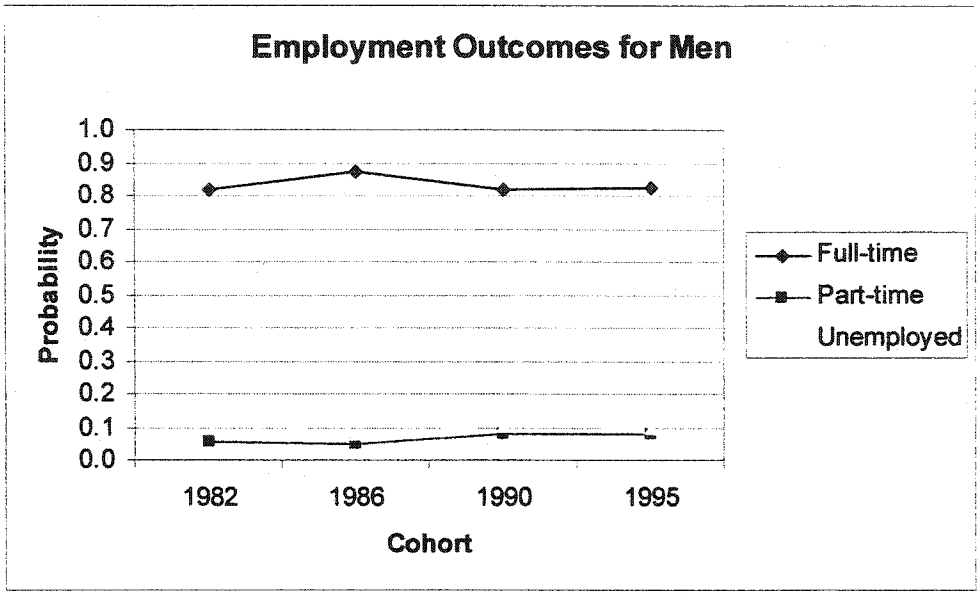
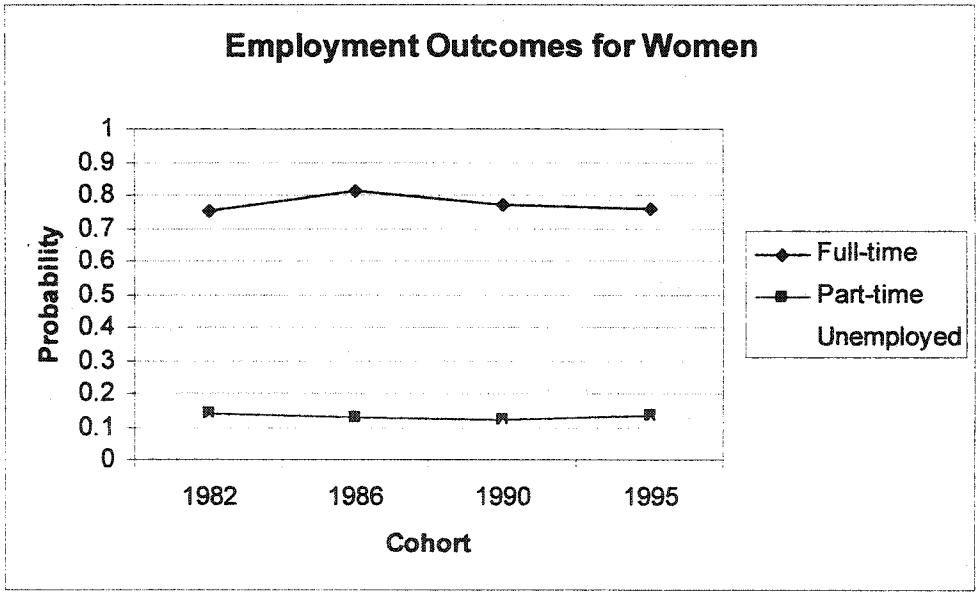


Figure B2


Employment Outcomes for Men
Probability
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1982
1986
1990
1995
Cohort
Full-time
Part-time
Unemployed


Employment Outcomes for Women
Probability
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1982
1986
1990
1995
Cohort
Full-time
Part-time
Unemployed

Appendix C

Appendix C includes all of the parameter estimates for the ordinary least squares regression results for "recycling" in chapter 4, as well as a discussion of the parameter estimates for models 1 and 2 of this analysis.

The Appendix Table 4.4, provides the ordinary least squares results for the "recycling" analysis in chapter 4. For model 1 of this analysis, the parameter estimate for the sex variable suggests that women earn considerably less than do men ($p < .001$), when controlling for the other variables in the model. Postsecondary graduates who are married make considerably more than the single respondents ($p < .001$). At the same time, single respondents actually earn less than previously married graduates (separated, divorced, and widowed), although the difference is not statistically significant. The coefficients for the region variable show that graduates from Ontario, the reference category, earn more than graduates from the eastern provinces and Quebec. They also earn more than graduates surveyed from the Western region, but this difference is not statistically significant.

In general, the parameter estimates for both parental education variables suggest that higher parental education is associated with higher earnings. As well, we can see from the parameter estimates in Model 1, that childless graduates, the reference category, earn more than graduates with one child ($p < .001$) and graduates with three or more children ($p < .05$). The difference between graduates with two children and the reference category is not statistically significant.

When controlling for the other variables in the model, sex, marital status, region, mother's and father's education, number of children, and age are all statistically significant ($p < .001$). The effect of language on earnings is also statistically significant, but at a new level ($p < .01$). The variable that distinguishes between Native and non-Native Canadians does not have an effect on earnings, when controlling for the other variables.

As with all of the models generated above, age is entered into each model as a series of dummy variables, each representing one year of age. Figure C1 shows the relationship between age and income for all four models estimated, where the age coefficients from each model are plotted against the log of earnings. As can be seen in the top graph of Figure C1, the relationship between age and the log of income is positive, and curvilinear. The effect of age is strongest from ages 21 to 25, but much more subtle between ages 26 through 45. In fact, this relationship is nearly identical for all of the models estimated in this section. Combined, the sociodemographic variables in Model 1 explain roughly 13 percent ($R^2 = .125$) of the variation in earnings.

Appendix Table 4.4
Ordinary Least Squares Regression: Recycling

	Model 1			Model 2			Model 3			Model 4		
	b	Std E	p	b	Std E	p	b	Std E	p	b	Std E	p
Constant	4.175	0.0413	***	4.246	0.0434	***	4.261	0.0439	***	4.385	0.0419	***
Sex			***			***			***			***
Women	-0.103	0.0038	***	-0.077	0.0044	***	-0.074	0.0044	***	-0.052	0.0040	***
Men	---	---		---	---		---	---		---	---	
Marital Status			***			***			***			***
Married	0.030	0.0044	***	0.024	0.0048	***	0.024	0.0048	***	0.026	0.0042	***
Separated/Divorced/Wid	0.016	0.0116		0.000	0.0140		-0.001	0.0140		-0.014	0.0121	
Single	---	---		---	---		---	---		---	---	
Indian Status												
Indian	0.017	0.0159		-0.007	0.0186		-0.003	0.0185		-0.018	0.0164	
Non-Indian	---	---		---	---		---	---		---	---	
Region			***			***			***			***
Eastern Provinces	-0.069	0.0080	***	-0.096	0.0086	***	-0.098	0.0086	***	-0.093	0.0076	***
Quebec	-0.039	0.0086	***	-0.078	0.0099	***	-0.075	0.0099	***	-0.053	0.0086	***
Western Provinces	-0.008	0.0047		-0.017	0.0051	***	-0.016	0.0051	**	-0.017	0.0045	***
Ontario	---	---		---	---		---	---		---	---	
Mother's Education			***			***			***			***
High school	0.012	0.0056	*	0.014	0.0060	*	0.012	0.0060	*	0.013	0.0052	*
Some post-secondary	0.003	0.0081		0.008	0.0089		0.007	0.0088		0.000	0.0078	
Trade	0.038	0.0111	***	0.032	0.0126	*	0.032	0.0125	*	0.011	0.0110	
College	-0.003	0.0071		-0.015	0.0076		-0.018	0.0076	*	-0.017	0.0067	*
University	0.016	0.0073	*	0.013	0.0078		0.012	0.0078		0.005	0.0069	
Master's	0.032	0.0131	*	0.024	0.0140		0.027	0.0140		0.017	0.0121	
Professional	-0.002	0.0464		0.018	0.0454		0.021	0.0452		0.061	0.0384	
Ph.D.	0.148	0.0309	***	0.065	0.0323	*	0.068	0.0321	*	0.055	0.0273	*
Don't Know	-0.004	0.0123		-0.004	0.0134		-0.002	0.0133		-0.013	0.0118	
Less than high school	---	---		---	---		---	---		---	---	
Father's Education			***			*			*			
High school	0.005	0.0056		0.002	0.0060		0.003	0.0059		0.003	0.0052	
Some post-secondary	0.011	0.0086		0.021	0.0096	*	0.022	0.0095	*	0.015	0.0084	
Trade	0.013	0.0095		0.003	0.0103		0.005	0.0103		-0.004	0.0090	
College	0.015	0.0081		0.015	0.0086		0.015	0.0086		0.004	0.0076	
University	0.013	0.0067	*	0.005	0.0071		0.007	0.0071		0.002	0.0063	
Master's	0.031	0.0102	**	0.031	0.0108	**	0.033	0.0108	**	0.021	0.0095	*
Professional	0.003	0.0152		-0.009	0.0157		-0.001	0.0157		-0.012	0.0137	
Ph.D.	-0.009	0.0149		-0.011	0.0158		-0.011	0.0158		-0.001	0.0138	
Don't Know	-0.035	0.0099	***	-0.004	0.0107		-0.009	0.0107		0.002	0.0095	
Less than high school	---	---		---	---		---	---		---	---	
Number of Children			***			***			***			
One child	-0.042	0.0073	***	-0.037	0.0081	***	-0.036	0.0081	***	-0.006	0.0071	
Two children	-0.011	0.0085		-0.020	0.0096	*	-0.017	0.0096		0.012	0.0084	
Three or more children	-0.028	0.0127	*	-0.017	0.0151		-0.012	0.0150		0.009	0.0132	
No children	---	---		---	---		---	---		---	---	
Language			**			***			***			***
French	0.027	0.0085	**	0.038	0.0092	***	0.034	0.0092	***	0.027	0.0080	***
English	---	---		---	---		---	---		---	---	
Age			***			***			***			***
Coop Program						***			***			***
Coop				0.054	0.0063	***	0.050	0.0063	***	0.029	0.0056	***
No coop				---	---		---	---		---	---	

