Exploring the Alignment between Postsecondary Education Programs and Labour Market Outcomes in Ontario

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for the Higher Education Quality Council of Ontario

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Introduction

The school-to-work transition of Ontario postsecondary graduates is a growing concern within Canada's "knowledge-based" economy, with increasing attention given to the skills possessed by recent graduates. There is some debate about whether the skills developed within postsecondary programs provide a good fit with the requirements of the evolving "knowledge" economy. While some argue that graduates require technical and applied skills for this economy, others assert that generic skills offered by liberal arts programs, such as communication and critical thinking skills, are also in demand by employers. Therefore, although technological skills are required for the creation of new technology in this economy, an alternate perspective identifies a need for a variety of educated workers, including those who can evaluate, interpret, and communicate information in the knowledge economy.

The field of study of recent postsecondary graduates is thus a salient aspect of their labour market outcomes. Previous research indicates that there was little difference in outcomes between graduates of different fields of study in the 1980s and early 1990s; however, information about more recent cohorts is needed. The impact of new information technology and a greater concentration on producing workers for the knowledge economy has influenced changes in human resources needs and business activities. It is therefore important to study a recent cohort of graduates who made their school-to-work transitions during a time of rapid technological change.

The primary purpose of this study is to explore issues relating to the labour market outcomes of recent graduates of various field of study and levels of schooling in Ontario. While stratification based on fields of study is the focus of this research, attention is also given to gender when examining the employment outcomes of recent graduates. Enrolment across trades, college, and university programs remain segregated by gender, leading to gender differences in occupational choice and technical training. Thus, the reproduction of the gendered division of labour may result. This study will provide important information for policy officials involved with allocating government funding to education and may inform decisions about tuition levels for different programs. Results may also be of interest to administrators of college, trades, and university programs who are concerned with admissions strategies and enrolment across different fields of study. The findings from this study will also be of assistance to students concerned about their school-to-work transition while navigating through the postsecondary system.

Background Literature

The notion of a "knowledge-based" economy has been a key focus of recent literature examining the fit between postsecondary educational programs and the labour market outcomes of graduates. Characterized by the production of knowledge and technology, the development of the knowledge economy has contributed to a common view that higher education and specialized training are imperative to the success of new labour market entrants (Finnie and Usher, 2007; Lavoie and Finnie, 1999; Riddell and Sweetman, 1999; Allen, 1997;

Stehr, 1994; Drucker, 1993). There has been particular emphasis on the necessity of a highly skilled labour force to satisfy Canada's need for research and development in the information technology, environmental technology, and telecommunications fields, as well as in specific occupational fields such as engineering (Statistics Canada, 1999; Government of Canada, 2002a). While the knowledge economy has grown gradually since the early 1970s (Baldwin and Beckstead, 2003), there has been more rapid change in recent years. Throughout the 1990s and into the 21st century, the increasing creation and development of information technology has significantly impacted how businesses operate and has subsequently affected the skills required to compete in this changing economy (Walters, 2004a; Allen, 1999; Bell, 1973).

The challenges presented by the knowledge economy have led many to deduce that students who obtain higher levels of education and develop specialized skills will be more competitive in the labour market (Conference Board of Canada, 2007; Baldwin and Beckstead, 2003; Rubinson and Browne, 1994). This has resulted in an increase in the proportion of the labour force that holds a university degree; in fact, Canada boasts some of the most highly educated young adults in the world (Baldwin and Beckstead, 2003; Riddell and Sweetman, 1999). However, some concern over this advantage has been raised as the level of education obtained by individuals in other areas of the world over the last 20 years has risen substantially (Finnie and Usher, 2007). Thus, there has been increased interest in training a highly skilled workforce in Canada that can compete at the global level. The Government of Canada (2002b) and others (e.g., Finnie and Usher, 2007) have expressed a need to increase the number of graduate students while there has also been more specific concern over a need for more business and engineering students (Martin Property Institute, 2007; Government of Canada 2002a).

While Canadian employers are believed to require more highly skilled employees, some have questioned whether postsecondary education provides the resources to allow such skills to be developed (Canadian Council on Learning, 2008). Skill requirements for many occupations have increased over the past two decades leading to the assumption that higher credentials and more specialized skill sets are necessary to succeed in the new economy (Gingras and Roy, 1998). However, some argue that employers' increasing emphasis on higher levels of education is a case of "upskilling" in which the job responsibilities do not actually require such highly advanced knowledge or skills (Gingras and Roy, 1998; Krahn and Lowe, 1998; Livingstone, 1998, Berg, 1970, Collins, 1979). This argument has led some to question the value of a university-level education, especially when college-level programs offer more technical training in similar disciplines. A debate has thus emerged over the value of certain types of educational pathways in students' school-to-work transitions and, despite evidence that some academic programs contribute to the over-qualification of workers in the knowledge economy (Frenette, 2004), there remains an assumption that the Canadian economy requires more highly skilled workers (Canadian Council on Learning, 2008; Finnie and Usher, 2007; Government of Canada, 2002a). However, some have warned that policies based on the "exchange value of education", which result in primarily funding programs that are directly related to work skills, may be short-sighted and detrimental to higher education as a whole (Axelrod et al., 2001:49).

Nevertheless, the demand for highly skilled workers in the knowledge economy has been met by an increase in postsecondary education. Walters (2004b) argues that this increase in schooling will continue as long as the cost of further education does not outweigh the prospect

of future earnings. Thus, there is a direct relationship between postsecondary education and the labour market, a relationship that is primarily rooted in the human capital perspective. The positive relationship between level of education and earnings is well established in the human capital literature and has thus been largely influential in shaping education policy (Walters, 2004b; Ashton and Lowe, 1991). The influence of this perspective has been apparent in Ontario's education policies since the 1960s, representing the assumption that increases in the demand for skills in the labour force require an increased investment in education and training (Taylor, 2005). In addition, there has been an increase in policy reforms focusing on the need for greater links between education and work in recent years, indicating a movement toward making "educational institutions more responsive to economic demands" (Taylor, 2005:322).

The notion that postsecondary educational programs should be directly related to labour market outcomes has been a persistent issue in government policies and policy reforms linking educational training with economic demands. In particular, the Ontario government has increased funding to university programs that develop technological skills which are "most in demand by industry" (Lin et al., 2000:38). Postsecondary institutions have responded to this by attempting to create greater contact and networking between students and employers. Concern over the fit between postsecondary education and employer expectations has led to an increase in cooperative education programs, or "experiential learning" (Canadian Council on Learning, 2008:2). Such programs have become increasingly popular with students, particularly in Ontario where the majority of Canadian co-op graduates reside (Walters and Zarifa, 2008). While such programs are growing, there is concern that more Canadian students should have access to them in order to ease their school-to-work transition (Bell and O'Reilly, 2008; Canadian Council on Learning, 2008).

A rise in the educational and training requirements of employers has also influenced many students to stay in school longer than previous generations and to follow non-traditional pathways into the work force (e.g., obtain a university degree and then enter a community college program) (Bell and O'Reilly, 2008). These non-traditional pathways have been largely supported by government initiatives, particularly in Ontario where there has been support for the creation of technical universities (e.g., the Ontario Institute for Technology) and university-college collaborations (e.g., University of Guelph-Humber) that offer theoretical and applied education (Boggs and Trick, 2009; Walters and Zarifa, 2008; Axelrod et al., 2001). Axelrod (2002) states that employers now expect both generic skills and specific technical skills from recent graduates of postsecondary programs. The relationship between educational outcomes and employability skills is, therefore, complicated as they "cannot be viewed in isolation of one another" (Ministry of Training, Colleges and Universities, 2010b). The combination of both applied and generic skills is particularly evident within college programs as college students are expected to develop general analytic skills such as critical thinking and problem-solving in addition to more specific, technical skills (Ministry of Training, Colleges and Universities, 2010a). Thus, the development of programs that focus on the development of a variety of "soft" skills (e.g., communication skills) and technical skills is of interest to a wide range of employers and, subsequently, of interest to postsecondary education programs.

The role of a liberal education in a technologically-oriented society has therefore been receiving increased attention from researchers as some have asserted that this "new" economy requires

workers with highly specialized skills rather than workers with the “soft” skills typically associated with a liberal arts education (Canadian Council on Learning, 2008, Krahn and Bowlby, 1999, Lavoie and Finnie, 1999, Rush and Evers, 1986). However, some argue that liberal arts programs are integral to an economy that is increasingly centred on technology and innovation (e.g., Axelrod et al., 2001).

Those who contend that there is a need for liberal arts graduates assert that those who are educated within such programs can fulfill a need in the knowledge economy that graduates from technical programs cannot. Workers with broad problem-solving and critical thinking skills can use new technology in the workplace and have the ability to understand and analyze the abundant amount of information produced by the knowledge economy (Walters, 2004b; Giles and Drewes, 2001; Allen, 1999). Thus, employers may not desire only specific technical skills; rather, individuals who possess more general skills (e.g., problem-solving or inter-personal skills) may also be valued (Walters, 2004a; Axelrod et al., 2001; Giles and Drewes 2001; Allen 1999, Krahn and Bowlby, 1999).

Despite the commonly held belief among employers, students, and policy makers that education should develop skills directly applicable to the responsibilities required by students’ future employment (Brisbois et al., 2008; Axelrod et al., 2001; Human Resources Development Canada, 2001), others argue that the role of education is to provide students with general cognitive and social skills that allow them to adapt to changes in job requirements (Lin et al., 2000). While some assert that current postsecondary educational programs do not provide students with the skills expected by employers (Canadian Council on Learning, 2008), others have noted that the future demand for particular skills cannot be predicted (Brisbois et al., 2008). Therefore, students may benefit from more liberal-based programs which offer the type of skills that are adaptable to the changing economy, providing these students with a greater range of employment opportunities (Axelrod et al., 2001; Giles and Drewes, 2001; Allen, 1999; Riddell and Sweetman, 1999). Others echo this notion, arguing that students who acquire only specific technical skills may in fact risk future labour market success as their skills may become outdated due to continual changes in the economy (Walters 2004a, Government of Canada 2002a; Axelrod et al., 2001). Conversely, proponents of vocational education assert that graduates from applied and technical programs are better prepared to identify and obtain employment that offers a greater job-skill match (Human Resources Development Canada, 2001).

