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The Determinants of Education-Job Match among
Canadian University Graduates

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Mémoire présenté à la Faculté des études supérieures
en vue de l'obtention du grade de M.Sc.
en relations industrielles

Juillet 2009

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Université de Montréal
Faculté des études supérieures

Ce mémoire intitulé :

The Determinants of Education-Job Match among
Canadian University Graduates

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RÉSUMÉ

Le Canada s'avère un des pays de l'OCDE avec le plus haut taux de diplômés de niveau collégial et universitaire. Néanmoins, un tel succès requiert un investissement énorme, tant pour la société qui doit injecter des sommes colossales afin de soutenir et développer le système scolaire, que pour l'individu qui demeure de longues années sur les bancs d'école, en périphérie de la population active, avant de décrocher un diplôme. Dans une perspective de politiques publiques, il est important, afin de réellement recevoir un retour sur cet investissement, que les diplômés puissent accéder à des emplois qui correspondent à leurs études lors de leur entrée sur le marché du travail.

Notre étude vise à identifier les déterminants qui associent le cheminement académique aux emplois occupés par les diplômés universitaires canadiens. Nous puisons nos données dans « l'Enquête de suivi auprès des diplômés de l'année 2000 ». C'est une enquête nationale échantillonnée de manière aléatoire et représentative auprès des diplômés canadiens, et dont le but est de relever les correspondances entre le cheminement postsecondaire et les débouchés sur le marché du travail, cinq ans après l'obtention du diplôme dans l'année 2000. Notre modèle comporte des variables indépendantes et des indicateurs qui nous permettront de comprendre comment les caractéristiques éducatives, démographiques et de l'emploi influent sur notre variable dépendante qui est la correspondance entre l'éducation et l'emploi occupé. Cette correspondance tient compte non seulement du niveau de scolarité, mais également du domaine d'études, variable souvent négligée dans les recherches.

Nos résultats empiriques montrent que plus d'un tiers des diplômés occupent un emploi faiblement lié à leur domaine d'études. De plus, les caractéristiques de l'éducation présentent une influence significative avec notamment une forte correspondance entre le domaine d'études et l'emploi occupé. Les diplômés en sciences de la santé et de l'éducation sont les plus susceptibles d'occuper un emploi correspondant à leur scolarité. Le niveau de scolarité universitaire (par exemple les diplômés de 1er cycle, comparés aux diplômés 3es cycles) et la qualité des relevés des notes semblent renforcer positivement cette correspondance. Toutefois, les caractéristiques démographiques comme le sexe et le milieu familial n'ont montré aucun lien significatif lors de nos analyses de régression. Quant aux caractéristiques d'emploi, elles ont un

effet mitigé. Par exemple, des caractéristiques comme l'industrie et le travail à temps plein présentent un lien très fort, tandis que la permanence de l'emploi et les méthodes de recherche d'emploi possèdent un lien faible.

Nous dégageons de nos résultats des conclusions positives : les caractéristiques hors du contrôle des diplômés comme le sexe et le milieu familial ne semblent pas présenter une influence significative sur le degré de correspondance entre le domaine d'études et le type d'emploi, alors que le capital humain acquis tout au long du cursus académique y démontre plus d'influence.

Mots -clés : lien éducation-emploi, niveau d'études, domaine d'études, Canada, éducation universitaire, diplômés, Enquête de suivi auprès des diplômés – 2000.

ABSTRACT

Canada is among the OECD nations with the highest percentage of individuals with either a college or university education. Although impressive, this represents an enormous investment, both for society which spends billions of dollars on its post-secondary educational system, and for the individuals who spend years of their lives earning their degree. It is therefore important from a public policy perspective that graduates use their post-secondary education in their subsequent employment.