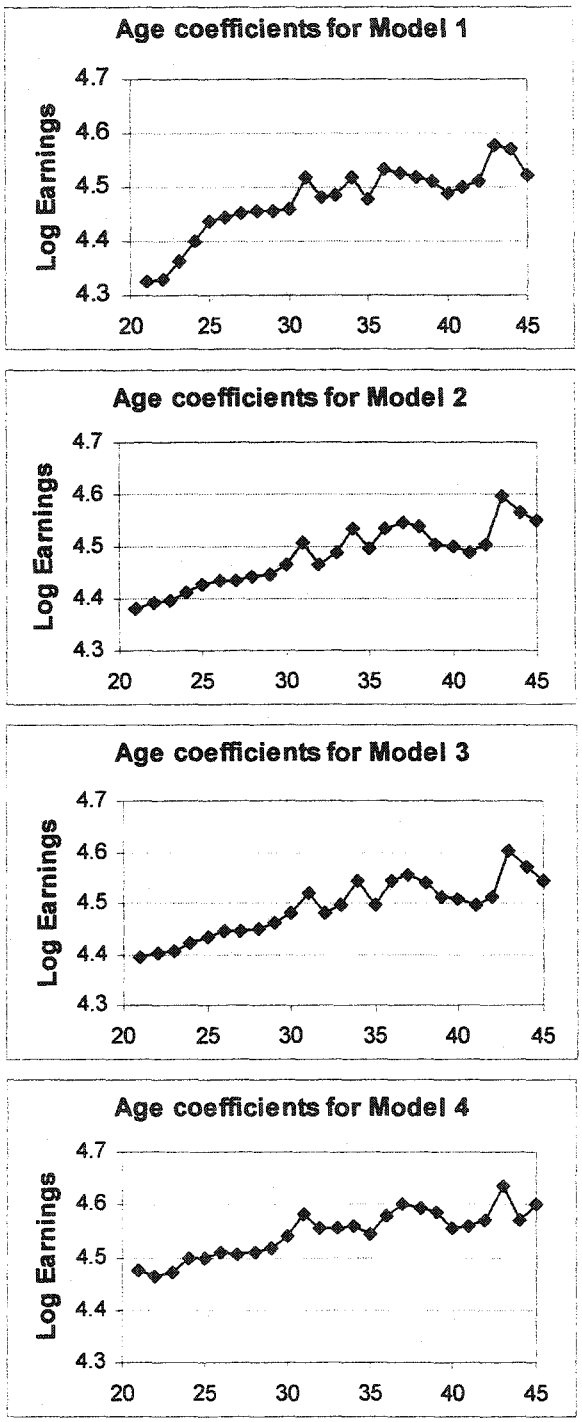
Appendix Table 4.4 Continued

		Model 2			Model 3			Model 4		
		b	Std E	p	b	Std E	p	b	Std E	p
Field of Study				***			***			***
Fine Arts	R-square = .125	-0.023	0.0118		-0.136	0.0222	***	-0.115	0.0194	***
Humanities	Adj R-square = .1216	-0.041	0.0093	***	-0.065	0.0135	***	-0.068	0.0119	***
Social Sciences	n= 14013	0.002	0.0071		-0.032	0.0119	**	-0.033	0.0105	**
Commerce		0.076	0.0070	***	0.098	0.0130	***	0.039	0.0118	***
Agricultural/Bio Sci		0.000	0.0105		-0.031	0.0154	*	-0.072	0.0135	***
Engineering/Ap Science		0.148	0.0080	***	0.146	0.0151	***	0.071	0.0139	***
Health Professions		0.106	0.0086	***	0.141	0.0198	***	0.058	0.0187	**
Math		0.097	0.0115	***	0.082	0.0162	***	0.015	0.0147	
Other		-0.019	0.0158		-0.039	0.0249		-0.055	0.0218	*
Education		---	---		---	---		---	---	
Recycle				***			***			***
College only		-0.114	0.0061	***	-0.123	0.0153	***	-0.114	0.0135	***
College to college		-0.105	0.0101	***	-0.176	0.0340	***	-0.108	0.0293	***
Univ after college		0.000	0.0076		-0.037	0.0154	*	-0.018	0.0135	
Univ to univ		0.063	0.0087	***	0.051	0.0149	***	0.077	0.0132	***
College after Univ		-0.049	0.0127	***	-0.029	0.0378		-0.037	0.0344	
University only		---	---		---	---		---	---	
Field of Study*Recycle							***			***
Arts*College					0.153	0.0284	***	0.117	0.0249	***
Arts*College to college		R-square = 2157			0.231	0.0576	***	0.127	0.0493	*
Arts*Univ after college		R-square= .2107			0.082	0.0458		0.068	0.0392	
Arts*Univ to univ		n= 11028			0.147	0.0889		0.006	0.0781	
Arts*College after univ					0.098	0.0657		0.083	0.0615	
Humanities*College					0.070	0.0296	*	0.069	0.0261	**
Humanities*Col to col					0.100	0.0752		0.079	0.0640	
Humanities*Univ aft c					0.028	0.0270		-0.015	0.0239	
Humanities*Univ to u					0.060	0.0319		0.048	0.0277	
Humanities*Col aft u					-0.048	0.0594		-0.039	0.0521	
Soc Sci*College					0.077	0.0187	***	0.075	0.0166	***
Soc Sci*Col to col					0.191	0.0444	***	0.100	0.0382	**
Soc Sci*Univ aft c					0.033	0.0199		0.001	0.0175	
Soc Sci*Univ to u					0.041	0.0231		-0.002	0.0206	
Soc Sci*Col aft u					-0.062	0.0517		-0.024	0.0464	
Commerce*College					-0.060	0.0183	***	-0.023	0.0162	
Commerce*Col to col					0.028	0.0413		-0.007	0.0355	
Commerce*Univ aft c					0.015	0.0194		0.005	0.0169	
Commerce*Univ to u					-0.027	0.0265		-0.070	0.0238	**
Commerce*Col aft u					-0.034	0.0447		-0.029	0.0404	
Agricultural*College					0.053	0.0256	*	0.077	0.0225	***
Agricultural*Col to col					0.131	0.0541	*	0.101	0.0476	*
Agricultural*Univ aft c					0.087	0.0392	*	0.028	0.0348	
Agricultural*Univ to u					-0.029	0.0473		-0.062	0.0405	
Agricultural*Col aft u					-0.035	0.0733		-0.008	0.0647	
Engineering*College					-0.001	0.0200		0.020	0.0177	
Engineering*Col to col					0.050	0.0396		-0.001	0.0343	
Engineering*Univ aft c					0.026	0.0231		-0.017	0.0202	
Engineering*Univ to u					-0.035	0.0363		-0.044	0.0311	
Engineering*Col aft u					-0.085	0.0481		-0.063	0.0436	
Health*College					-0.072	0.0247	**	-0.022	0.0222	
Health*Col to col					-0.008	0.0416		0.006	0.0365	
Health*Univ aft c					0.034	0.0277		0.036	0.0247	
Health*Univ to u					-0.030	0.0327		-0.059	0.0294	*
Health*Col aft u					-0.030	0.0511		0.070	0.0457	
Math*College					0.082	0.0467		0.068	0.0409	