Due to the debates over the usefulness of liberal arts and applied programs, the field of study in which students choose to enrol is an important factor to consider when examining the labour market outcomes of recent graduates. While there has been increasing attention given to the impact of graduates’ fields of study in their employment success (Stark, 2007; Hansen, 2006; Bourdabat, 2004; Frenette, 2004; Walters 2004a; Finnie and Frenette, 2003; Walters, 2003; Axelrod et al., 2001; Finnie, 2001; Lin et al., 2000; Allen, 1999; Lavoie and Finnie, 1999; Riddell and Sweetman, 1999; Silver et al., 1999; Davies and Guppy, 1997), none has examined the most recent data available through the National Graduates Survey (NGS) (Hansen, 2006).

Because the existing literature on the school-to-work transitions of graduates is out-dated, the effects of more recent changes in the economy on new graduates from different fields of study

are unclear. The proliferation of information technologies and information sharing devices since the beginning of the 21st century has affected the collection, processing, and storage of information in the workplace in addition to changing how businesses approach advertising, sales, and communication (Walters, 2004a). The development of the knowledge economy has also changed the structure of organizations, largely decreasing the hierarchical structure resulting in the allocation of a greater range of work activities for each employee (Allen, 1999). Therefore, when identifying the impact of the changing economy on the labour market outcomes of postsecondary graduates, it is important that analyses involve graduates of the most critical cohort – those who made their school-to-work transitions during this period of rapid technological change. The National Graduates Survey data allow for the exploration of the relationship between graduates' labour market experiences, their education and training, and their sociodemographic characteristics (Human Resources Development Canada, 2001).

Despite the lack of recent data, several studies indicate that previous cohorts of graduates in applied and technical fields generally fare better in the labour market than liberal arts graduates, particularly in terms of earnings and unemployment rates (Walters, 2004a; Walters, 2003; Lin et al., 2003; Finnie, 2002; Finnie, 2001; Lin et al., 2000; Silver et al., 1999, Davies and Guppy, 1997). This is particularly true of university graduates of applied fields whose programs are typically more costly than other programs, indicating greater rates of return in the labour market for these students (Statistics Canada, 2009a). Specifically, graduates from engineering, health, business and commerce, mathematics, and computer sciences are consistently found to obtain higher earnings than graduates from other fields of study; graduates of fine arts and the humanities consistently obtain the lowest earnings (Stark, 2007; Hansen, 2006; Walters, 2004b; Lin et al., 2003; Walters, 2003; Finnie, 2001; Silver et al., 1999). Graduates of professional programs in fields such as health, law, engineering, and education are also more likely to obtain occupations directly related to their fields of study (Finnie, 2001; Boothby, 2000; Lavoie and Finnie, 1999). In addition, a relative earnings advantage of university graduates over community college and trade school graduates has been found (Hansen, 2006; Walters 2004a). However, there is also evidence that university graduates have similar unemployment rates than graduates from community college or trades programs (Statistics Canada, 2009b).

Although liberal arts graduates are generally found to have lower earnings levels than other graduates, some studies indicate that liberal arts graduates may experience some advantages in the labour market. As previously discussed, liberal arts programs often develop generic skills that are applicable to a wide range of occupations in the knowledge economy (Giles and Drewes, 2001). Lin et al. (2000:38) also find that, overall, there is relatively little difference in the "employability skills" possessed by liberal arts graduates and graduates of vocational programs. This finding supports Redpath's (1994) hypothesis that the earnings differences may be attributable to employers' perceptions of the relevancy of the skill sets possessed by these two groups of graduates. Although there may be no significant variations in their employability skills, it is evident that there are differences in the value that employers place on "liberal" and "vocational" skills (Lin et al., 2003). The perception of skill development among liberal arts graduates themselves also indicates a possible advantage over other graduates, as they are more likely than graduates of vocational programs to report strong writing skills (Lin et al., 2003; Lin et al., 2000). However, Walters (2004a) notes that liberal arts graduates may be unaware of many of the skills that they have developed throughout their postsecondary education and thus

report less fit between their education and work than graduates of applied and technical programs.

Nevertheless, several studies have found that the earnings disadvantage faced by liberal arts graduates may be most pronounced during their school-to-work transition phase. While liberal arts graduates in their twenties typically earn less than their peers who have graduated from applied programs, they have been found to catch up to and sometimes surpass them over time (Admuti-Trache, 2006; Giles and Drewes, 2001; Allen, 1999). Giles and Drewes (2001:33) attribute this change to the nature of skills acquired by liberal arts graduates which "have a greater longevity and are complementary to continued, lifelong learning", which is required to survive in the constantly evolving knowledge economy. The earnings advantage that liberal arts graduates appear to gain over time may also be due to the opportunities that this type of education provides for further studies in graduate or professional programs which are largely unavailable to graduates of vocational programs (Walters, 2003). Therefore, the earnings advantages that liberal arts graduates may experience with time in the labour market may be attributable to the strong relationship between field of study and the likelihood of pursuing advanced degrees.

While field of study is clearly an important factor in the labour market outcomes of recent graduates, so too is gender. Gender segregation in postsecondary education has been apparent across university, college, and trades programs, leading to significant gender differences in occupational choice, as well as technical training (Walters, 2006; Davies et al., 1996; Lowe and Krahn, 1989). These differences are largely rooted in field of study choice, which have been well-documented in the literature (Finnie, 2001; Burbidge and Finnie, 2000; Allen, 1999; Davies and Guppy, 1997; Davies et al., 1996; Jacobs, 1995). Women are typically over-represented in fields such as nursing and education and men dominate the fields of engineering, physical sciences, and computer sciences (Junor and Usher, 2005; Finnie, 2001; Davies and Guppy, 1997; Jacobs, 1995; Wannell and Charon, 1995). Although more women are now studying law and medicine, gender imbalances remain in many fields, as women continue to constitute the majority of students enrolled in the humanities and social sciences at both the university and college levels (McMullen and Parsons, 2009; Statistics Canada, 2006). In light of concerns over the success of liberal arts graduates in the knowledge economy, gender is thus an important factor in the examination of the labour market outcomes of recent graduates. Level of schooling is also an important factor in relation to gender as men largely dominate trades programs (Statistics Canada, 2006).

These differences are primarily due to gender-typed socialization which influences the field of study choices made by women and men (Jacobs, 1995). While women typically enter people-oriented fields that are centred on nurturing, men are more likely to be "drawn to fields involving analytical thinking" (Jacobs, 1995:82). Thus, this contrast in field of study choice between men and women is of concern as it contributes to the gender division of labour; greater participation of women in male-dominated fields would diminish gender segregation in the labour force, changing this basis of inequality (Looker and Thiessen, 1999; Jacobs, 1995). Similarly, the fact that men have not entered female-dominated fields in large numbers also reproduces the gendered division of labour. Although there has been a significant increase in the number of women participating in university-level programs, gender inequality with respect to field of study

persists (Davies and Guppy, 1997). For example, although women's enrolment in Canadian engineering programs made gains throughout the 1990s, Engineers Canada (2009) reports that the proportion of female engineering students has consistently decreased since 2001.

Considering the debates discussed above, an examination of the labour market outcomes of a recent cohort of graduates is valuable given the rapid changes in the knowledge economy. This study will focus specifically on the cohort of 2005 graduates, allowing for an understanding of how field of study choice and type of schooling influenced the early labour market outcomes for this group of individuals. While many have examined this issue with previous cohorts at a national level, this study will focus on Ontario graduates specifically, providing a view of graduates' experiences at the provincial level. The labour market outcomes of recent graduates are of particular importance to Ontario's economy as structural changes (e.g., aging workforce) will impact the province's future economic growth (Conference Board of Canada, 2007). There is also some concern that, due to changes in the job requirements of employers in the knowledge economy, the province needs to ensure that more Ontarians "achieve higher levels of education" that will lead to greater innovation and productivity in the province (Martin Property Institute, 2007).

Research Questions

The above discussion brings to light several issues of interest that will be considered when examining the labour market outcomes of recent graduates in Ontario. While field of study and level of education are of particular importance to this study, several other factors will be considered as potential predictors of graduates' employment outcomes. The primary research questions that this study seeks to answer are as follows:

1. Are there significant differences in earnings and/or employment status between graduates of different fields of study? If so, which graduates fare better in the labour market?
2. Are there significant differences in earnings and/or employment status between graduates of different levels of schooling (trades, college, university undergraduate, university-advanced level)?
3. Do sociodemographic factors (e.g., sex, marital status, visible minority status, parental education) influence the earnings and/or employment status of recent graduates in Ontario?
4. Do government and/or non-government loans for education influence the earnings and/or employment status of recent graduates in Ontario?
5. Does educational funding in the form of bursaries, grants, or scholarships influence the earnings and/or employment status of recent graduates in Ontario?

Data

This study is based on data from Statistics Canada's 2005 National Graduates Survey (NGS). The original survey contains information on approximately 40,000 postsecondary graduates of various programs across all provinces and territories. A series of questions was asked via telephone that related to educational history and the employment profiles of the NGS respondents. The survey population is composed of all graduates of Canadian postsecondary educational institutions who had completed the requirements for degrees, diplomas, or certificates during the 2005 calendar year. Prior versions of the NGS have been used extensively in the research literature (Krahn and Bowlby, 1999; Taillon and Paju, 1999; Lin, Sweet, Anisef, and Schuetze, 2000; Finnie, 2001; Statistics Canada, 2001; Walters, 2004a; 2006; Walters and Zarifa, 2008; Zarifa and Walters, 2008); however, very little research is available that examines data from the newly released 2005 NGS, postsecondary graduates of the 2005 cohort who were surveyed in 2007.[1]

Variables and Procedures

The key explanatory variables used for the analyses relate to postsecondary programs of study: level of schooling and field of study. The level of schooling variable distinguishes between graduates of trades certificate programs, community college diploma or certificate programs,[2] university bachelor's level degree programs, and graduates of advanced level university degree programs. Graduates of programs typically classified "professional" (e.g., education, BEd; dentistry, DDS, DMD; veterinary medicine DVM; law, LLB; optometry, OD; medicine, MD) [3] are grouped together with graduates of graduate-level (e.g., MA, PhD etc.) programs. These programs are classified as "advanced" university-level degrees because they require at least

[1] We would like to note that Statistics Canada's webpage states that the NGS has "some under-coverage for graduates of colleges in some provinces. Data required to build the frame could not be obtained from a few institutions and therefore, graduates from those institutions were not included on the frame. Consequently, they could not be selected nor represented in any tabulation. It is estimated that approximately 10,000 college graduates in Ontario and 5,000 college graduates in Alberta are missing from the survey population. No adjustment was made at the weighting stage to compensate for this under-coverage." (see: http://www.statcan.gc.ca/cgi-bin/imdb/p2SV.pl?Function=getSurvey&SDDS=5012&lang=en&db=imdb&adm=8&dis=2)

[2] In 2005 community college programs were structured to provide graduates with a certificate and diploma, as opposed to a baccalaureate degree.