This study aims to look at the determinants of education-job match of Canadian university graduates. Our data source is the Follow-up of Graduates Survey – Class of 2000 (FOG2000), a nationally representative study of Canadian graduates collected by Statistics Canada, designed to gauge the link between post secondary education and career outcomes of graduates from the year 2000, five years after graduation. We investigate how numerous independent variables, namely how various education, demographic, and employment characteristics, affect our dependent variable of education-job match, namely the relation of the job to the degree. This measure of mismatch encompasses not only the level of study, but also the field of study as well, which is a relatively neglected area of research.

Our findings indicate that over a third (35.1%) of graduates are in jobs that are not closely related to their education. Results from our logistic regression analysis show that education characteristics significantly influence match, with certain fields such as “Health sciences” and “Education” having the highest likelihood of obtaining an education-job match. In addition, the level of education (i.e. graduates with a doctorate degree vs. a bachelor degree), as well as good grades, strongly affect the match. Demographic characteristics such as sex and family background prove for the most part insignificant in our multivariate analysis. Employment characteristics affect the match to a mixed extent, with certain characteristics, such as industry a graduate works in, as well as working full-time (vs. part time) affecting the match to a strong extent, while others, such as the permanence of employment, as well as the method used to obtain employment not having a significant effect on match.

We see these results as being positive, from the perspective that characteristics beyond the graduates control such as their sex and family wealth did not affect match very much, while the human capital obtained in school influences match to a much greater extent.

Key words: education-job match, level of study, field of study, Canada, postsecondary education, graduates, the Follow-up of Graduates Survey – Class of 2000 (FOG2000)

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ACKNOWLEDGEMENTS

I would like to sincerely thank my directeur de recherche, Professor Brahim Boudarbat, for his years of guidance. It was a long process, and I could not have done it without his seemingly infinite patience and wisdom. Merci... so much.

I would also like to thank my friends and family for their support throughout my student life... I hope that you will continue to be there for me.

CHAPTER 1: INTRODUCTION, RESEARCH QUESTION & PROBLEMATIQUE

1.1. INTRODUCTION AND RESEARCH QUESTION

In Canada, the investment in postsecondary education is enormous, both from the society as a whole's point of view, as well as from the individuals who invest years of their lives in such institutions. A better understanding of the match graduates of postsecondary institutions have with their subsequent employment can help society better organize its postsecondary educational institutions, and may influence individuals to make a more appropriate choice of study. Postsecondary institutions also can benefit from obtaining a more in-depth understanding of how and why individuals are obtaining employment related to their education. For instance, individual courses or even entire programs may be modified or abolished based on the extent of, and reasons for educational mismatch. Information about education-job match can also affect the hiring and training requirements of business organizations.

Education mismatch can have important labour market consequences for the mismatched individual, employers, and society. Wolbers (2003) notes that job mismatches are an important cause of job dissatisfaction, and subsequent employee turnover. Redpath (1994) notes that the fit between the education system and the labour market is considered to be essential for economic progress. Garcia-Espejo and Ibanez (2006) note that for society at large, a proper job-education match "leads to social benefits, such as productivity increase and welfare, which derive from an efficient use of the active population's human capital" (p141).

Despite its importance, a preliminary review of the research indicates that a high percentage of Canadian graduates do not have a job that matches what they studied in school. Barely over half the graduates of 1995 had jobs closely related to their field of

study, two years after graduation (Boudarbat and Montmarquette, 2009). Our objective is to help understand this phenomenon, thus our research question is: “*What are the determinants for obtaining employment that is related to one’s university degree?*”

Clarity: The question is clear and concise. We are looking at what factors determine whether postsecondary graduates in Canada will obtain employment that is related to what they studied in university.

Feasibility: This research is feasible because relevant data is available through The Follow-up of Graduates Survey – Class of 2000 (FOG2000). It is a professionally collected and reputable study carried out by Statistics Canada, designed to investigate career outcomes of Canadian postsecondary graduates from the year 2000. The data sample is extensive, and the survey is comprehensive. We will then use an econometrics technique that is suitable for the type of research we are performing.