Appendix Table 4.4 Continued

	Model 3			Model 4		
	b	Std E	p	b	Std E	p
Field of Study*Recycle						
Math*col to col	0.106	0.0621		0.040	0.0547	
Math*Univ aft c	0.036	0.0296		0.012	0.0262	
Math*Univ to u	-0.045	0.0372		-0.078	0.0322	*
Math*Col aft u	0.115	0.0849		0.097	0.0730	
Other*College	-0.048	0.0439		-0.029	0.0394	
Other*Col to col	-0.085	0.1612		-0.162	0.1367	
Other*Univ aft c	0.096	0.0383	*	0.124	0.0330	***
Other*Univ to u	0.007	0.0562		-0.018	0.0490	
Other*Col aft u	0.015	0.2253		-0.038	0.1914	
Occupation Type						
Manager, admin				0.032	0.0099	***
Natural Sci, Engineering	R-square = .2316			0.059	0.0111	***
Religion	Adj R-square = .2236			-0.139	0.0464	**
Teaching & Related	n = 11028			-0.004	0.0105	
Medicine & Health				0.073	0.0123	***
Art, Literary, Recreation				0.011	0.0127	
Clerical & Related				-0.029	0.0098	**
Sales				-0.024	0.0103	*
Service				-0.039	0.0100	***
Manual Labour				-0.014	0.0103	
Social Science occup				---	---	
Occupational Status						
Part-time				-0.309	0.0052	***
Full-time				---	---	
				R-square = .4537		
				Adj R-square = .4470		
				n = 10205		

Figure C1


Age coefficients for Model 1
Log Earnings
4.7
4.6
4.5
4.4
4.3
20
25
30
35
40
45
Age coefficients for Model 2
Log Earnings
4.7
4.6
4.5
4.4
4.3
20
25
30
35
40
45
Age coefficients for Model 3
Log Earnings
4.7
4.6
4.5
4.4
4.3
20
25
30
35
40
45
Age coefficients for Model 4
Log Earnings
4.7
4.6
4.5
4.4
4.3
20
25
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35
40
45

Appendix D

Appendix D includes all of the parameter estimates for logistic regression results for objective overeducation in chapter 5, as well as a discussion of the parameter estimates for sociodemographic variables in models 1 and 2 of this analysis.

The Appendix Table 5.1, provides the logistic regression results for the objective overeducation analysis in chapter 5. The pseudo R^2 for Model 1 is .013. Independent Wald tests reveal that each of the independent variables is statistically significant ($p<.001$). The parameter estimates for the independent variables sex, marital status, mother's education, father's education, number of children, language of interview, age, and NGS cohort are summarized below.

When one only controls for the sociodemographic variables, men are more likely than women to be overqualified for their current jobs ($p<.001$). Graduates who are married are more likely to have academic credentials that fit the needs of their employers than are any other marital status group. In fact, they are much less likely than are respondents who are single, the reference category, to be overqualified for their jobs ($p<.001$). Respondents who were previously married are slightly less likely than respondents who are single at the time of the interview to be overqualified for their current job ($p<.05$).

Ontario is used as the reference category for the region variable. The only region in which graduates are more qualified for their jobs than the graduates surveyed in Ontario is the Western region; however, the difference is not statistically significant. Graduates from Quebec were most likely to be overqualified for their jobs, followed by graduates from the Eastern provinces. The coefficients for the latter two categories are statistically significant ($p < .001$),

suggesting that patterns in these regions are indeed different from patterns in the reference category, region, Ontario.

The parameter estimates for the mother's education variable do not show any specific pattern. However, it is clear that graduates whose a mothers have earned doctorates are least likely to be overqualified for their current jobs. The parameter estimates for father's education show a general trend. The more highly educated the father, the less likely the graduate is to be overqualified for his or her current job.

Graduates without children represent the reference category for the number of children variable. These graduates are most likely to find themselves in jobs that require their current credentials. In other words, they are the group least likely to be overeducated. On the other hand, graduates with three or more children are most likely to be overqualified for their current jobs, two years after graduation. They are followed by graduates with one child. Next to come graduates with two children. The differences between each of these parameter estimates and the reference category are statistically significant ($p<.001$)

The relationship between age and the likelihood of being overqualified is also statistically significant ($p<.001$). Once again, rather than discussing each individual age parameter estimate, each one has been converted into a predicted probability and plotted against the likelihood of being overqualified (Figure D1)[1].

When one compares the cohorts, it is obvious that rates of overqualification are highest among graduates belonging to the 1982 cohort and lowest among graduates from the 1990 cohort. Graduates from the 1986 cohort

[1] The predicted probabilities were calculated holding the other variables at their means.

are slightly more likely to be overqualified than are graduates belonging to the 1995 cohort.

The inclusion of the interaction term in Model 2 did not alter the model statistics very much. The pseudo R^2 increased slightly to .03. All of the parameter estimates not included in the interaction were basically unchanged[2], and the interaction coefficient is statistically significant ($p<.001$).

Looking at the graph in Figure D2, in every cohort, the likelihood of being overeducated is greater for men than for women. The likelihood is largest for graduates belonging to the 1982 cohort (a gender difference of .07), and smallest among graduates belonging to the 1995 cohort (a gender difference of .01)[3].

---

[2] Except for the age variable. When one compares the graph for Model 1 in Figure D1 with the graph for Model 2 in Figure D1, it is clear that the impact of age on the probability of experiencing being overeducated while in ones early to mid twenties (20-28) has diminished considerably. In fact, when one controls for all of the independent variables (Model 5) the relationship between age and overeducation is clearly negative.

[3] The probability estimates were calculated holding the other independent variables at their respective means.

Appendix Table 5.1
Objective Overeducation

	Model 1			Model 2			Model 3			Model 4			Model 5		
	b	Std E	p	b	Std E	p	b	Std E	p	b	Std E	p	b	Std E	p
Constant	-0.831	0.0729	***	-0.765	0.0738	***	-0.368	0.0798	***	-0.252	0.086	**	0.931	0.0995	***
Sex			***						***			*			
Women	0.177	0.0133	***	0.052	0.0256	*	-0.001	0.0274		0.066	0.030	*	0.062	0.0331	
Men	---	---		---	---		---	---		---	---		---	---	
Marital Status			***			***			***			***			***
Married	0.197	0.0160	***	0.197	0.0160	***	0.164	0.0167	***	0.160	0.017	***	0.102	0.0185	***
Separated/Divorced/Wid	0.088	0.0380	*	0.087	0.0380	*	0.174	0.0399	***	0.181	0.040	***	0.141	0.0439	***
Single	---	---		---	---		---	---		---	---		---	---	
Region			***			***			***			***			***
Eastern Provinces	-0.080	0.0251	***	-0.081	0.0251	***	0.003	0.0265		0.008	0.027		0.077	0.0297	*
Quebec	-0.200	0.0299	***	-0.200	0.0300	***	-0.179	0.0312	***	0.187	0.031	***	-0.099	0.0347	**
Western Provinces	0.024	0.0168		0.024	0.0168		0.026	0.0175		0.019	0.018		0.024	0.0194	
Ontario	---	---		---	---		---	---		---	---		---	---	
Mother's Education			***			***			***						***
High school	0.090	0.0191	***	0.089	0.0191	***	0.073	0.0199	***	0.072	0.020	***	0.040	0.0219	
Some post-secondary	-0.078	0.0327	*	-0.076	0.0327	*	-0.106	0.0340	**	0.102	0.034	**	-0.175	0.0376	***
Trade	0.116	0.0439	**	0.117	0.0438	**	0.090	0.0456	*	0.087	0.046		0.027	0.0508	
College	0.149	0.0255	***	0.149	0.0255	***	0.074	0.0265	**	0.075	0.027	**	0.043	0.0292	
University	0.092	0.0298	**	0.090	0.0298	**	0.056	0.0310		0.057	0.031		0.019	0.0342	
Master's	0.038	0.0601		0.039	0.0601		0.052	0.0623		0.050	0.062		0.120	0.0696	
Professional	-0.073	0.1509		-0.072	0.1509		-0.030	0.1558		-0.025	0.156		0.034	0.1732	
Ph.D.	0.543	0.1450	***	0.551	0.1450	***	0.570	0.1491	***	0.575	0.149	***	0.536	0.1651	***
Don't Know	-0.172	0.0349	***	-0.171	0.0349	***	-0.052	0.0364		0.046	0.037		-0.042	0.0404	
Less than high school	---	---		---	---		---	---		---	---		---	---	
Father's Education			***			***			**			**			**
High school	0.009	0.0200		0.007	0.0200		-0.006	0.0208		0.004	0.021		-0.003	0.0229	
Some post-secondary	-0.066	0.0345		-0.068	0.0345	*	-0.077	0.0359	*	0.076	0.036	*	-0.076	0.0398	
Trade	0.037	0.0349		0.034	0.0349		0.033	0.0361		0.017	0.036		-0.002	0.0396	
College	0.050	0.0326		0.047	0.0326		0.014	0.0338		0.017	0.034		0.034	0.0372	
University	0.091	0.0270	***	0.091	0.0270	***	0.061	0.0282	*	0.065	0.028	*	0.077	0.0310	*
Master's	0.131	0.0428	**	0.130	0.0428	**	0.093	0.0444	*	0.078	0.045		0.084	0.0495	
Professional	0.093	0.0560		0.093	0.0560		0.038	0.0585		0.027	0.059		0.095	0.0646	
Ph.D.	-0.068	0.0586		-0.070	0.0586		-0.127	0.0612	*	0.137	0.061	*	-0.143	0.0679	*
Don't Know	-0.076	0.0303	*	-0.077	0.0304	*	-0.021	0.0315		0.019	0.032		0.011	0.0351	
Less than high school	---	---		---	---		---	---		---	---		---	---	