[3] Technically these are undergraduate programs, however, they are typically classified as "professional" because they are required for access into highly regulated professions. Admission to professional programs is also much more competitive than standard undergraduate programs, as they generally require high grade-point-averages for at least two years undergraduate schooling, and, in some instances, competitive standardized test results.

some undergraduate (bachelor's level) schooling for admission to their programs; hence, these programs are generally not accessible to students directly out of secondary school or from community colleges. Moreover, graduates of these programs generally experience more favourable labour market outcomes two years after graduation (Walters, 2004a).

All respondents were asked to report their field of study. Their responses were originally converted into a field of study code that is applicable for all graduates, using a classification system developed by the National Centre for Education Statistics in the United States called the Classification of Instructional Programs (CIP). This process allows Statistics Canada to aggregate the field of study codes into a smaller subset of categories to match the university student field of study categories and the community college and trade-vocational field of study categories. Due to issues relating to sample size we grouped graduates from fields relating to education and recreational services with those from interdisciplinary or other studies. See Appendix A. We also grouped liberal arts graduates together (e.g., the fine arts, humanities and social sciences). Finally, graduates with credentials in fields relating to mathematics are grouped together with graduates in fields relating to engineering and applied sciences.

The statistical models also include the primary sociodemographic variables sex, marital status, age, mother's education, father's education, the presence of dependent children, and visible minority status. The parental education variables are used as proxies for socioeconomic status. Also included are a series of variables that identify whether the respondents borrowed money from government or non-government sources to finance their schooling,[4] along with variables that capture whether the respondents received bursaries, grants or other scholarships[5] over the course of their programs. These variables have been found to be important determinants of earnings in recent research employing 2000 NGS data (Zarifa and Walters, 2008).

The response (dependent) variables in the statistical analyses are earnings and employment status. The earnings variable is assessed via respondents' estimated gross annual earnings (in Canadian dollars) during the 2007 calendar year. The earnings variable was derived by Statistics Canada, and is based on the respondent's reported salary, how it was paid (yearly, monthly, weekly or hourly) and the number of hours usually worked. The employment status variable distinguishes between those who reported working full-time (> 30 hours per week) and those who did not report working full-time (e.g., part-time and unemployed) at the time of the survey in 2007. This variable is reverse coded such that a respondent is assigned a value of 1 if s/he is not employed full-time.

[4] These variables may also represent proxies for socioeconomic status, as students from lower socioeconomic status (SES) families are more likely to borrow money to fund their postsecondary education.

[5] The scholarships variable is likely related to postsecondary programs – e.g., graduates of graduate-level university programs are more likely to receive scholarships than graduates of all other programs. It is also likely to indirectly tap into ability (or aptitude), as scholarships are also closely tied to students' grades and academic standing.

To be consistent with previous research employing NGS data the analyses involving earnings apply to graduates with full-year employment and who work more than 30 hours per week. All graduates who obtained additional credentials or who were enrolled in an additional postsecondary program at the time of the survey were removed from all analyses (descriptive statistics, earnings regressions, and employment status regressions) because they are no longer considered to belong to the same educational group. Finally, a small number of observations were removed as a result of missing data, leaving a maximum of 6,664 cases for the statistical analyses. All analyses employ the sample weights available in the NGS.

Descriptive Results

The descriptive statistics for the variables in this study are provided in Table 1. With the exception of age, all of the explanatory variables used in the analysis are treated as categorical. The categories and descriptive information (proportions and means) relating to each variable in this study can be found in Table 1.

Table 1. Descriptive statistics for the entire sample for the variables in the analyses.

	Percentage
Sex	
Female	58
Male	42
Marital Status	
Married	43
Not Married	58
Dependent Children	
Yes	26
No	75
Visible Minority Status	
Visible Minority	25
Non Minority	75
Mother has Postsecondary Education	
No	51
Yes	49
Father has Postsecondary Education	
No	50
Yes	50
Government Loans	
Yes	63
No	37
Bursaries/Grants	
Yes	25
No	76

Scholarships	
Yes	35
No	65
Other Loans	
Yes	31
No	69
Field of Study	
Business	22
Sciences	4
Engineering/Computer Sciences	19
Health	13
Other	19
Liberal Arts	23
Level of Schooling	
Trades	17
College	24
University (undergraduate)	25
University (advanced)	34
Age (mean)	31
Yearly Earnings for full time (median, n=4622)	$48,160
Employment Status	
Employed full-time	80
Unemployed or employed part-time	20
	n=6224

The descriptive statistics in Table 1 reveal that the average age of respondents in the sample of postsecondary graduates (two years after graduation) is 31. Consistent with past research more women than men graduate from postsecondary institutions in Ontario, where approximately 58 per cent of postsecondary graduates from the overall sample are female. The majority of respondents are not married (58 per cent), while most (75 per cent) do not have dependent children, two years after graduation. Postsecondary graduates reporting a visible minority status are outnumbered by their non-minority counterparts by a ratio of 3:1. In terms of parental education, slightly more than half of the respondents report that their mother has at least some postsecondary schooling; the same applies to their father. Approximately 63 per cent of respondents received a government student loan to subsidize the cost of schooling, while nearly 25 per cent reported that they had received bursaries or grants to help pay for their postsecondary education. More than 35 per cent of respondents had received scholarships, while approximately 31 per cent borrowed money from non-government sources.

With respect to field of study, most graduates come from fields classified as liberal arts (23 per cent) and business (22 per cent). Graduates of fields classified as engineering and other (which includes interdisciplinary studies) each represent approximately 19 per cent of the 2005 Ontario postsecondary graduates who are included in our analyses. Nearly 13 per cent of

postsecondary graduates in the sample have health related credentials, while approximately five per cent of the respondents have credentials classified as science oriented. Approximately 80 per cent of the sample are employed full-time, whereas approximately 20 per cent are either unemployed or employed part time (< 30 hours per week). The estimated median earnings of graduates who are employed full-time throughout the year is $48,160. Appendix B provides these statistics separately for each level of postsecondary schooling.

Regression Results

The first two sets of analyses apply to all postsecondary graduates in Ontario who received their credentials in 2005, and were surveyed in 2007. Thus, the results presented in Table 2 and Table 3 include postsecondary graduates of all levels (trades, community college, university baccalaureate, and university graduates with advanced degrees). The second set of analyses, presented in Table 4 and Table 5, apply only to community college and university baccalaureate level graduates. These models are designed to tease out the interrelationship between field of study and level of schooling for those groups of graduates.

The key explanatory variables in all models are field of study and level of schooling. All models control for the sociodemographic variables of marital status, the presence of dependent children, age, visible minority status, and parental education. We also control for factors relating to students' abilities to fund their postsecondary schooling that have been found to have an important impact on the labour market outcomes of recent postsecondary graduates. These are whether the respondents received any scholarships, grants or bursaries, and whether they borrowed from government or other sources to help subsidize the cost of schooling. All of the variables, except age, are treated as categorical. We employ indicator (0/1 dummy) coding for categorical variables. The coding of these variables and corresponding reference categories are clearly identified in the tables.

Table 2 provides the regression results for earnings for graduates of trades, college, and university. Since the distribution of earnings is positively skewed with non-negative values we use a regression model where a log transformation is employed for the response variable. The purpose of Model 1 is to assess the impact of field of study and level of schooling on earnings, controlling for the other variables in the model.[6] Among the control variables, gender, marital status, age, visible minority status, father's education, and the variables representing whether the respondent borrowed from non-government sources and whether the respondents reported receiving scholarships are all statistically significant at $p<.001$. The parameter estimates for these variables are interpreted as follows: When controlling for the other variables in the model,

[6] When not otherwise stated, the effects of all variables are to be interpreted as "controlling for all of the other variables in the model."

males earn more than females, married graduates earn more than their single counterparts, and visible minorities earn less than non-minorities. Age is positively related to earnings.[7]

Table 2. Regression of earnings on level of schooling and gender, controlling for sociodemographic characteristics (n=4,622).

	Model 1			Model 2		
Constant	10.225			10.208		
Sex						
Female	-0.103	0.012	***	-0.081	0.017	***
Male	------	------		------	------	
Marital Status						
Married	0.070	0.013	***	0.069	0.013	***
Not Married	------	------		------	------	
Dependent Children						
Yes	-0.018	0.018		-0.017	0.018	***
No	------	------		------	------	
Age	0.015	0.001	***	0.015	0.001	***
Visible Minority Status						
Visible Minority	-0.047	0.013	***	-0.045	0.013	***
Non Minority	------	------		------	------	
Mother has Postsecondary Education						
No	-0.011	0.013		-0.012	0.013	
Yes	------	------		------	------	
Father has Postsecondary Education						
No	0.033	0.013	***	0.034	0.013	***
Yes	------	------		------	------	
Bursaries/Grants						
Yes	-0.003	0.014		-0.002	0.014	
No	------	------		------	------	
Borrowed Government Loan						
Yes	-0.011	0.013		-0.011	0.013	
No	------	------		------	------	
Scholarships						
Yes	0.041	0.012	***	0.041	0.012	***
No	------	------		------	------	
Other (Non Government) Loans						
Yes	-0.031	0.012	***	-0.030	0.012	***
No	------	------		------	------	
Field of Study			***			***
Business	0.174	0.016	***	0.175	0.016	***
Sciences	0.012	0.029		0.013	0.029	
Engineering/Computer Sciences	0.217	0.018	***	0.212	0.018	***

[7] We originally included an orthogonal polynomial contrast for age to assess whether the relationship between age and earnings is curvilinear; a common finding in labour market research. The polynomial estimates were not statistically significant in any of the models we estimated, likely because very few recent postsecondary graduates are over the age of 45. Thus, they were subsequently removed from the analyses.