Pertinence: The question is pertinent to industrial relations for several reasons. It examines actual labour market conditions for graduates. This is important because education-job mismatch can have important repercussions on such labour market outcomes as salary level, the requirement of further training, job mobility, and on-the-job-satisfaction. The results of studies which look at this are mixed, though some have shown clear and important labour market repercussions. For example, Wolbers (2003), Robst (2007a), Roterman (1999), Boudarbat and Montmarquette’s (2009), as well as Heijke, Meng, and Ris (2003) show a clear negative effect that education-job mismatch has on salary / job status. Roterman (1999) and Garcia-Espejo and Ibanez (2006) show that graduates with a close education-job match are most satisfied with their present job. Wolbers (2003) shows that education-job mismatch increases on on-the-job search activities. Van Smoorenburg and Van der Velden (2000) show that a proper match between education and employment reduces the need for further training within the firm. Heijke, Meng and Ris (2003) show, when properly matched, it reduces the need for training when people lack in vocational skills.

Many stakeholders can benefit from such a study. For instance, policy makers might find it useful so they can better allocate resources for postsecondary education. Researchers might find it useful to better understand and compare theoretical aspects of labour market theories; educators might benefit from such information so they might adapt their curriculum so it becomes more pertinent to the labour market; employers, so they might have a better idea of whom to recruit and subsequent training requirements. Finally, it is of use to young adults - both in choosing postsecondary educational paths of study, and for their transition from school to work upon graduating, so they can assess which jobs might be most suitable.

Our project will add to the existing literature for two main reasons. First of all, to our knowledge, no studies have looked education-job match by relation to their degree for the FOG 2000 data; therefore, we will provide the most up to date analysis available for the determinants of education-job match, five years after graduation. Our second contribution is that we will provide a very thorough analysis of education-job match, observing many variables. The concepts of family background or a graduate's activities prior to program entry have not been looked at pertaining to any analysis of the determinants of education-job match pertaining to relation to degree as far as we have found.

1.2. PROBLEMATIQUE

From the individual's point of view, there are numerous reasons why someone might invest in specific levels or fields of postsecondary education. It is important to understand these reasons, because as Boudarbat and Montmarquette (2009) note that: "if education is to continue to function as an engine of the country's socio-economic development, it is important for education policy in Canada to grasp individuals' university related decisions, and their interaction with labour market conditions. ...there are concerns that certain education fields might be ignored... thus creating a shortage of skilled workers" (p1). Students select postsecondary education by level and field. We will now explore several possible reasons why a student may pursue either.

One obvious reason why one would select a field of study is for greater earning capacities. Boudarbat (2008) shows that students are motivated by expected levels of income when choosing their field of study. Knowing which fields lead to higher salaries is important because it allows for the better planning of the allocation of money and resources to various programs, and it is useful for individuals to know which fields lead to the best pay.

Montmarquette, Cannings, and Mahserdjian (2003) show that students choose majors based on the likelihood that they will be able to finish the degree in their major choice. Paglin and Rufolo (1990) show that people may forgo fields that they would earn more in for fields in which they possess the best corresponding skills and aptitudes for. Another obvious reason for students to choose a program is simply because it interests them. A final reason someone might choose a particular field of study is for the possibility of finding work that is related to what was studied in school.

As for why people would pursue additional education at higher levels, again the obvious reasons would be for greater earnings. Walters (2004a) shows that the higher the level of education, the greater the earnings. In addition, it might be assumed that the higher levels of education would provide more in-depth study of a subject, and thus further increase one's odds of finding employment related to what one studied in school.

From society's point of view, the initial costs of education are expensive. Costs include both the subsidies that postsecondary educational institutions are given, as well as the years individuals spend studying in a postsecondary institution as opposed to working. However, because of globalization and technological advancements, the nature of work has changed in society. Walters (2004b) cites Rubinson and Browne (1994) as noting that workers now require a variety of skills to adapt to the constantly evolving requirements in the new knowledge-based and competitive economy. Postsecondary institutions have needed to adapt to the changing work climate. Krahn and Bowlby (1999) note that since the 1990's, postsecondary institutions are increasingly evaluated in terms of how they

transmit useable skills and expertise to their students, and are paying closer attention to the labour market outcomes of their graduates.