Appendix Table 5.1 Continued

	Model 1			Model 2			Model 3			Model 4			Model 5		
	b	Std E	p	b	Std E	p	b	Std E	p	b	Std E	p	b	Std E	p
Number of Children			***			***			***			***			*
One child	-0.229	0.0250	***	-0.229	0.0250	***	-0.171	0.0262	***	0.169	0.026	***	-0.074	0.0292	*
Two children	-0.178	0.0288	***	-0.178	0.0288	***	-0.133	0.0303	***	-0.129	0.030	***	-0.071	0.0332	*
Three or more children	-0.223	0.0403	***	-0.224	0.0403	***	-0.179	0.0425	***	0.168	0.043	***	-0.115	0.0465	*
No children	---	---		---	---		---	---		---	---		---	---	
Language			***			***			**			***			
French	0.115	0.0296	***	0.116	0.0296	***	0.088	0.0308	**	0.103	0.031	***	0.044	0.0342	
English	---	---		---	---		---	---		---	---		---	---	
Age			***			***			***			***			***
NGS Cohort									***			***			***
1982	-0.439	0.0192	***	-0.579	0.0275	***	-0.555	0.0285	***	-0.645	0.063	***	-0.612	0.0706	***
1986	-0.033	0.0179		-0.098	0.0260	***	-0.104	0.0268	***	-0.288	0.057	***	-0.206	0.0639	***
1990	0.463	0.0191	***	0.386	0.0282	***	0.379	0.0291	***	0.166	0.058	**	0.017	0.0628	
1995	---	---		---	---		---	---		---	---		---	---	
Sex*NGS Cohort						***			***			*			*
Sex*NGS 82				0.263	0.0372	***	0.284	0.0386	***	0.070	0.045		0.148	0.0502	***
Sex*NGS 86	n = 98520			0.118	0.0354	***	0.129	0.0367	***	0.069	0.041		0.062	0.0459	
Sex*NGS 90	LR (56) = 4246.85			0.141	0.0380	***	0.176	0.0393	***	0.123	0.044	**	0.046	0.0473	
Field of Study												***			***
Education	p > chi2 = 0.0000						0.673	0.0270	***	0.574	0.049	***	0.303	0.0555	***
Fine Arts	Pseudo R2 = 0.0312			n = 98520			-0.372	0.0407	***	-0.330	0.084	***	-0.251	0.0921	**
Humanities	LI = -66041.247			LR (59) = 4297.38			-0.228	0.0334	***	-0.361	0.065	***	-0.319	0.0722	***
Commerce				p > chi2 = 0.0000			0.196	0.0243	***	0.134	0.045	**	0.266	0.0496	***
Agricultural/Bio Sci				Pseudo R2 = 0.0315			0.012	0.0347		-0.062	0.070		-0.003	0.0769	
Engineering/Ap Science				LI = -66015.978			0.632	0.0265	***	0.665	0.050	***	0.622	0.0560	***
Health Professions							1.189	0.0292	***	0.878	0.054	***	0.523	0.0643	***
Math							0.732	0.0397	***	0.850	0.081	***	0.572	0.0901	***
Other							-0.068	0.0493		-0.190	0.115		-0.202	0.1266	
Social Sciences							---	---		---	---		---	---	
Level of Schooling									***			***			***
Trades							-0.984	0.0229	***	-1.078	0.043	***	-0.574	0.0469	***
College							-0.255	0.0192	***	-0.574	0.034	***	-0.283	0.0375	***
Professional							0.586	0.0469	***	0.943	0.099	***	0.866	0.1115	***
Master's							-0.723	0.0310	***	-0.797	0.056	***	-1.182	0.0608	***
Ph.D.							0.554	0.0812	***	0.466	0.142	***	-0.161	0.1505	
Undergraduate							---	---		---	---		---	---	

Appendix Table 5.1 Continued

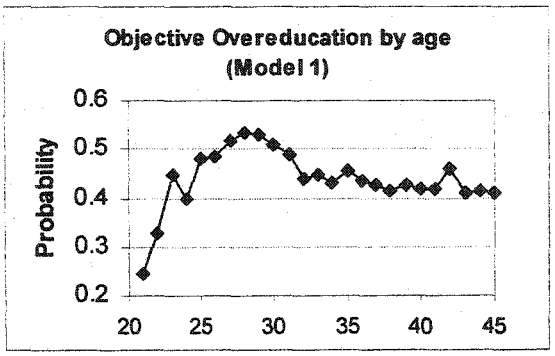
	Model 3			Model 4			Model 5		
	b	Std E	p	b	Std E	p	b	Std E	p
NGS*Field of Study						***			***
NGS 82*FOS Education				0.084	0.078		-0.034	0.0883	
NGS 82*FOS Arts	n = 98150			-0.023	0.119		0.127	0.1317	
NGS 82*FOS Human	LR (73) = 11016.36			0.138	0.099		0.247	0.1114	*
NGS 82*FOS Commer	p > chi2 = 0.0000			0.052	0.071		0.079	0.0795	
NGS 82*FOS Agricult	Pseudo R2 = 0.0811			0.021	0.103		0.294	0.1166	*
NGS 82*FOS Engin	Ll = -62400			-0.136	0.077		-0.070	0.0869	
NGS 82*FOS Health				0.652	0.085	***	0.498	0.0954	***
NGS 82*FOS Math				-0.224	0.122		-0.014	0.1408	
NGS 82*FOS Other				-0.118	0.201		0.049	0.2259	
NGS 86*FOS Education				0.006	0.073		-0.212	0.0816	**
NGS 86*FOS Arts				-0.010	0.111		-0.111	0.1222	
NGS 86*FOS Human				0.200	0.090	*	0.157	0.1013	
NGS 86*FOS Commer				0.073	0.065		0.002	0.0712	
NGS 86*FOS Agricult				0.021	0.095		0.063	0.1064	
NGS 86*FOS Engin				-0.008	0.071		-0.073	0.0795	
NGS 86*FOS Health				0.342	0.077	***	0.098	0.0855	
NGS 86*FOS Math				-0.152	0.106		-0.143	0.1185	
NGS 86*FOS Other				0.348	0.135	*	0.319	0.1511	*
NGS 90*FOS Education				0.189	0.075	*	0.077	0.0807	
NGS 90*FOS Arts				-0.173	0.122		0.051	0.1298	
NGS 90*FOS Human				0.144	0.094		0.207	0.1007	*
NGS 90*FOS Commer				0.057	0.066		0.127	0.0709	
NGS 90*FOS Agricult				0.206	0.100	*	0.219	0.1078	*
NGS 90*FOS Engin				-0.047	0.074		-0.044	0.0803	
NGS 90*FOS Health				0.259	0.081	***	0.214	0.0866	*
NGS 90*FOS Math				-0.111	0.117		-0.131	0.1255	
NGS 90*FOS Other				-0.273	0.162		-0.159	0.1750	
NGS*Level of School						***			***
NGS 82*Trades				-0.216	0.062	***	0.052	0.0692	
NGS 82*College				0.666	0.051	***	0.697	0.0574	***
NGS 82*Professional				-1.106	0.138	***	-1.192	0.1523	***
NGS 82*Master's				0.091	0.086		0.193	0.0929	*
NGS 82*Ph.D.				0.109	0.231		0.181	0.2476	
NGS 86*Trades				0.134	0.058	*	0.403	0.0645	***
NGS 86*College				0.393	0.046	***	0.382	0.0511	***
NGS 86*Professional				-0.388	0.133	**	-0.722	0.1459	***
NGS 86*Master's				0.128	0.081		0.163	0.0863	