Health	0.210	0.020	***	0.212	0.020	***
Other	0.016	0.018		0.017	0.018	
Liberal Arts	------	------		------	------	
Level of Schooling			***			***
Trades	-0.261	0.031	***	-0.170	0.042	***
College	-0.251	0.013	***	-0.232	0.019	***
University Advanced	0.206	0.017	***	0.225	0.026	***
University Undergraduate	------	------		------	------	
Gender*Level of Schooling						*
Female*Trades				-0.184	0.059	***
Female*College				-0.032	0.025	
Female*University (Advanced)				-0.033	0.033	

* p<.05; ** p<.01; ***p<.001.

The effect of field of study is statistically significant (p<.001). The parameter estimates for this variable reveal that graduates of engineering and computer sciences report the highest earnings, followed closely by those of health related programs, and then by graduates with business related credentials. The difference in reported earnings, two years after graduation, between these graduates and graduates with liberal arts credentials (the reference category) is statistically significant (p<.001). This finding provides evidence that the new economy continues to favour graduates with applied and technical skills over graduates with the more generalist skills provided in the liberal arts.

The effect of level of schooling is also statistically significant (p<.001). When controlling for the effects of field of study and the other variables in the model, college graduates report the lowest earnings, followed by graduates of trades programs. Both groups of graduates earn significantly less than university graduates with undergraduate degrees (p<.001). Graduates with advanced university degrees report the highest earnings; significantly more than their counterparts with general bachelors-level degrees, two years after graduation (p<.001).[8]

The interaction between gender and level of schooling included in Model 2 is statistically significant (p<.05).[9] This implies that the effect of level of schooling on earnings depends on gender, and vice versa. The regression estimates for gender, level of schooling, and the interaction between gender and level of schooling in Model 2 of Table 2 are converted into meaningful quantities (dollars) by taking the inverse of the link function (e.g., exponentiation), and holding the other "control" variables constant at typical values (we used the mean for age,

[8] The estimates reflect earnings differences two years after graduation, and not different rates of return for postsecondary credentials.

[9] This was the only interaction we tested that was statistically significant. We did not test for an interaction between level of schooling and field of study because the field of study groups were not adequately represented across all levels of schooling (e.g., there are very few graduates with trades certificates in the sciences or the liberal arts). The interaction between gender and field of study was not statistically significant, and was removed from the analyses.

and proportions for the categorical variables). The predicted values for earnings, along with corresponding 95 per cent confidence intervals are plotted in Figure 1. These values are derived from the estimates drawn from Model 2. The display reveals the relationship between earnings and level of schooling separately for males and females. In general, the pattern of the estimates for earnings reveals that graduates with higher-level credentials report better earnings. For example, graduates with advanced university degrees report the highest earnings ($58,943 for males, and $52,654 for females), followed by university undergraduates ($47,100 for males, and $43,446 for females), and then by community college graduates ($37,327 for males, and $33,363 for females). There is an interesting exception for the comparison of trades and community college graduates. While females with community college diplomas have higher estimated earnings ($33,363) than their counterparts with trades certificates ($30,423), males who received trades certificates in 2005 have higher estimated yearly earnings in 2007 ($39,700) than their counterparts who graduated from community college programs in the same year ($37,327).

For all groups of postsecondary graduates males earn significantly more than females, however, the gender gap in earnings varies slightly by level of schooling. When holding all of the other variables constant at typical values, the gender gap in yearly earnings is $6,289 for university graduates with advanced degrees, $3,655 for university graduates with baccalaureate level degrees, $3,963 for community college graduates, and $9,276 for trades graduates.

Figure 1

Predicted earnings, two years after graduation, for male and female graduates of trades, community college, baccalaureate and advanced-degree university programs. The fitted earnings values are calculated holding the control variables constant at typical values (means and proportions). Earnings are reported in 2007 Canadian dollars.

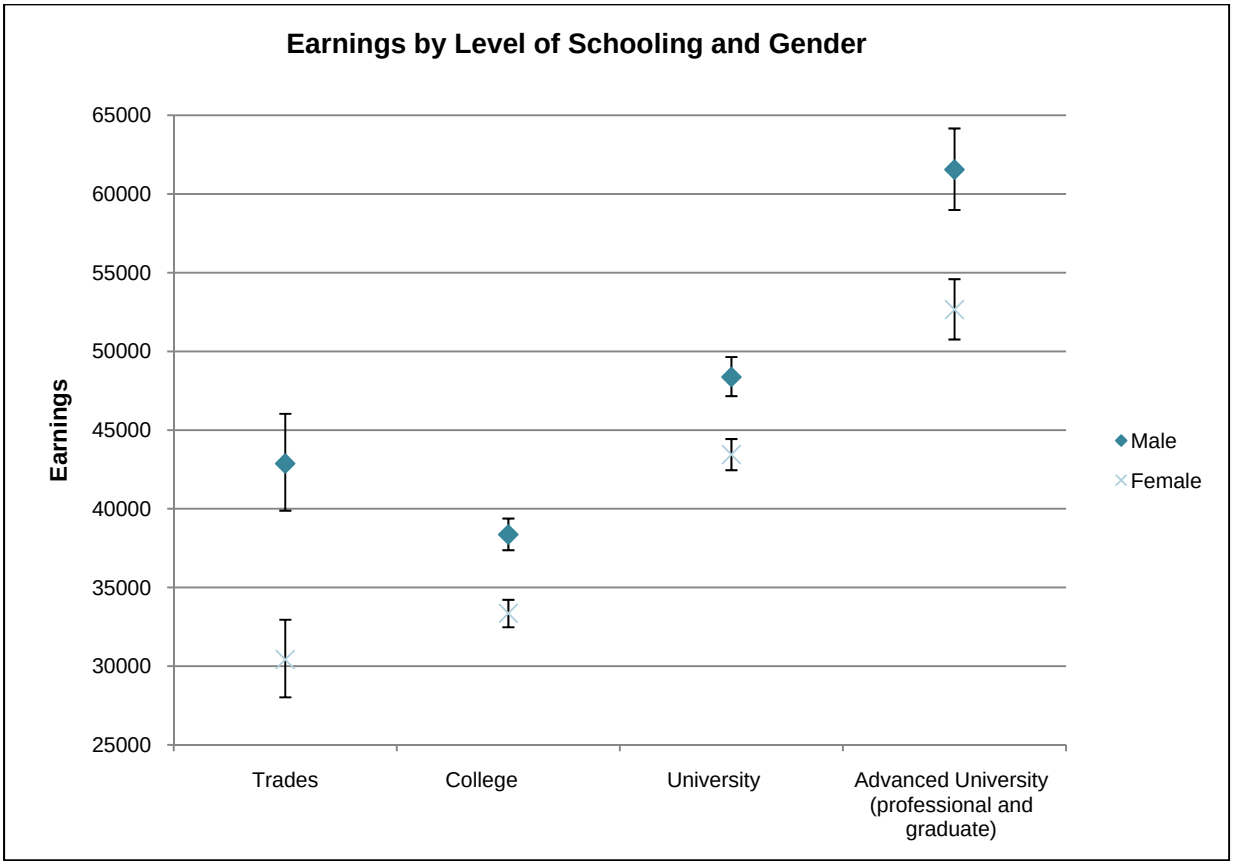


Table 3. Logistic regression of full-time employment status on level of schooling and gender, controlling for the sociodemographic characteristics (n=6,224).

	Model 1			Model 2		
Constant	-2.215			-2.034		
Sex						
Female	0.412	0.074	***	0.153	0.109	
Male	------	------		------	------	
Marital Status						
Married	-0.204	0.082	*	-0.198	0.082	*
Not Married	------	------		------	------	
Dependent Children						
Yes	0.459	0.097	***	0.453	0.097	***
No	------	------		------	------	
Age	0.019	0.005	***	0.019	0.005	***
Visible Minority Status						
Visible Minority	0.256	0.076	**	0.250	0.077	**
Non Minority	------	------		------	------	
Mother has Postsecondary Education						
No	0.236	0.075	**	0.234	0.075	**
Yes	------	------		------	------	
Father has Postsecondary Education						
No	-0.186	0.075	*	-0.178	0.075	*
Yes	------	------		------	------	
Bursaries/Grants						
Yes	0.076	0.081		0.067	0.081	
No	------	------		------	------	
Borrowed Government Loan						
Yes	-0.045	0.077		-0.055	0.077	
No	------	------		------	------	
Scholarships						
Yes	-0.117	0.075		-0.112	0.075	
No	------	------		------	------	
Other (Non Government) Loans						
Yes	0.239	0.075	**	0.229	0.075	**
No	------	------		------	------	
Field of Study			***			***
Business	-0.760	0.096	***	-0.771	0.096	***
Sciences	-0.301	0.178		-0.296	0.178	
Engineering/Computer Sciences	-0.814	0.117	***	-0.776	0.117	***
Health	-0.131	0.101		-0.141	0.101	
Other	-0.488	0.107	***	-0.482	0.108	***
Liberal Arts	------	------		------	------	
Level of Schooling			***			*
Trades	0.076	0.177		-0.422	0.326	
College	0.354	0.077	***	0.048	0.125	
University Advanced	-0.348	0.115	**	-0.555	0.196	**
University Undergraduate	------	------		------	------	
Gender*Level of Schooling						*
Female*Trades				0.728	0.382	
Female*College				0.467	0.152	**
Female*University (Advanced)				0.307	0.236	

* p<.05; ** p<.01; ***p<.001.

Table 3 provides estimates for the regressions relating to employment status, employing the same predictors in Table 2 (n=6,664). Since the response variable is reverse coded, the "logits" in Table 3 represent the change in the log-odds of **not** being employed full-time for a unit change (or increase) in the explanatory variables.[10] Among the sociodemographic characteristics, the effects of gender, the presence of dependent children, and age are statistically significant ($p<.001$). The parameter estimates for these variables reveal that females are less likely to be employed full-time than are males, and graduates who are older are more likely than those who are younger to be employed full-time. Visible minorities are less likely to be employed full-time than are non-minorities ($p<.01$), while respondents who reported that their mother had a postsecondary education credential are more likely to be employed full-time ($p<.01$). Married respondents are more likely to be employed full-time than are non-married respondents ($p<.05$), while respondents who have a father with some postsecondary schooling are less likely to be employed full time ($p<.05$).[11] Among the control variables relating to student awards and borrowing, only the effect of the variable assessing whether the respondent borrowed from non-government sources to finance postsecondary education is statistically significant ($p<.01$). Interestingly, respondents who borrowed from non-government sources to pay for their schooling are less likely to be employed full-time.