It should be noted that postsecondary education can provide many functions in society. Wolfe and Zuvekas (1997) show that education increases a workers well being and quality of life, and therefore must be taken into account in any analysis of educational investments. Nevertheless, a key premise of this paper is that the benefits of postsecondary education mainly manifest themselves if students are learning/developing the skills that will be used in the job market.

CHAPTER 2: LITERATURE REVIEW

In this chapter, we will first begin by providing a brief overview of postsecondary education in Canada, including educational investment, enrolment, its evolution, and the economic situation in the past few decades, to give some context of the postsecondary situation in Canada. We will then explore the types of education postsecondary education provides, the various forms of educational mismatch, and how these forms of mismatches are related to each other. We then review articles that have specifically examined education-job mismatch, and the determinants of mismatch found in these articles. We conclude this chapter by examining how these articles look at mismatch from a theoretical perspective, and then we attempt to connect the various forms of educational mismatch from a theoretical perspective.

2.1. POSTSECONDARY EDUCATION IN CANADA

Canada has kept up with and even surpassed the already tremendous international growth in postsecondary education that western countries have experienced since World War Two. In 2001, over half of Canada's working age population (25 to 64) had postsecondary credentials, ranking it first amongst OECD countries in this category. As of 2004-2005, there were 756,894 full-time student enrolled in university, and approximately 514,000 enrolled full-time in Public college and institutes (Council of Ministers of Education, Canada 2007).

According to the Canadian Information Centre for International Credentials (CICIC) website, revenue for Canada's universities and colleges in 2007-2008 was approximately \$36.7 billion. 54.3% of this revenue came from the federal and provincial government, 21% from student fees, 14.6 per cent from sales of goods and services, and the rest came from other sources, such as investment income and donations.

University degrees are offered at 3 consecutive levels; Bachelor's, Master's, and then Ph.D. Universities focus on research, and typically provide their graduates with extensive knowledge in a particular discipline, as well as exposure to a variety of subjects in all disciplines.

Colleges typically offer more vocationally oriented programs, and work in conjunction with business to provide specialized programs for local needs, although they do have a wide array of more general programs. Programs usually take from 2 – 3 years to complete. Quebec is unique in Canada, in that it has a Cegep¹ system, typically following high school and with completion of a Cegep degree as a pre-requisite for entering university. Alternatively, Cegeps offer a variety of 3 year vocational and technical programs, designed for easy entrance into the labour market.

Emery (2004) cites Oworm (1996) as identifying the expansion of white-collar positions in administration, finance, and in the public sector between 1950 and 1980 as the reasoning behind the increase in postsecondary education in Canada, requiring it to have more teachers, civil servants, bankers, and doctors. Roterman (1999) describes how in the 1950s and 1960s, a booming postwar economy and the relatively scarce number of university graduates meant that all fields had labour market success. As time passed and economic conditions declined, universities became more heavily scrutinized in terms of how they were funded, and as a response to this, money was reinvested in more professional-related programs.

While the scope of full-time university enrolment has increased significantly in the past few decades, there has been relatively little change in program distribution, with the majority of graduates being in the more general, non-technical programs such as Arts and Science. Emery (2004) notes that such stability in the face of a dramatic shift in the labour market economy has brought scepticism over the worth of university education. The author describes how in the 1990s, a belief emerged in Canada, that these general

¹ Cegep is an acronym for Collège d'enseignement général et professionnel, meaning "College of General and Vocational Education"

Arts & Science programs were not useful in the labour market, and that money should be reinvested to more technical programs at the college, and trades/vocational level, which were said to teach more “relevant” specific skills to students. However, it would appear that this belief was unsubstantiated, because labour market results of university education remain clearly more favourable than college and trade school graduates, both of which are said to offer more vocational skills than university programs (Allen, 1998).