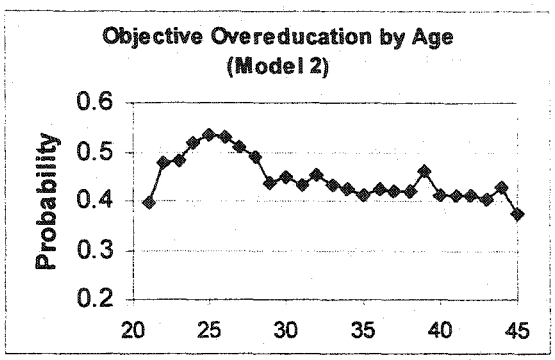
Appendix Table 5.1 Continued

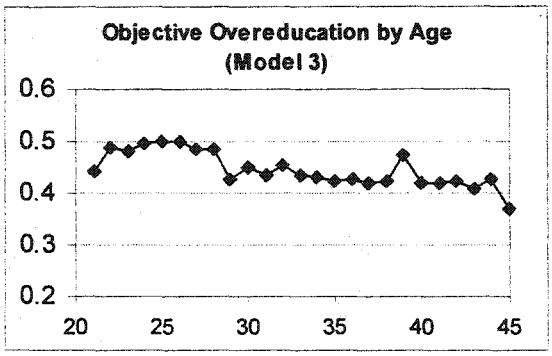
	Model 4			Model 5		
	b	Std E	p	b	Std E	p
NGS*Level of School						
NGS 86*Ph.D.	0.031	0.217		0.071	0.2287	
NGS 90*Trades	0.530	0.061	***	0.655	0.0651	***
NGS 90*College	0.242	0.050	***	0.253	0.0538	***
NGS 90*Professional	0.055	0.149		-0.248	0.1584	
NGS 90*Master's	0.053	0.081		0.182	0.0842	*
NGS 90*Ph.D.	0.155	0.213		0.326	0.2204	
Occupation Type						***
Manager, admin				-0.685	0.0397	***
Natural Sci, Engineering				-0.112	0.0453	*
Religion				0.583	0.1504	***
Teaching & Related				0.225	0.0421	***
Medicine & Health				-0.296	0.0508	***
Art, Literary, Recr				-1.045	0.0559	***
Clerical & Related				-1.606	0.0410	***
Sales				-1.604	0.0462	***
Service				-1.629	0.0446	***
Manual Labour				-1.624	0.0436	***
Social Science occup				---	---	
Occupational Status						***
Part-time				-0.535	0.0253	***
Full-time				---	---	
	n = 98150			n = 87010		
	LR (115) = 11878.29			LR (126) = 16183.48		
	p > chi2 = 0.0000			p > chi2 = 0.0000		
	Pseudo R2 = 0.0875			Pseudo R2 = 0.1343		
	LI = -61969.035			LI = -52178.235		

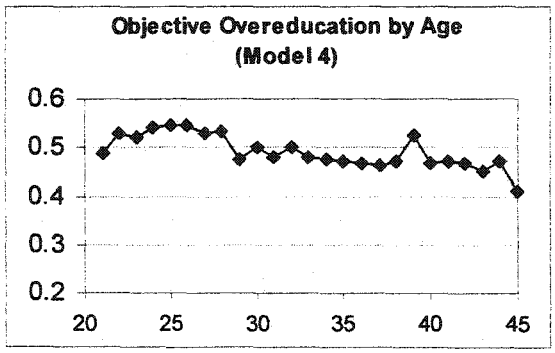
*** = p < .001
** = p < .01
* = p < .05

Figure D1


Objective Overeducation by age
(Model 1)
Probability
0.6
0.5
0.4
0.3
0.2
20
25
30
35
40
45


Objective Overeducation by Age
(Model 2)
Probability
0.6
0.5
0.4
0.3
0.2
20
25
30
35
40
45


Objective Overeducation by Age
(Model 3)
0.6
0.5
0.4
0.3
0.2
20
25
30
35
40
45


Objective Overeducation by Age
(Model 4)
0.6
0.5
0.4
0.3
0.2
20
25
30
35
40
45

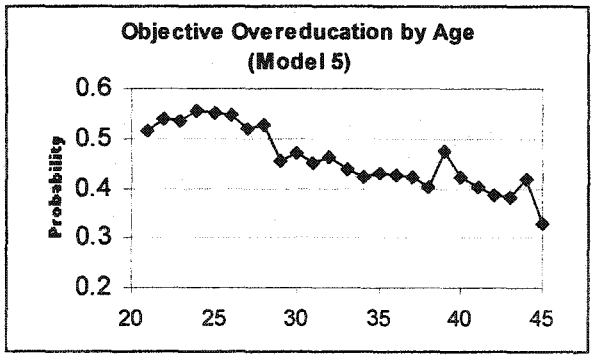
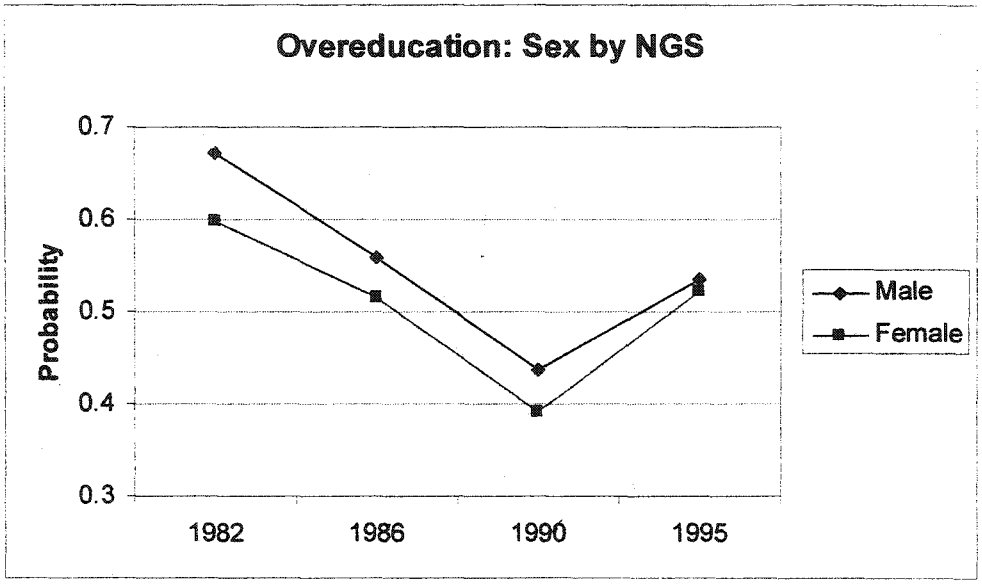

Objective Overeducation by Age
(Model 5)
Probability
0.6
0.5
0.4
0.3
0.2
20
25
30
35
40
45

Figure D2


Overeducation: Sex by NGS
Probability
0.7
0.6
0.5
0.4
0.3
1982
1986
1990
1995
Male
Female

Appendix E

Appendix E includes all of the parameter estimates for logistic regression results for subjective overeducation in chapter 5, as well as a discussion of the parameter estimates for sociodemographic variables in model 1 of this analysis.

The Appendix Table 5.2 provides the complete model statistics for the subjective overeducation analysis in chapter 5. The pseudo R^2 for the model 1 is 0.01, suggesting that the sociodemographic variables explain very little regarding the probability of whether the respondents feel overqualified for their current jobs. All of the independent variables, however, do play a role in predicting the dependent variable, subjective feeling of being over educated for one's job. The variables sex and marital status are both statistically significant when one controls for the other sociodemographic variables ($p < .001$). Women are more likely to feel overqualified for their jobs than are men ($p < .001$). Those who are single, the reference category, are more likely to feel this way than those who are married ($p < .001$). They are slightly more likely than those who were previously married ($p < .05$) to feel overqualified for their jobs.

The region variable is also statistically significant ($p < .001$). In contrast with the objective over-education results presented in the previous section, graduates from Ontario, the reference category, are most likely to feel that they are overqualified for their current jobs. However, the difference between them and graduates from the Eastern provinces and graduates from Quebec are not statistically significant. Graduates from the West are the least likely to feel overqualified for their jobs, and the difference between them and graduates from Ontario is statistically significant ($p < .001$).

The Native Canadian status variable is also statistically significant ($p < .01$). The parameter estimate for this variable indicates that graduates who are Native are more likely than non-Native graduates to feel, two years after graduation, that they are overqualified for their jobs, two years after graduation.

Mother's level of education also has a significant effect on whether or not a graduate is likely to feel overqualified for his or her current job ($p < .001$). Ironically, the higher a mother's education, the more likely is the graduate is to feel overqualified. The relationship between father's education and overqualification is much weaker ($p < .05$).

The relationship between age and respondents' subjective feelings of overqualification is statistically significant ($p < .001$). As has been done for all of the previous models, the predicted probabilities for each year of age are plotted in Figure E1.

Once again, graduates without children are the reference category for the number of children variable. While they are slightly more likely than graduates with three or more children and slightly less likely than graduates with only one child to feel overqualified, these differences are not statistically significant. Graduates with two children are the least likely to feel that they are overeducated, and the difference between them and the reference category (childless graduates) is statistically significant ($p < .001$). Lastly, the language variable has a relatively small, but statistically significant ($p < .05$) effect on subjective underemployment. Graduates who speak French as their main language are less likely to feel overqualified than English-speaking graduates.