The effects of both level of schooling and field of study on full-time employment status are statistically significant ($p<.001$). Parameter estimates for field of study reveal that liberal arts graduates (the reference category) are least likely to find full-time employment two years after graduation. Graduates with significantly better full-time employment prospects two years after graduation have credentials in areas classified as "other," business, and engineering/computer science ($p<.001$), respectively. The parameter estimates reveal that college graduates are least likely to be employed full-time, whereas university graduates with advanced degrees are most likely to find full-time employment two years after graduation. The difference in employment status between respondents with community college diplomas and university undergraduate degrees (reference category) is statistically significant ($p<.001$). Likewise, the difference between university graduates with advanced degrees and university graduates with undergraduate degrees is statistically significant at $p<.01$.

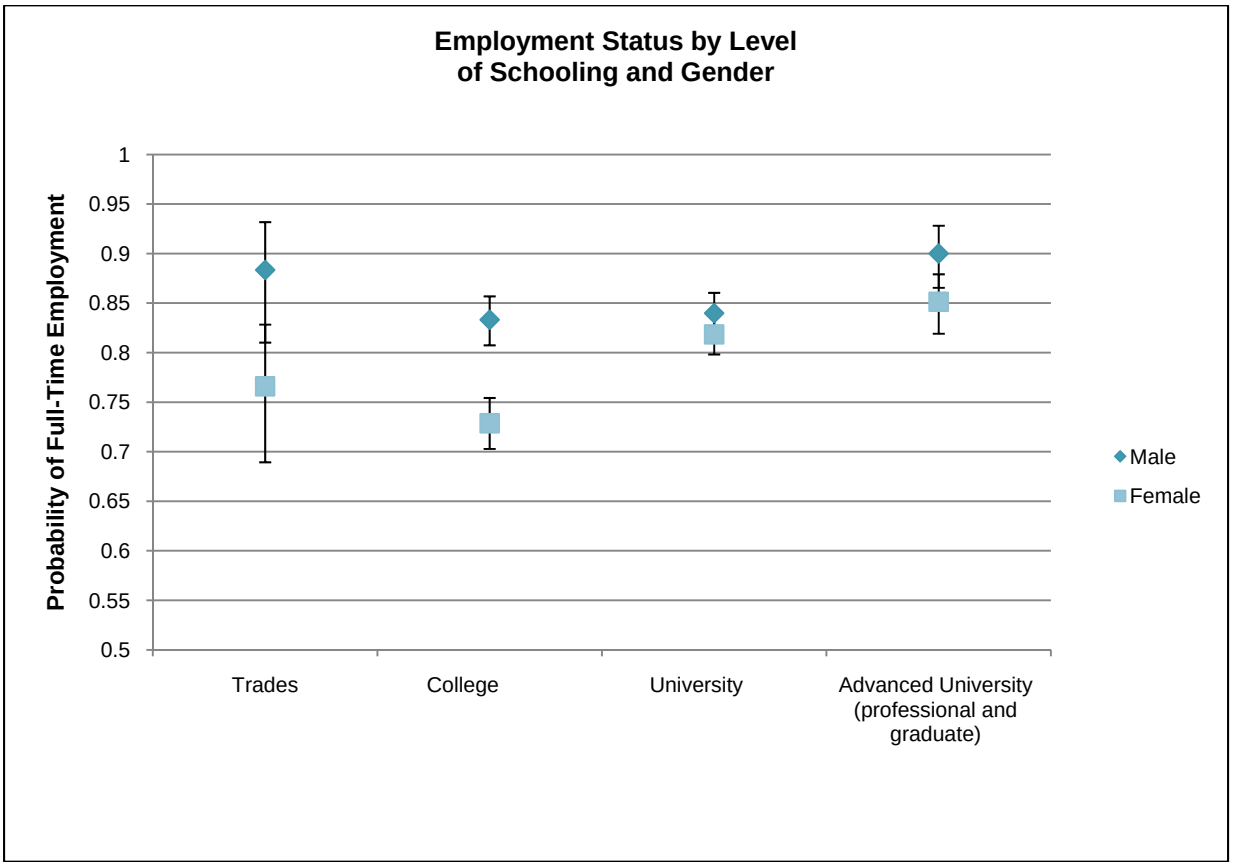
The interaction between gender and level of schooling in Model 2 is statistically significant ($p<.05$), revealing that the effect of level of schooling on being employed full-time depends on gender, and vice versa.[12] The purpose of Model 2 is to reveal the relationship between employment status and level of schooling separately for males and females. Thus, our attention is directed to the estimates for level of schooling, gender, and the interaction between gender and level of schooling. As the estimates (logits) do not represent meaningful quantities, we converted them into predicted probabilities, holding the other variables at typical values. The

[10] The sample size is larger for this analysis because these models include all graduates, employed and unemployed.
[11] A similar finding was obtained by Lin et al., (2000). They argued that "this disadvantage of family capital is offset by a greater motivation to succeed" (p.28). They also state that this supports previous findings indicating a decrease in the effect of social origin after an individual's high school years.
[12] The interaction involving gender and field of study was not statistically significant.

predicted probabilities of being employed full-time are displayed in Figure 2. Consistent with previous research (Walters, 2006), Figure 2 reveals that for each group of postsecondary graduates, males are more likely to be employed full-time than are females, two years after graduation. The group with the highest probability of being employed full-time is university graduates with advanced degrees. Among these graduates, the probability of being employed full-time two years after graduation is .90 for males and .85 for females. The respective probabilities for those with general undergraduate-level degrees are .84 for males and .82 for females. For college graduates the probabilities for males and females are .83 and .73, respectively. The most interesting finding in this figure applies to trades graduates, where the probability of reporting full-time employment two years after graduation is considerably higher for males (.88) than it is for females (.77). While the difference is statistically significant, the wide confidence interval reflects a high degree of variance associated with these estimates.

Figure 2

Predicted probability of being employed full-time, two years after graduation, for males and females of trades, college, and university programs. The predicted probabilities are calculated holding the control variables constant at typical values.



Field of study for community college graduates and university baccalaureates

The following series of regression models are based only on graduates of community college and university baccalaureate degree programs. The purpose of these analyses is to assess the impact of field of study on labour market outcomes for college and university graduates. We focus on university and community college graduates in this section because they represent the two most common postsecondary pathways out of secondary school. As well, since the focus of this section is on field of study we excluded trades graduates and university graduates with advanced degrees because the aggregated (harmonized) field of study comparisons become

more challenging (e.g., Statistics Canada classifies graduates with law LLB degrees within the social sciences). Likewise, trades graduates have very few observations for a few of the field of study categories.

Table 4 provides the parameter estimates for the regression of earnings on field of study for community college graduates and graduates of baccalaureate level university programs (n=2,181). The primary purpose of Model 1 in Table 4 is to provide estimates of the "main" effects for field of study and level of schooling, when controlling for the other variables in the model. The direction of the effects for the sociodemographic control variables that are statistically significant are largely consistent with the previous regression models estimated for earnings. Males earn more than females ($p<.001$), and married graduates earn more than non-married graduates ($p<.01$). Older respondents report higher earnings than younger respondents ($p<.001$), while visible minorities report lower earnings than non-minorities. Finally, graduates who report that their father has a postsecondary education have slightly lower wages than respondents who reported that their father did not have a postsecondary education ($p<.05$), controlling for the other variables in the model. Graduates who reported receiving a scholarship have higher earnings than those who did not report receiving a scholarship ($p<.001$). Finally, postsecondary graduates who received financial assistance for their postsecondary schooling in the form of non-government loans report slightly lower earnings ($p<.05$) than graduates who did not borrow from non-government sources for their education.

Table 4. Regression of earnings on level of schooling and field of study for community college and university baccalaureates, controlling for sociodemographic characteristics (n=2181).

	Model 1			Model 2		
Constant	10.178			10.172		
Sex						
Female	-0.089	0.017	***	-0.092	0.017	***
Male	------	------		------	------	
Marital Status						
Married	0.055	0.020	**	0.058	0.020	**
Not Married	------	------		------	------	
Dependent Children						
Yes	-0.019	0.029		-0.017	0.029	
No	------	------		------	------	
Age	0.016	0.002	***	0.016	0.002	***
Visible Minority Status						
Visible Minority	-0.043	0.019	*	-0.045	0.019	*
Non Minority	------	------		------	------	
Mother has Postsecondary Education						
No	-0.014	0.018		-0.012	0.018	
Yes	------	------		------	------	
Father has Postsecondary Education						
No	0.043	0.018	*	0.042	0.018	*
Yes	------	------		------	------	
Bursaries/Grants						
Yes	0.007	0.020		0.005	0.020	
No	------	------		------	------	