2.2. EDUCATION-JOB MISMATCH VS. SKILL-JOB MISMATCH

There are numerous forms of education, and numerous skills that education provides. Thusly, there are numerous forms of education-job match/mismatch. This section will explore three types: mismatch by skills obtained during education, mismatch by level of education, and mismatch by field of education. Although these types of mismatches are connected, an analysis of the studies that specifically ask questions comparing each category of mismatch shows differences in prevalence and consequences, as we shall soon see.

Each form of mismatch has its theoretical and practical importance. If the most important objective of education is to provide the skills and competencies to perform one’s job, then the direct match between the skills and knowledge graduates obtained during a graduate’s education compared to what is used or lacking on their job is perhaps the most important aspect of match/mismatch. However, the two main categories of choices one makes when enrolling postsecondary education concern the level of education and the discipline. Therefore, it is important to look at education mismatch in terms of these two categories, and how they relate to skills mismatch. We will start by reviewing types of skills, and then we will explore types of mismatch.

2.2.1. TYPES OF SKILLS

Following the example of Storen and Arnesen (2006), as well as Heijke, Meng, and Ris (2003), we will separate skills into two types of competencies: vocational competencies,

which include field specific knowledge, and generic competencies, which include such skills as ability to learn and problem solve.

Most obvious would be the vocational skills taught in school specifically for the purpose of being able to carry out specific on the job tasks. Heijke, Meng, and Ris (2003) note: *“Higher education is organized around discipline or higher professional fields and hence around the learning of discipline or field specific (vocational) competencies”* (p217). For example, nurses who are taught the specific duties of nursing, checking charts, giving injections, administering drugs, etc., would need to be skilled in these competencies to perform their duties. These types of skills are rather specific, and unlike general skills, cannot easily be learned outside of academic settings.

Another area of skills is general skills. Krahn and Bowlby (1999) mention that postsecondary institutions are not only being evaluated on their ability to train graduates for specific occupations, but also on their ability to develop generic employability skills. In addition to their specific duties, nurses will generally need to have the ability to think critically in certain situations, to improvise, and to supervise others, skills that are difficult to be specifically taught in school. Both Roterman (1999) and Krahn and Bowlby (1999) use National Graduate Survey data to show that general skills learned in school, such as creative thinking, writing skills, critical thinking skills, are used frequently on the job, and the match students had with these skills was pretty consistent across all fields.

2.2.2. EDUCATION-JOB MISMATCH BY LEVEL OF STUDY

Most studies to do with education-job match pertain to level of education (Robst 2007a). An example of mismatch would be an individual with a Masters degree in Chemistry working in an entry-level position at a lab. In this example, a postsecondary degree would be a requirement for obtaining such a position, and the subject material is in line with what has been studied, but does the individual have the chance to utilize the human capital growth of his/her extra two years of formal education obtaining a post-graduate

degree? The increased ability to do research, the knowledge of specific organisms, new trends in lab technology... might all have been skills learned in formal education that may not be used when working in a position below their level of study.

There is some debate as to the interpretation of these extra skills. As Buchel (2001) notes: *“The term ‘over-qualification’ is generally used to [vaguely] describe a situation in which the knowledge and skills acquired through the education system are not exploited to the full”* (p459). Some authors, however, for example Halaby (1994), argue that there is a weak connection at best between over-education and skills mismatch. He feels there are numerous forms and uses of human capital, and measuring education-match in terms of years of schooling is a poor indicator of skills and abilities. Halaby (1994) cross-tabulates a question of appropriate level of education vs. the appropriate skill required for the job, he shows that there is only a weak connection between reported levels of over education and skills mismatch.

Di Pietro and Urwin (2003) cross-tabulate a question about the extent to which individuals use the skills and knowledge specifically acquired at university in their current job, with the required level of education. Although in general, level of education was correlated with skill use on the job, people could be adequately educated in terms of their educational level and still be under-skilled in their job requirements, and vice-versa.