Appendix Table 5.2
Subjective Overeducation

	Model 1			Model 2			Model 3		
	b	Std E	p	b	Std E	p	b	Std E	p
Constant	-1.018	0.1847	***	-0.874	0.1936	***	-1.470	0.2231	***
Sex			***			***			**
Women	0.193	0.0274	***	0.112	0.0309	***	0.091	0.0345	**
Men	---	---		---	---		---	---	
Marital Status			***			***			***
Married	-0.311	0.0329	***	-0.280	0.0334	***	-0.258	0.0359	***
Separated/Divorced/Wid	-0.202	0.0795	*	-0.258	0.0806	***	-0.259	0.0852	**
Single	---	---		---	---		---	---	
Indian Status			**			***			**
Indian	0.351	0.1278	**	0.429	0.1291	***	0.420	0.1426	**
Non Indian	---	---		---	---		---	---	
Region			***			***			***
Eastern Provinces	-0.085	0.0539		-0.072	0.0556		-0.072	0.0593	
Quebec	-0.061	0.0582		-0.077	0.0599		-0.150	0.0637	*
Western Provinces	-0.190	0.0354	***	-0.207	0.0362	***	-0.215	0.0389	***
Ontario	---	---		---	---		---	---	
Mother's Education			***			***			***
High school	-0.029	0.0401		-0.027	0.0407		-0.016	0.0433	
Some post-secondary	0.166	0.0590	**	0.169	0.0599	**	0.297	0.0642	***
Trade	-0.200	0.0836	*	-0.183	0.0846	*	-0.059	0.0895	
College	-0.150	0.0527	**	-0.122	0.0535	*	-0.061	0.0572	
University	-0.130	0.0547	*	-0.150	0.0559	**	-0.137	0.0599	*
Master's	0.030	0.0991		-0.006	0.1008		-0.095	0.1075	
Professional	0.092	0.3248		0.096	0.3285		0.145	0.3509	
Ph.D.	0.084	0.2121		0.064	0.2156		0.114	0.2241	
Don't Know	-0.018	0.0773		0.022	0.0782		-0.007	0.0841	
Less than high school	---	---		---	---		---	---	
Father's Education			*			*			*
High school	0.060	0.0407		0.058	0.0413		0.049	0.0441	
Some post-secondary	-0.073	0.0638		-0.096	0.0648		-0.151	0.0696	*
Trade	-0.035	0.0698		-0.036	0.0705		-0.018	0.0744	
College	0.186	0.0590	**	0.182	0.0599	**	0.184	0.0639	**
University	0.063	0.0499		0.083	0.0509		0.103	0.0544	*
Master's	-0.015	0.0771		-0.004	0.0787		0.069	0.0841	
Professional	0.046	0.1145		0.043	0.1171		0.052	0.1248	
Ph.D.	-0.075	0.1084		-0.065	0.1111		-0.036	0.1183	
Don't Know	0.071	0.0668		0.005	0.0676		-0.003	0.0729	
Less than high school	---	---		---	---		---	---	
Number of children			***			***			**
One child	0.089	0.0500		0.094	0.0509		0.057	0.0542	
Two children	-0.169	0.0587	**	-0.162	0.0596	**	-0.202	0.0634	***
Three or more children	-0.137	0.0834		-0.121	0.0845		-0.110	0.0896	
No children	---	---		---	---		---	---	
Language			*			*			
French	-0.131	0.0573	*	-0.123	0.0579	*	-0.052	0.0613	
English	---	---		---	---		---	---	
Age			***			***			***

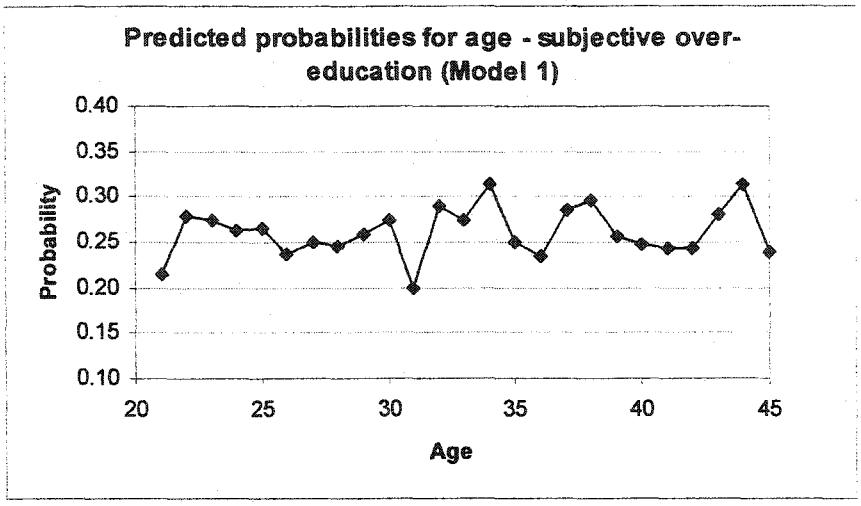
Appendix Table 5.2 Continued

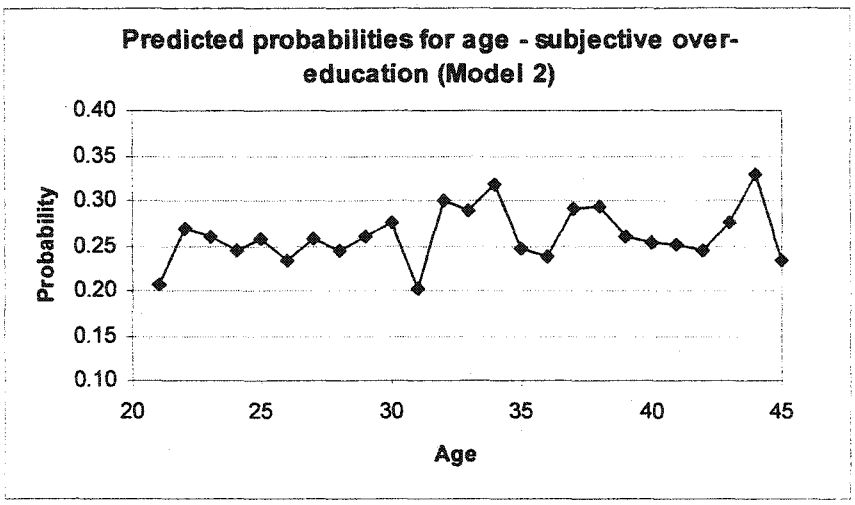
	Model 1	Model 2			Model 3		
		b	Std E	p	b	Std E	p
Field of Study				***			***
Education		-0.374	0.0513	***	-0.201	0.0579	***
Fine Arts	n = 25458	0.285	0.0778	***	0.226	0.0850	**
Humanities	LR (54) = 398.69	0.228	0.0631	***	0.175	0.0689	**
Commerce	p > chi2 = 0.0000	-0.260	0.0455	***	-0.250	0.0511	***
Agricultural/Bio Sci	Pseudo R2 = 0.0123	-0.075	0.0680		0.020	0.0740	
Engineering/Ap Science	Ll = -16006.657	-0.564	0.0513	***	-0.391	0.0599	***
Health Professions		-0.690	0.0577	***	-0.222	0.0758	**
Math		-0.765	0.0886	***	-0.390	0.0987	***
Other		0.181	0.1143		0.237	0.1219	
Social sciences		0.000	---		0.000	---	
Level of Schooling				***			***
Trades		0.115	0.0462	*	-0.262	0.0517	***
College		0.053	0.0376		-0.116	0.0411	**
Professional		-1.025	0.1070	***	-1.050	0.1182	***
Master's		-0.235	0.0618	***	-0.045	0.0664	
Ph.D.		-0.600	0.1690	***	-0.250	0.1795	
Undergraduate		0.000	---		0.000	---	
Occupational Type							***
Manager, admin					0.114	0.0835	
Natural Sci, Engineering		n = 25424			-0.327	0.0985	***
Religion		LR (68) = 1023.13			0.275	0.2895	
Teaching & Related		p > chi2 = 0.0000			-0.189	0.0874	*
Medicine & Health		Pseudo R2 = 0.0316			-0.278	0.1031	**
Art, Literary, Recreation		Ll = -15668.206			0.683	0.1094	***
Clerical & Related					0.932	0.0818	***
Sales					0.839	0.0865	***
Service					0.582	0.0833	***
Manual Labour					0.800	0.0855	***
Social Science occup					---	---	
Occupational Status							***
Part-time					0.512	0.0432	***
Full-time					---	---	

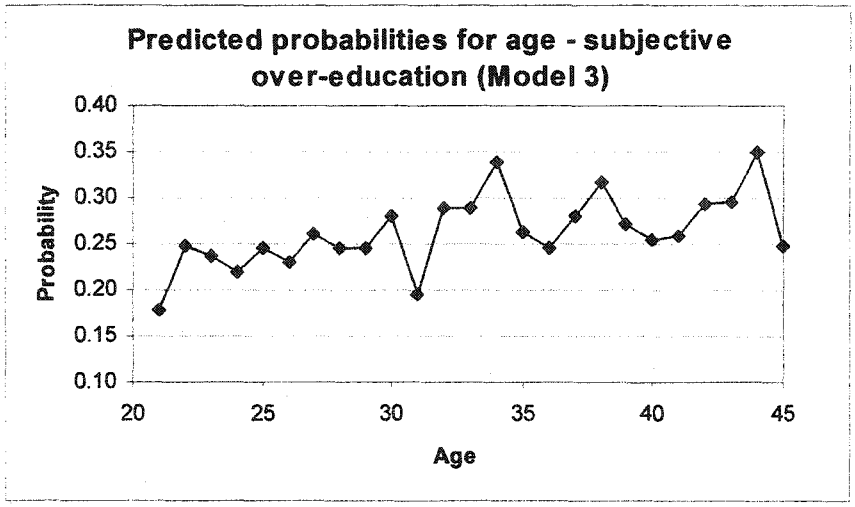
*** = p < .001
** = p < .01
* = p < .05

n = 23262
LR (79) = 1907.15
p > chi2 = 0.0000
Pseudo R2 = 0.0643
Ll = -13874.556

Figure E1


Predicted probabilities for age - subjective over-education (Model 1)
Probability
0.40
0.35
0.30
0.25
0.20
0.15
0.10
20
25
30
35
40
45
Age


Predicted probabilities for age - subjective over-education (Model 2)
Probability
0.40
0.35
0.30
0.25
0.20
0.15
0.10
20
25
30
35
40
45
Age


Predicted probabilities for age - subjective over-education (Model 3)
Probability
0.40
0.35
0.30
0.25
0.20
0.15
0.10
20
25
30
35
40
45
Age

Appendix F

Appendix E includes all of the parameter estimates for logistic regression results for the mismatch between education presented in chapter 5, as well as a discussion of the parameter estimates for sociodemographic variables in model 1 of this analysis.