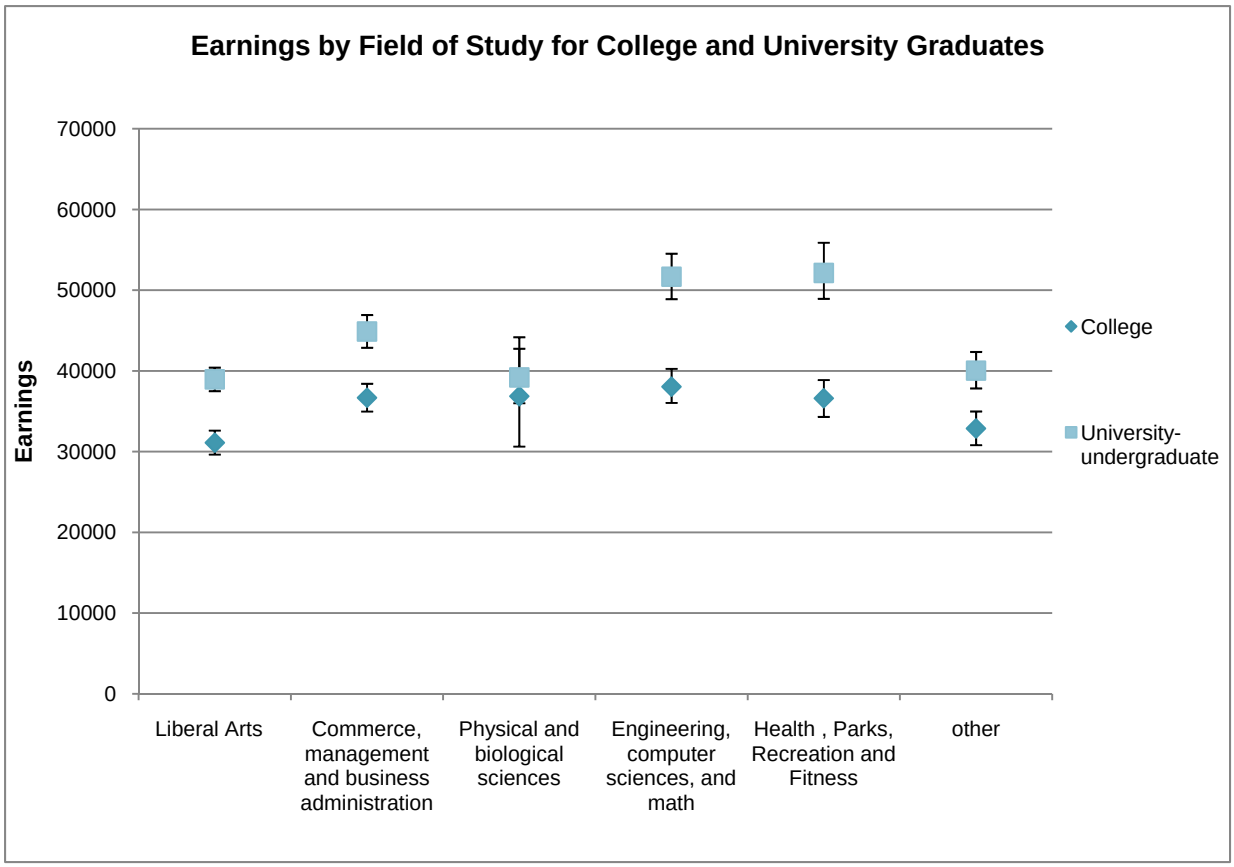
Borrowed Government Loan						
Yes	-0.017	0.018		-0.018	0.018	
No	------	------		------	------	
Scholarships						
Yes	0.062	0.018	***	0.059	0.018	**
No	------	------		------	------	
Other (Non Government) Loans						
Yes	-0.034	0.017	*	-0.031	0.017	
No	------	------		------	------	
Field of Study			***			***
Business	0.157	0.022	***	0.141	0.030	***
Sciences	0.037	0.044		0.007	0.050	
Engineering/Computer Sciences	0.243	0.026	***	0.281	0.034	***
Health	0.229	0.028	***	0.294	0.038	***
Other	0.042	0.027		0.027	0.035	
Liberal Arts	------	------		------	------	
Level of Schooling			***			***
College	-0.243	0.017	***	-0.227	0.031	***
University	------	------		------	------	
Field of Study*Level of Schooling						**
Business*College				0.026	0.044	
Sciences*College				0.164	0.109	
Engineering/Computer*College				-0.080	0.049	
Health*College				-0.130	0.055	*
Other*College				0.027	0.054	

* p<.05; ** p<.01; ***p<.001.

Similar to the previous analyses the effect of field of study is statistically significant (p<.001). The parameter estimates for field of study reveal that among 2005 community college and university graduates in Ontario, those of the liberal arts programs (reference category) report the lowest earnings, two years after graduation. In comparison, graduates with credentials in engineering/computer science, health, and business, report earnings that are statistically significantly higher than graduates with liberal arts credentials (p<.001). Consistent with past research employing national level data (Walters, 2004a), university graduates with baccalaureate level degrees earn more than community college graduates, two years after graduation.

Figure 3

Predicted earnings, two years after graduation, for community college and baccalaureate level university programs of various fields of study. The fitted earnings values are calculated holding the control variables constant at typical values. Earnings are reported in 2007 Canadian dollars.



Model 2 in Table 4 adds the interaction between field of study and level of schooling. The effect of the interaction between field of study and level of schooling (e.g., college, university) is statistically significant ($p<.01$), revealing that the impact of field of study on earnings is different for community college graduates than it is for baccalaureate-level university graduates.[13][14] In order to better assess the interrelationship between field of study and earnings for college and

[13] Several other interaction effects were also estimated; however, the other two-way (and the three-way) interactions involving gender, level of schooling, and field of study were not statistically significant.

[14] The substantive interpretations relating to the control variables in the model did not change when the interaction term is included in the model. Thus, they are not interpreted.

university graduates the log-earnings estimates involving level of schooling, field of study, and the interaction between field of study and level of schooling from Model 2 are converted to earnings and plotted in Figure 3, holding the other variables constant at typical values.

Figure 3 reveals that field of study appears to be a more important marker of stratification among university graduates than community college graduates. For example, among university graduates, the average yearly earnings range from $38,958 (liberal arts) to $52,141 (health). In between are graduates of sciences ($39,191), other fields ($40,031), business ($44,886), and engineering/computer sciences ($51,671). In comparison, the range in earnings among community college graduates is much smaller, from $31,095 for graduates with diplomas in the liberal arts to $38,038 for graduates with diplomas in engineering and computer science. In the middle are graduates with diplomas in fields classified as the "other" category ($32,859), health ($36,602), sciences ($36,856), and business ($36,669). The results in Figure 3 clearly reveal that, regardless of level of schooling (college or university), graduates of technical and applied fields report stronger earnings than graduates of liberal arts fields. Nevertheless, the predicted earnings of university graduates with degrees in the liberal arts are significantly higher than the predicted earnings of community college programs, for all fields except engineering.

Table 5 provides the estimates for the logistic regression of employment status (e.g., employed full-time versus not employed full-time) on field of study for college and university graduates, controlling for the other variables in the model. Sociodemographic variables that have a statistically significant effect on employment status in Model 1 in Table 5 include sex ($p<.001$), the presence of dependent children ($p<.001$), age ($p<.05$), and both variables relating to parental education ($p<.01$). The parameter estimates for these variables reveal that males are more likely than females to be employed full-time. Likewise, recent graduates with dependent children are less likely to be employed full-time than recent graduates without dependent children. Graduates who are visible minorities are less likely to obtain full-time employment than their counterparts who are not visible minorities. Finally, older graduates are slightly less likely than younger graduates to obtain full-time employment shortly after graduation. Obtaining scholarships, bursaries, or borrowing through government or non-government sources does not have a significant impact on employment status, two years following graduation.

Table 5. Logistic regression of full-time employment status on field of study for community college and university baccalaureates, controlling for sociodemographic characteristics (n=2949).

	Model 1			Model 2		
Constant	-2.084			-1.938		
Sex						
Female	0.387	0.106	***	0.396	0.107	***
Male	------	------		------	------	
Marital Status						
Married	-0.203	0.119		-0.248	0.120	*
Not Married	------	------		------	------	
Dependent Children						
Yes	0.575	0.145	***	0.561	0.146	***
No	------	------		------	------	
Age	0.015	0.007	*	0.016	0.007	
Visible Minority Status						
Visible Minority	0.311	0.109	**	0.342	0.109	**
Non Minority	------	------		------	------	
Mother has Postsecondary Education						
No	0.308	0.107	**	0.308	0.107	**
Yes	------	------		------	------	
Father has Postsecondary Education						
No	-0.278	0.107	**	-0.272	0.107	*
Yes	------	------		------	------	
Bursaries/Grants						
Yes	0.108	0.115		0.134	0.116	
No	------	------		------	------	
Borrowed Government Loan						
Yes	-0.116	0.109		-0.115	0.109	
No	------	------		------	------	
Scholarships						
Yes	-0.131	0.108		-0.111	0.109	
No	------	------		------	------	
Other (Non Government) Loans						
Yes	0.202	0.106		0.183	0.107	
No	------	------		------	------	
Field of Study			***			***
Business	-0.696	0.134	***	-0.989	0.205	***
Sciences	-0.211	0.261		-0.305	0.295	
Engineering/Computer Sciences	-0.750	0.165	***	-1.192	0.255	***
Health	-0.034	0.140		-0.754	0.240	**
Other	-0.522	0.162	**	-0.502	0.215	*
Liberal Arts	------	------		------	------	
Level of Schooling			**			
College	0.328	0.102	**	-0.113	0.166	
University	------	------		------	------	
Field of Study*Level of Schooling						***
Business*College				0.640	0.275	**
Sciences*College				0.072	0.642	
Engineering/Computer*College				0.886	0.330	**
Health*College				1.266	0.306	***
Other*College				0.065	0.329	