2.2.3. EDUCATION-JOB MISMATCH BY FIELD OF STUDY

Vertical mismatch of education (mismatch of level of education and job) is not the only form of education mismatch. Another important form of educational mismatch which should be looked at when looking at education-job mismatch is horizontal mismatch (i.e. mismatch of field of study and job). An extreme example of horizontal mismatch would be two individuals with more or less equal human capital levels (equal abilities, experience...); one studies to be a nurse for three years, the other spends an equal amount of time studying to be an Airplane mechanic. Assuming the labour market is in equal need of both, that the jobs are of equal skill requirement and pay the same salary, what

percentage of the human capital is wasted if the individual with the nursing degree works with airplane engines, and the individual with a mechanic degree works in a hospital with patients?

Walters (2004b) cross-tabulates a question about whether employers requested a specific postsecondary credential for the job, and compares this to whether graduates used the skills and knowledge they acquired in university on the job. The author finds that there is a strong connection for occupationally specific disciplines, but not for general ones.

2.2.4. EDUCATION-JOB MISMATCH BY SKILLS, LEVEL, AND FIELD

Allen and De Weert (2007) use data from five countries that participated in the CHEERS² work study and look at all three forms of mismatch. They find education match and the corresponding skills-use varies significantly by country. They find that half the graduates were properly match to a job by their level and field, a seventh were under-educated for their job, a quarter were over-educated, and about one in eight were at the right level of education but not matched to their field.

In general, across all countries, people working in an appropriate level and field of study have high skill use on the job, but they emphasize the relationship was not perfect. 10-20% of graduates with a perfect educational match use skills and knowledge from school less than the average. Conversely, 20% of graduates who work below their level report a higher than average use of their skills. They find that people who work in a different field from the one in which they were trained, tend to make low use of their skills. Contrary to what they expected, this relationship between education match and skill use is weakest in Germany and the Netherlands, the two countries in which the education system is said to be the most highly linked to the labour market, and highest in the UK and Japan where this link is thought to be the weakest.

² CHEERS is an acronym for Careers after Graduation – An European Research Study; A study collected from autumn 1998 to spring 2000 which looked at labour market results of graduates from 12 European countries.

2.3. EDUCATION-JOB MATCH DETERMINANTS

As previously mentioned, most articles on the subject of education-job mismatch have focused on how level of school affects match. However, a careful examination of the literature reveals there have been a growing number of articles pertaining to job mismatch by education degree field, as well as job mismatch by degree generally. The articles examined for this study have been chosen because they examine (sometimes in combinations) the determinants of education job-match/mismatch by field, degree, and skills.

The education job-match determinants of each article are shown in the table. The following is a brief analysis and summary of some of the findings of articles that have looked at either the determinants of education-job mismatch by field. Table 1 gives a breakdown of these articles, while Table 2 looks at the determinants of match/mismatch.