Table Appendix Table 5.3 provides the complete model statistics for the mismatch analysis in chapter 5. The pseudo R^2 for the model that includes only the sociodemographic variables (Model 1) is .021. The effects of marital status, region, language of interview, mother's education, and age are all statistically significant ($p < .001$). The effects of sex, Indian status, father's education, and number of children are also statistically significant ($p < .05$).

The parameter estimate for the gender variable suggests that women are slightly less likely than men to feel that they are in jobs that are related to their schooling than are men ($p < .05$)[1]. Of all the marital status categories, married respondents are most likely to find themselves in jobs that they believe are related to their education. The difference between them and the reference category, single respondents, is statistically significant ($p < .001$). Respondents who were previously married are also more likely to be in jobs that are related to their schooling than are graduates who are single at the time of the survey ($p < .05$).

While graduates classified as native Indian are more likely to find themselves in jobs that they feel are related to their schooling than are graduates who are non-Indians, the difference is just barely statistically significant ($p < .05$).

---

[1] The base-line category for the dependent variable represents respondents who are in jobs that they feel are closely related to their education. The choice of the baseline category is arbitrary and does not affect the relative differences between categories or respective significance tests.

Graduates from the Western provinces are most likely to feel that their jobs are related to their schooling, while graduates from Ontario, the reference category, are least likely to feel this way ($p < .001$). Graduates from the Eastern provinces are more likely than are graduates from Ontario to feel that their education is related to their schooling ($p < .05$). Those living in Quebec are not any more likely than are graduates living in Ontario to feel like they have found jobs that are related to their schooling.

A mother's education affects the likelihood that a respondent will feel that he or she is in a job that is related to his or her schooling ($p < .001$). Graduates whose mothers has trade certificates are most likely to feel that their jobs are related to their work, while respondents whose mothers have a master's degree are least likely to feel that their education is related to their work. On the other hand, the parameter estimates for the father's education variable do not show any particular relationship with the dependent variable.

Graduates with three or more children are the most likely to feel that they work in jobs that are related to their education. The difference between them and the reference category, childless respondents, is statistically significant ($p < .01$). Graduates with one or two children are not any more or less likely than childless graduates to find themselves in jobs that are related to their schooling.

As mentioned above, the last two variables, language and age, are both statistically significant. The parameter estimate for the language variable indicates that graduates for whom French as the everyday language are more likely to report that they are in jobs that are related to their schooling than

graduates for whom English is the everyday language ($p < .001$). The parameter estimates for the age variable are converted into predicted probabilities, and are displayed in Figure F1.

Incidentally, as was mentioned in chapter 5, after adding the level of schooling and the field of study variables in Model 2 some of the parameter estimates for the other variables did change somewhat. For example, the Indian status variable becomes statistically significant at ($p < .01$), while the number of children variable is no longer statistically significant. The other variables remained statistically significant at their respective levels, but the respective parameter estimates for some of them did change slightly. For example, after controlling for the education variables, graduates from Quebec are now more likely than graduates from Ontario to feel that their jobs are related to their education; however, the coefficient has barely achieved statistical significance ($p < .05$). The difference between graduates from the Eastern provinces and graduates Ontario graduates also becomes greater; the significance level of this parameter estimate increased (to $p < .01$). The parameter estimates for mother's education and for father's education did not change very much. Neither did the age coefficients (see Figure F1). Lastly, the statistically significant difference between graduates with three or more children and graduates without any children declined to ($p < .05$).

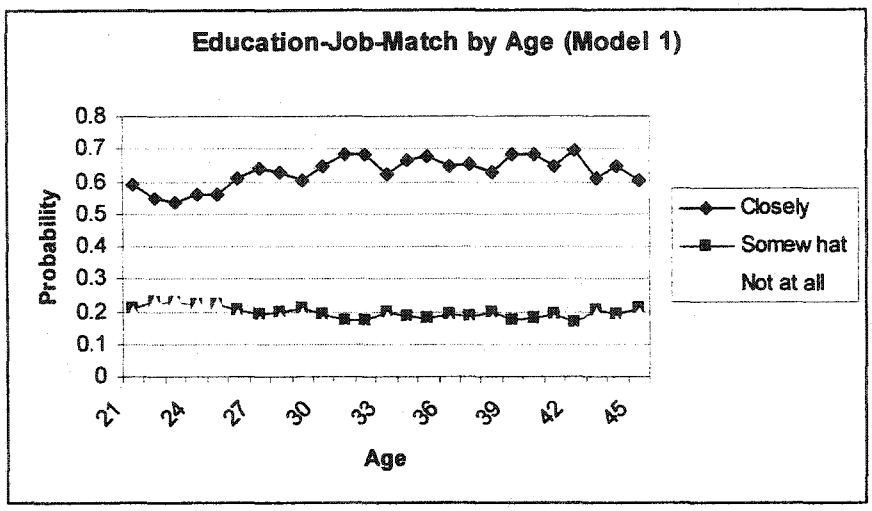
Appendix Table 5.3
Dependent Variable: Whether Education is Related to Job
Ordered Logistic Regression

	Model 1			Model 2			Model 3			Model 4		
	b	Std E	p	b	Std E	p	b	Std E	p	b	Std E	p
Cut 1	-0.35	0.161		0.10	0.173		0.63	0.200		-0.74	0.211	
Cut 2	0.67	0.162		1.18	0.173		1.77	0.201		0.60	0.211	
Sex			*			*			*			**
Women	0.05	0.025	*	0.05	0.028		0.08	0.031	*	0.10	0.033	**
Men	---	---		---	---		---	---		---	---	
Marital Status			***			***			***			***
Married	-0.28	0.029	***	-0.22	0.030	***	-0.19	0.032	***	-0.18	0.034	***
Separated/Divorced/Wid	-0.15	0.073	*	-0.22	0.074	**	-0.21	0.078	**	-0.18	0.082	*
Single	---	---		---	---		---	---		---	---	
Indian Status			*			*			**			**
Indian	0.27	0.108	*	0.35	0.111	**	0.32	0.122	**	0.37	0.127	**
Non-Indian	---	---		---	---		---	---		---	---	
Region			***			***			***			***
Eastern Provinces	-0.10	0.048	*	-0.14	0.050	**	-0.14	0.053	**	-0.05	0.056	
Quebec	-0.05	0.052		-0.13	0.054	*	-0.20	0.057	***	-0.14	0.060	*
Western Provinces	-0.25	0.031	***	-0.27	0.032	***	-0.27	0.035	***	-0.21	0.036	***
Ontario	---	---		---	---		---	---		---	---	
Mother's Education			***			***			***			***
High school	-0.08	0.036	*	-0.10	0.037	**	-0.09	0.039	*	-0.08	0.041	*
Some post-secondary	-0.02	0.054		-0.03	0.055		0.05	0.059		0.03	0.062	
Trade	-0.35	0.076	***	-0.36	0.077	***	-0.26	0.081	***	-0.26	0.086	**
College	-0.23	0.047	***	-0.20	0.048	***	-0.16	0.051	**	-0.13	0.054	*
University	-0.16	0.049	***	-0.21	0.050	***	-0.16	0.053	**	-0.15	0.056	**
Master's	0.28	0.088	***	0.21	0.090	*	0.21	0.095	*	0.19	0.099	
Professional	0.02	0.284		0.06	0.288		0.12	0.309		0.35	0.321	
Ph.D.	-0.08	0.192		-0.14	0.194		-0.11	0.200		-0.17	0.210	
Don't Know	-0.06	0.071		-0.04	0.072		-0.04	0.077		-0.06	0.081	
Less than high school	---	---		---	---		---	---		---	---	
Father's Education			*									**
High school	-0.01	0.037		-0.01	0.038		-0.01	0.040		-0.05	0.042	
Some post-secondary	-0.07	0.058		-0.09	0.059		-0.10	0.063		-0.18	0.067	**
Trade	-0.05	0.062		-0.05	0.063		-0.07	0.067		-0.13	0.070	
College	0.04	0.054		0.03	0.055		0.02	0.058		0.04	0.061	
University	0.06	0.045		0.07	0.046		0.06	0.049		0.06	0.051	
Master's	0.05	0.068		0.03	0.071		0.03	0.075		0.04	0.079	
Professional	0.15	0.101		0.12	0.105		0.14	0.111		0.20	0.117	
Ph.D.	0.14	0.094		0.08	0.097		0.15	0.102		0.20	0.106	
Don't Know	0.18	0.061	**	0.13	0.062	*	0.11	0.066		0.02	0.070	
Less than high school	---	---		---	---		---	---		---	---	
Number of Children			*									**
One child	0.00	0.046		0.01	0.047		-0.04	0.049		-0.06	0.052	
Two children	-0.05	0.053		-0.03	0.054		-0.10	0.057		-0.16	0.061	**
Three or more children	-0.24	0.077	**	-0.20	0.079	*	-0.19	0.083	*	-0.28	0.087	**
No children	---	---		---	---		---	---		---	---	
Language			***			***			***			***
French	-0.49	0.051	***	-0.47	0.052	***	-0.38	0.055	***	-0.32	0.058	***
English	---	---		---	---		---	---		---	---	
Age			***			***			***			***