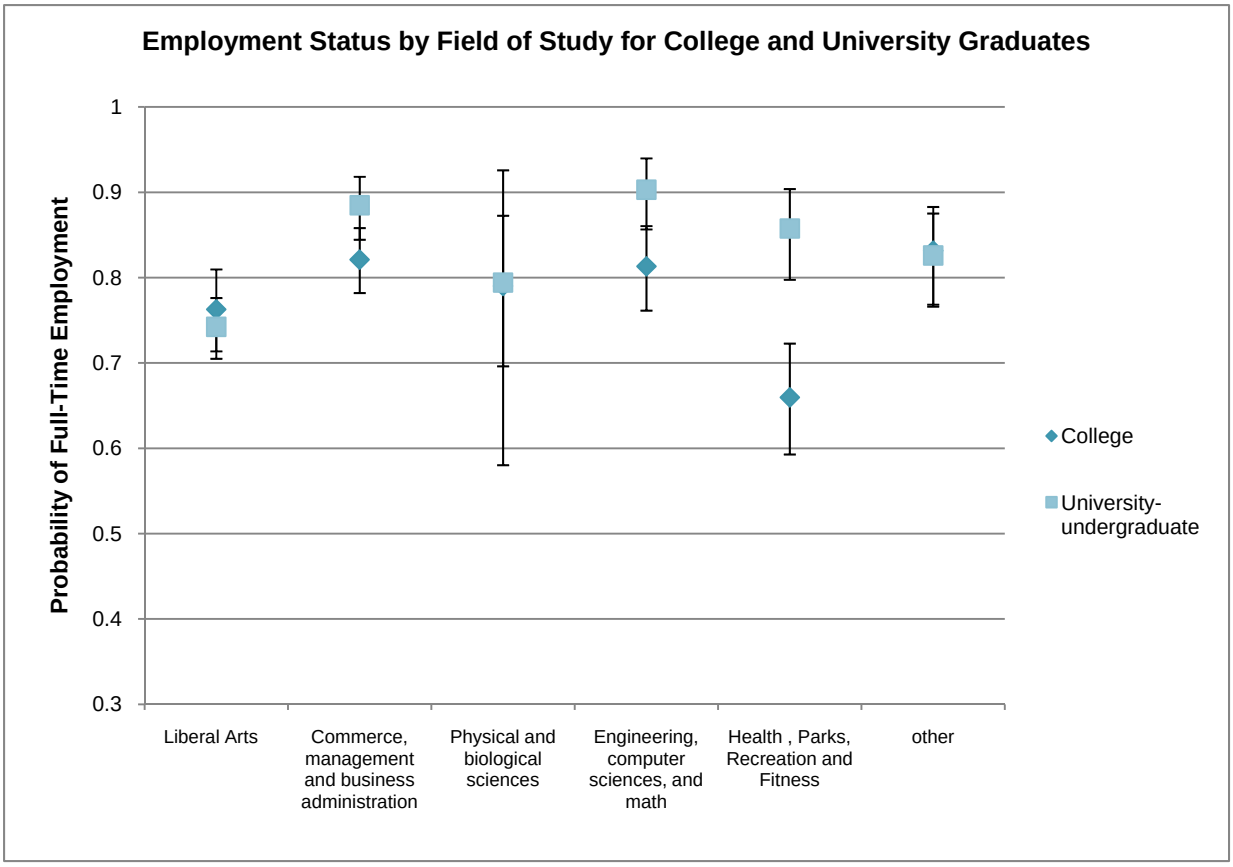
* p<.05; ** p<.01; ***p<.001.

Model 1 of Table 5 also provides estimates for the “main effects” of field of study and level of schooling (without interactions) on employment status when controlling for the above variables. The effect of field of study is statistically significant ($p<.001$). The parameter estimates for this variable reveal that liberal arts graduates in Ontario are least likely to secure full-time employment two years after graduation. In comparison, graduates of engineering/computer science, business, and fields classified as “other” are statistically significantly more likely to obtain full-time employment two years following graduation than are graduates of liberal arts programs ($p<.001$). When controlling for field of study, and the other variables in the model, baccalaureate level university graduates are more likely to report being employed full-time two years after graduation than are their community college counterparts ($p<.01$).

The interaction between level of schooling and field of study included in Model 2 of Table 5 is statistically significant ($p<.001$). As with previous analyses, the estimates relating to the variables in the interaction term for Model 2 are converted into interpretable quantities (predicted probabilities), holding the other variables at typical values. The predicted probabilities of being employed full-time for college and university graduates are provided in Figure 4. When holding the other variables constant at typical values, the probabilities of being employed full-time for university graduates range from .74 for liberal arts graduates to .90 for engineering/computer science graduates. Within this range are graduates with science degrees (.79), undergraduate degrees in other areas of concentration (.83), degrees in health related fields (.86), and undergraduate degrees in business (.88).

Figure 4

Predicted probability of being employed full-time, two years after graduation, for community college and baccalaureate level university programs. The predicted probabilities are calculated holding the control variables constant at typical values.



In comparison, community college graduates classified in the "other" category report the highest probability of being employed full-time (.83). Behind them are graduates of business (.82), engineering/computer science (.81), sciences (.79),[15] and then graduates with diplomas in the liberal arts (.76). Lastly, and most surprisingly, community college graduates with health related credentials have the lowest probability of being employed full-time (.66) two years after graduation. Thus, programs in health related fields at community colleges do not apear to be attractive for securing full-time employment, two years after graduation. It is possible that

[15] The confidence interval for this estimate is particularly wide, which means that we are unable to obtain a precise estimate for this group of graduates. This is likely due to the small sample size (24 observations) for this group.

community college graduates are less likely to be employed full-time due to the nature of casual work in health related areas. For example a profile report for 2007/2008 community college graduates reveals that they are more likely to be employed overall, when including both full-time and part-time employment.[16] The 95 per cent confidence intervals reveal that university graduates of fields relating to health, engineering/computer science, and business are statistically significantly more likely to report being employed full-time two years after graduation than their counterparts in the same fields who graduated from community colleges.

Discussion

This study provides insight into the labour market outcomes of recent postsecondary graduates in Ontario. Results from this study are based on graduates' employment within two years of graduation, providing an examination of early labour market outcomes for the 2005 cohort of Ontario graduates. Although definite conclusions on the future labour market success of these graduates cannot be drawn from these results, previous studies indicate that graduates' employment soon after graduation "strongly influences eventual position in the labour force" (Lin et al.,2003:55-56; Anisef et al., 1999). While some of the results are consistent with previous literature, some new and important issues are also brought to light with this research. However, it should be noted that previous studies examined different cohorts of graduates and, in some cases, different categorizations of field of study and labour market outcomes were employed.

With these issues in mind, the results indicate that field of study remains a salient aspect in determining postsecondary graduates' labour market success, particularly among university graduates with a Bachelor's degree. The effect of level of schooling is generally consistent with human capital theory, indicating that graduates with the highest levels of education (university-advanced) obtain the highest earnings and are most likely to be employed full-time. Because higher levels of education typically involve lengthier and more costly programs than lower levels of education, these results indicate that students' investments in higher levels of schooling generally result in greater labour market rewards. However, this result is somewhat complicated by the finding that male graduates of trades programs experience an earnings advantage over college graduates. Gender differences are also found to persist, as males at all levels of postsecondary education experience more favourable labour market outcomes than their female counterparts.

The examination of labour market outcomes by field of study provides results that are similar to the labour market outcomes found in previous cohorts of graduates (e.g., Stark, 2007; Walters, 2004a; Walters, 2003; Finnie, 2001). Results from this cohort indicate that graduates of applied and technical fields continue to fare better than liberal arts graduates both in terms of earnings and employment status. Generally, graduates of engineering and computer science programs obtain the highest earnings within two years of graduation, followed by graduates of health, and business and commerce programs. Thus, the knowledge economy does appear to favour graduates with applied and technical skills over those graduates with "soft" or generic skills.

[16] See http://www.edu.gov.on.ca/eng/document/serials/eprofile07-08/profile08.pdf.

However, while these findings are in accordance with previous research, results examining graduates' success by level of schooling offer some notable findings.

While the results for level of schooling generally support the human capital assumption that higher levels of education result in greater labour market rewards, the results of this study find an important exception to this linear assumption. Although recent graduates with advanced level university degrees obtain the best labour market outcomes, followed by university graduates with Bachelor's degrees, there is some discrepancy at the college and trades levels of education. The results indicate that male graduates of trades programs experience greater success in the labour market than college graduates, which contrasts previous findings (Walters, 2004a; Allen, 1999). Therefore, although college training is typically deemed a "higher" level of education than trades programs, graduates of trades programs are in many cases achieving greater success in the labour market than college graduates. This may be due to the increased need for workers in the skilled trades; graduates of trades programs may in fact be benefiting from an undersupply of skilled trades workers in the labour market (Pyper, 2008). This finding may also be unique to Ontario where there is a very strong manufacturing base, relative to other provinces in the country. However, while over one third of Canadian trades jobs were in Ontario in 2007, recent increases in trades employment in other provinces suggest that this trend would likely be found elsewhere in Canada (Pyper, 2008).

Despite the relative earnings advantage of trades graduates, it is important to note that female graduates of trades programs earn the least in comparison to graduates at all other levels of schooling. In addition, while males at each level of schooling earn more than their female counterparts, the earnings gap between genders is widest at the trades level. This may be due to the gendered division of labour, as women in the trades pursue more service-oriented occupations while men predominantly pursue occupations with higher remuneration in construction and manufacturing trades (Ontario Women's Directorate, 2009; Statistics Canada, 2009c). The wages earned in these male-dominated trades are also the likely explanation for the earnings advantage that male trades graduates have over college graduates, as occupations in these trades typically provide higher salaries than the employment obtained by college graduates. For example, in 2007, trades graduates working in construction technology occupations obtain average annual earnings of $40,000 compared to an average salary of $27, 200 earned by college graduates in social services occupations (Service Canada, 2007).[17]

In general, gender differences are consistent across all levels of schooling with male graduates obtaining higher earnings and being more likely to obtain full-time employment than their female counterparts. However, the results generally indicate that the higher the level of education, the greater the labour market payoff is for both genders. In particular, advanced degrees appear to be worthwhile for women as these graduates earn more than males at all other levels of schooling, although they continue to obtain lower earnings than males with similar credentials. The effect of level of schooling on both earnings and the likelihood of being employed full-time is also contingent on gender.

[17] Data obtained from Service Canada's *Job Futures* website: http://www.jobfutures.ca/fos/browse-programs-education_level.shtml

Results from this study indicate several things. While the field of study findings support previous findings that graduates of technical and applied programs fare better in the knowledge economy than liberal arts graduates, the results do not indicate that liberal arts degrees are unrewarded in the labour market. Although undergraduate-level liberal arts graduates obtain lower earnings than other Bachelor's degree holders two years after graduation, they do obtain significantly higher earnings than graduates of college programs in the liberal arts, business, and health fields (refer to Figure 3). Thus, while a liberal arts degree may not translate into the highest earnings soon after graduation, it does appear that these graduates obtain more favourable labour market outcomes than college graduates in both liberal arts fields and some applied fields. The advantage that liberal arts graduates from university programs experience over some college graduates may be the result of largely part-time or casual employment opportunities for recent college graduates. This is particularly apparent among college graduates of health fields who predominantly obtain part-time work within six months of graduation (Ministry of Training, Colleges and Universities, 2009). Results also indicate that field of study is a better measure of stratification for university graduates than college graduates, as the range in earnings between different fields of study at the university level is much greater than the range in earnings among college graduates from different programs (refer to Figure 3).

While it does not appear that college graduates have closed the gap with university graduates in terms of their labour market returns to education, there is some indication that male graduates of trades programs have made great strides in their labour market achievements. The success of this group of graduates is of particular interest in the changing economy and should be examined further in future research, particularly with recent concern over the supply of skilled workers in the trades and the creation of Ontario's "Second Career" program which is targeted at training workers for occupations that are currently in demand (Ministry of Training, Colleges and Universities, 2010c). The follow-up interviews for this cohort, conducted in 2009, will be of particular interest for future research as they will capture the labour market experiences of these graduates during the recent economic downturn. This event will surely lead to further questions about which skills and educational training are more marketable and resilient in a tight labour market and economic recession.