Appendix Table 5.3 Continued
Dependent Variable: Whether Education is Related to Job
Ordered Logistic Regression

	b	Std E	p	b	Std E	p	b	Std E	p	b	Std E	p
Field of Study						***			***			***
Fine Arts				0.92	0.075	***	0.74	0.082	***	0.55	0.086	***
Humanities	n = 25699			1.34	0.063	***	1.21	0.069	***	0.88	0.072	***
Social Sciences	LR (54) = 1067.37			0.93	0.048	***	0.77	0.054	***	0.56	0.056	***
Commerce	p = 0.0000			0.39	0.046	***	0.12	0.054	*	-0.02	0.056	
Agricultural/Bio Sci	Pseudo R2 = 0.0205			0.58	0.066	***	0.42	0.073	***	0.24	0.076	***
Engineering/Ap Science	Ll = -25466.546			0.23	0.052	***	0.07	0.061		0.17	0.063	**
Health Professions				-0.38	0.058	***	-0.06	0.075		0.07	0.078	
Math				0.11	0.078		0.02	0.088		0.06	0.093	
Other				1.31	0.107	***	1.19	0.113	***	1.05	0.120	***
Education				---	---		---	---		---	---	
Level of Schooling						***			***			***
Trades				0.11	0.042	**	-0.22	0.046	***	-0.71	0.050	***
College				-0.21	0.034	***	-0.38	0.037	***	-0.64	0.040	***
Professional				-1.08	0.094	***	-0.95	0.101	***	-0.78	0.104	***
Master's				-0.41	0.055	***	-0.25	0.059	***	0.01	0.062	
Ph.D.				-1.00	0.154	***	-0.57	0.162	***	-0.17	0.166	
University Undergrad				---	---		---	---		---	---	
Occupation									***			***
Manager, admin							0.50	0.075	***	0.30	0.078	***
Natural Sci, Engineering				n = 25665			0.34	0.085	***	0.32	0.088	***
Religion				LR (68) = 2840.31			-0.35	0.274		-0.27	0.302	
Teaching & Related				p = 0.0000			-0.15	0.080		-0.15	0.083	
Medicine & Health				Pseudo R2 = 0.0547			-0.19	0.095	*	-0.13	0.099	
Art, Literary, Rec				Ll = -24542.376			0.45	0.103	***	0.13	0.107	
Clerical & Related							1.12	0.075	***	0.71	0.078	***
Sales							1.20	0.079	***	0.81	0.083	***
Service							0.98	0.076	***	0.63	0.080	***
Manual Labour							1.14	0.078	***	0.73	0.081	***
Social Sciencs / Rel							---	---		---	---	
Occupational Status									***			***
Part-time							0.45	0.041	***	0.36	0.043	***
Full-time							---	---		---	---	
Education-Job Match												***
Match 2										-1.02	0.038	***
Match 3							n = 23475			-2.16	0.036	***
Match 1							LR (79) = 3899.44			---	---	
							p = 0.0000					
*** = p < .001							Pseudo R2 = 0.0817			n = 23474		
** = p < .001							Ll = -21911.581			LR (81) = 7928.88		
* = p < .01										p = 0.0000		
										Pseudo R2 = 0.1662		
										Ll = -19895.563		

Figure F1


Education-Job-Match by Age (Model 1)
Probability
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
21
24
27
30
33
36
39
42
45
Age
Closely
Somew hat
Not at all

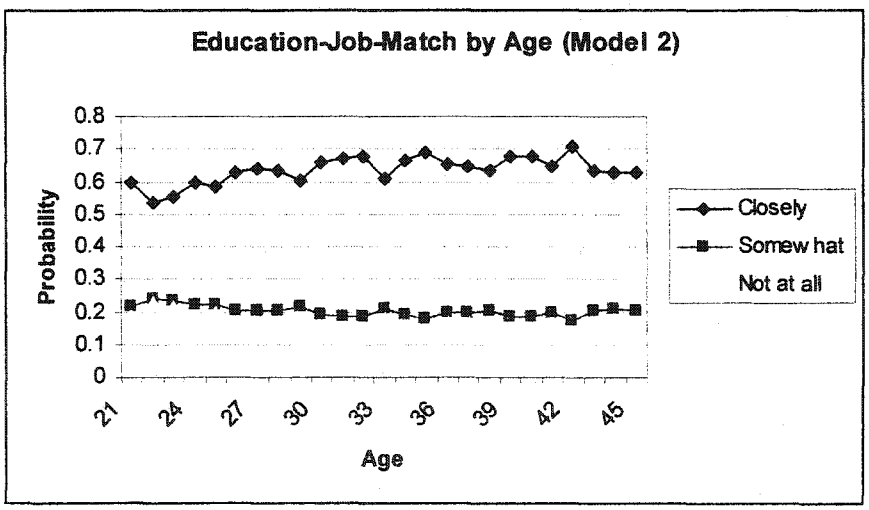
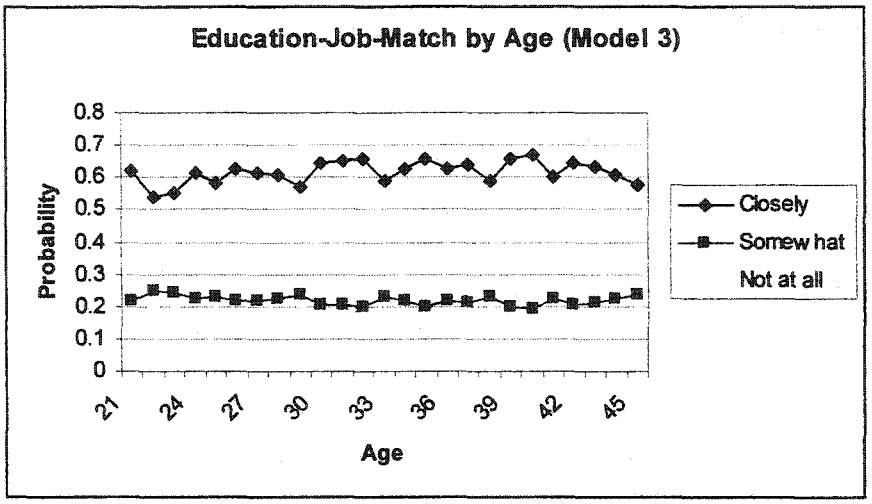
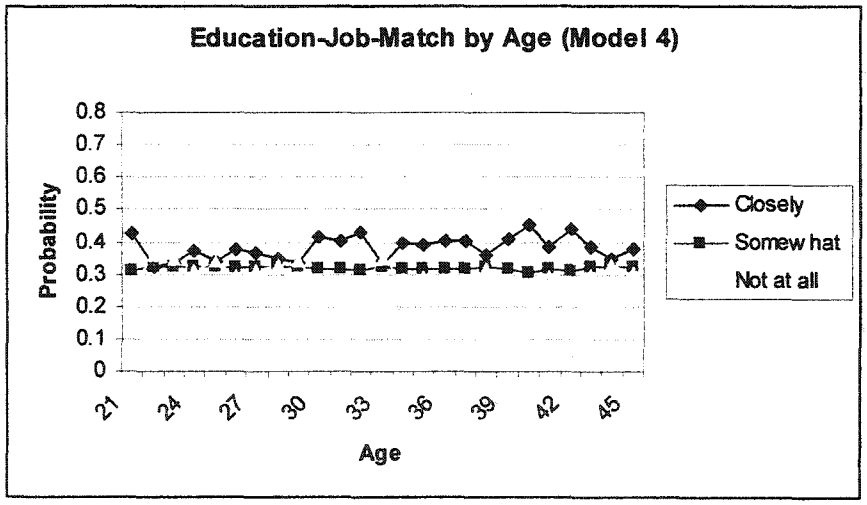

Education-Job-Match by Age (Model 2)
Probability
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
21
24
27
30
33
36
39
42
45
Age
Closely
Somew hat
Not at all

Figure F1 Continued





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