Policy Implications

The labour market outcomes of postsecondary graduates have several policy implications. These implications range from government funding of postsecondary programs to the admission strategies of educational institutions. In addition, results regarding the school-to-work transitions of recent graduates may be instrumental in influencing the field of study choices of future postsecondary students. Thus, the findings from this study are of interest to many parties. This study is also particularly timely as concerns about the match between educational programs and the job skills relevant to the labour market become a significant concern "during periods of economic instability" and high unemployment rates (Taylor, 2005:327).

The primary policy implications of examining the alignment between postsecondary education programs and the labour market outcomes of recent Ontario graduates relate to funding and budgetary decisions for educational programs. Changes in funding sources for postsecondary institutions have resulted in different concerns in more recent years. As non-government sponsors have become a large source of finding for these institutions, the alignment between educational programs and the workforce has become fundamental in shaping the policies of postsecondary institutions. With the growth in co-operative education programs, as well as an increase in corporate donations and research funding tied to business and technology needs, administrators of postsecondary programs are increasingly concerned with addressing the concerns of employers (Axelrod et al., 2001). Thus, the funding concerns of postsecondary institutions stretch beyond government sources, making them accountable to many different factions. The labour market outcomes of their graduates are thus of great interest to these institutions in order to forge strong partnerships with private donors.

However, the funding of postsecondary education also constitutes a large amount of the total spending of provincial governments (Hansen, 2006). An increased focus on the "exchange value" of postsecondary education has influenced governments to largely base their funding on graduates' labour market outcomes (Axelrod et al., 2001:49). Therefore, results from this study also may influence differential funding between programs from government sources. Because postsecondary graduates of applied and technical programs experience greater labour market outcomes than other graduates, more funding to these programs may result, potentially directing funding away from liberal arts programs. While some argue that this may further stratify postsecondary institutions by field of study (e.g., Quirke and Davies, 2002; Davies and Guppy, 1997), others assert that funding that is directly influenced by labour market outcomes will provide greater equilibrium "between the demand for, and supply of, skilled labour" (Bourdabat and Montmarquette, 2007). The consequences of such funding decisions are, however, potentially shortsighted, as the skills currently required by employers may not be in demand in the future (Walters, 2004a; Axelrod et al., 2001). Because the knowledge economy is one that is constantly evolving, the relative success of graduates of one type of program over another may be short-lived. Thus, while the labour market outcomes of graduates from different fields of study largely impact postsecondary funding in Ontario, funding decisions based on these results should consider the potential long-range effects. This is particularly apparent in studies that have found that, over time, graduates of liberal arts programs catch up to and sometimes surpass graduates of applied and technical programs with respect to their labour market outcomes (Admuti-Trache, 2006; Giles and Drewes, 2001; Allen, 1999).

The results from this study may also have implications for various policies of postsecondary institutions. First, admissions strategies may be altered based on the findings of this study. As mentioned above, because graduates from applied and technical programs are found to obtain greater labour market rewards, postsecondary institutions may decide to increase the number of spaces available in these programs. Such a strategy is encouraged, for example, by the Martin Property Institute (2007), which states a need for more spaces in business programs in Canada. Tied to this issue, tuition levels for different fields of study may be further impacted by the labour market outcomes of recent graduates. Inequities resulting from differences in tuition levels between various fields of study may become larger as applied fields of study (e.g., engineering) already have substantially higher tuition levels than liberal fields of study such as the humanities

and social sciences (Statistics Canada, 2009c). Because students often choose their field of study based on anticipated earnings upon graduation, programs that yield high returns in the labour market are likely to be in higher demand (Bourdabat, 2004). Thus, based on the assumption that graduates of such programs will obtain greater earnings upon graduation, higher tuition costs may result. However, if the costs of these programs far outweigh their future returns, significant tuition increases to programs producing successful labour market outcomes may be problematic.

Therefore, while postsecondary institutions, employers, and corporations have an interest in the school-work connections of graduates from different fields of study, students themselves are increasingly concerned with the issues of an education-job match in the knowledge economy. Due to this, student interest in the skills development offered by different fields of study has increased. As tuition costs have risen, the potential debt load carried by students upon graduation has become an increasing concern (Canada Millennium Scholarship Foundation, 2007; Osberg, 1997). While the debts of university graduates have been a concern for many years, more recently the debts of college graduates have increased (Canada Millennium Scholarship Foundation, 2007). Traditionally less costly, college programs are now producing many graduates with similar levels of debt as university graduates. The repayment of education-related debt is also of concern to lenders, as a large percentage of students (estimated at between 25 to 33 per cent) default on their payments (Canada Millennium Scholarship Foundation, 2007).

The fields of study choices made by students are therefore more likely to be based on potential earnings than in previous generations. The findings presented here provide students with some notion of what to expect upon graduation and may contribute to future postsecondary students making informed decisions about their program of study. Considering the issues addressed in this study, it is apparent that the alignments between postsecondary fields of study and levels of schooling with labour market outcomes are of interest to all stakeholders involved with the school-to-work transitions of recent Ontario graduates.

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Appendix A
Classification of Instructional Programs (CIP)

1. **Liberal Arts**
   Visual and performing arts, and communication technologies
   Humanities
   Social and behavioral sciences (excluding economics)

2. **Commerce, management and business administration**
   Including economics

3. **Physical and biological sciences**

4. **Engineering, computer sciences, and math**
   Mathematics, computer and information sciences
   Architecture, engineering and related technologies

5. **Health and related fields**

6. **Other**
   Education
   Agriculture, natural resources conservation
   Personal, protective and transportation services
   Recreational and counseling services
   Interdisciplinary studies
   Unknown or unclassified fields not specified, and undeclared

Appendix B

Descriptive statistics for the variables in the analysis.

	Trades *Percentage*	***Community College*** *Percentage*	***University*** *Percentage*	***University Advanced*** *Percentage*
Sex				
Female	48	52	59	59
Male	52	48	41	41
Marital Status				
Married	49	30	31	54
Not Married	52	70	69	46
Dependent Children				
Yes	39	17	11	29
No	61	83	89	71
Visible Minority Status				
Visible Minority	17	22	28	28
Non Minority	83	78	73	72
Mother has Postsecondary Education				
No	63	57	44	44
Yes	37	43	56	57
Father has Postsecondary Education				
No	71	57	41	41
Yes	29	43	59	59
Government Loans				
Yes	81	66	60	63
No	19	34	40	37
Bursaries/Grants				
Yes	12	22	29	28
No	88	78	71	72
Scholarships				
Yes	12	19	45	53
No	88	81	55	47
Other Loans				
Yes	18	30	36	39
No	82	70	64	61
Field of Study				
Business	14	27	22	25
Sciences	NA	NA	5	7
Engineering/Computer	44	20	16	13
Health	18	14	11	8
Other	19	14	13	28
Liberal Arts	NA	23	33	18
Age (mean)	33	28	28	33
Yearly Earnings (mean)	$42,228	$37,731	$47,376	$65,339
Employment Status				
Full-time	80	76	82	86
Part-time	20	24	18	14
	n=692	n=1070	n=1111	n=1749

Some interesting patterns are observed in Appendix Table A. For example, among trades graduates, males (52 per cent) out number females (48 per cent); however, the gender distribution shifts in favour of females among college (52 per cent female) and university (59 per cent) graduates. This finding is consistent with the results of past research (Walters, 2006). Graduates of trades programs are more likely to be married (49 per cent) than are their counterparts of community college or university baccalaureate programs (30 per cent). Likewise, more than half (54 per cent) of graduates with advanced university degrees are married. This pattern is likely related to the fact that graduates with trades and advanced-level university credentials are approximately five years older than their counterparts with community college and baccalaureate degrees.

Another interesting pattern is that visible minorities are more likely to graduate from university (28 per cent) than community colleges (22 per cent) or trades programs (17 per cent). University graduates are also more likely to report that their mother or father had a postsecondary education than are their counterparts from community colleges or trades programs. The estimates range from 37 per cent for trades graduates to 57 per cent for university graduates for mothers, and from 29 per cent to 59 per cent for fathers.

Approximately 81 per cent of trades graduates borrowed money from government sources for their postsecondary education, in comparison with 66 per cent, 60 per cent, and 63 per cent for graduates of college, university baccalaureate, and advanced university programs, respectively. Among respondents who reported receiving bursaries or grants, approximately 12 per cent of trades and 22 per cent of community college graduates report receiving grants or scholarships in comparison with 29 and 28 per cent of baccalaureate and advanced degree university graduates.

Not surprisingly, graduates of advanced level university degree programs are most likely to receive scholarships (53 per cent). They are followed by university baccalaureate level graduates (45 per cent), and then by community college graduates (19 per cent). Graduates of trades programs are least likely to receive scholarships for their postsecondary schooling (12 per cent). Graduates with advanced level university degrees are most likely (39 per cent) to borrow money from non-government sources. In comparison, approximately 36 per cent of graduates with baccalaureate-level university degrees report borrowing from non-government sources, followed by 30 per cent of community college graduates, and 18 per cent of trades graduates.

With respect to field of study, graduates of trades programs are most likely to come from engineering/computer science fields (44 per cent), followed by “other” (19 per cent), and health related fields (18 per cent). Community college graduates are most likely to receive diplomas in fields relating to business (28 per cent), the liberal arts (23 per cent) and engineering/computer sciences (20 per cent). Graduates of university baccalaureate degree programs are most likely to receive degrees in the liberal arts (33 per cent), followed by business (22 per cent) and then by engineering/computer science (16 per cent). Finally, university graduates with advanced degrees are most likely to have credentials in fields classified as “other” (28 per cent), business (25 per cent) and the liberal arts (18 per cent).

In regard to earnings, graduates with advanced degrees have the highest yearly wages ($65,339), followed by university graduates of baccalaureate programs ($47,376), then by trades graduates ($42,228), and then by community college graduates ($37,331). Finally, graduates with advanced university degrees are most likely to be employed full-time (86 per cent), followed by university graduates with baccalaureate degrees (82 per cent), then by trades (80 per cent) and community college (76 per cent) graduates.