Table 1: Comparative Breakdown of Articles

Survey	Data	Definition of match	Field of study breakdown
Witte and Kalleberg (1995); <i>Matching Training and Jobs: The Fit Between Vocational Education and Employment in the German Labour Market</i>	Study based on: The German Socioeconomic Panel (GSOEP), designed to collect German records of employment, education, income, etc. as well as data compiled yearly by the German Central Statistical Office in its <i>Statistisches Jahrbuch</i> series. Total sample: 5,021 households and the 16,000 individuals in these households Type of calculation used: Cross-sectional models of the incidence and determinants of fit were estimated for each year 1984-90. Means and standard deviations shown are for 1987 Years: Yearly, from 1984-1990 Region looked at: West Germany	Respondents' assessments of whether or not their current occupation is the one for which they received training. (subjective measure)	NA
Grayson (2004); <i>Social Dynamics, University Experiences, and Graduates' Job Outcomes</i>	Study based on: Data from a mailed survey and follow up telephone interviews of York University graduates Total sample: Mail interviews: 2211; Telephone interviews: 1434; After listwise deletion the total number of cases available for regressions ranged from 657 to 747 Type of calculation used: ordinary least squares regressions Years: 2 years after 1995 and 1996 graduates Region looked at: Canada (Toronto)	Measured by asking: "How closely is your job related to your undergraduate education at York? Is it closely related, somewhat related, or not at all related? (subjective)	1) Arts graduates; (reference category) 2) Schulich School of Business (SSB) graduates; 3) Fine arts graduate; 4) Science graduate
Garcia-Espejo and Ibanez (2006); <i>Educational-Skill Matches and Labour Achievements among Graduates in Spain</i>	Study based on: 1999 graduates of University Oviedo Total sample: 1337 responded Type of calculation used: Logistic regression techniques Years: Longitudinal 2003 survey among 1999 graduates Region looked at: Asturias (region of Spain)	Graduates were asked about the level of education they considered most adequate to exercise their job; (1) 'My university degree', (2) 'Any university degree', and (3) 'A non-university degree, including no degree'. - Model B was elaborated, in which the dependent variable adopts two values: 1 'My university degree is required' (1) and 0 for 'Rest of the situations' (2+3) (objective)	1) Experimental studies; 2) Technical studies; 3) Social studies; 4) Humanities
Robst (2007a); <i>Education and Job Match</i> & Robst (2007b); <i>Education, College Major, and Job Match: Gender Differences in Reasons for Mismatch</i>	Study based on: 1993 National Survey of College Graduates (NSCG) Total sample: 124,063 responses Type of calculation used: ordered logit regression Years: Graduates of 1990, the study was taken in 1993 Region looked at: United States	Respondents asked: "Thinking about the relationship between your work and your education, to what extent was your work on your principal job... related to your highest degree field? Was it <i>closely related</i> , (match) <i>somewhat related</i> , (partially mismatched) or <i>not related</i> (completely mismatched)".(subjective)	1) Agricultural sciences; 2) Architecture 3) Biological sciences; 4) Business management; 5) Communication; 6) Education; 7) Engineering; 8) Engineering-related technologies; 9) English and foreign languages; 10) Health professions; 11) Home economics; 12) Law/prelaw/legal studies; 13) Liberal arts; 14) Library studies; 15) Mathematics 16) Parks/recreation/fitness studies; 17) Philosophy/religion/theology; 18) Physical sciences; 19) Psychology; 20) Public affairs; 21) Social sciences; 22) Visual and performing arts; 23) Computer and information sciences
Roterman (1999); <i>Is there a Value in</i>	Study based on: 1995 NGS data Total sample: 43,000 surveyed, representing almost	Respondents asked if they feel their job is related to their schooling, is it 1) closely related, 2) is it	1) Fine Arts; 2) Humanities; 3) Social Science; 4) All Arts; 5) Commerce; 6) Math and physical Science; 7)

Survey	Data	Definition of match	Field of study breakdown
<i>an Arts Education? An Analysis using the 1997 National Graduates Survey</i>	300,000 graduates Type of calculation used: Multiple regression analysis Years: Graduates in 1995, the survey was taken in 1997 Region looked at: Canada	somewhat related, 3) not at all related (subjective)	Agriculture/Biological Science; 8) Health; 9) Engineering; 10) Education
Krahn and Bowlby (1999); <i>Education-Job Skills Match</i>	Study based on: 1990 NGS study Total sample: 51,111, weighted up to 187,837 Type of calculation used: Logistic regression Years: Graduates in 1990, the survey was taken in 1992 Region looked at: Canada	A derived variable "job related to field of study" by cross-tabulating responses to whether the employer had specified a required credential to work at the job, and a self-assessment of students indicating whether they used their acquired knowledge and skills from their program on their job. (objective and subjective)	University level: 1) Commerce, management and administration; 2) Fine and Applied arts; 3) Humanities; 4) Social sciences; 5) Law; 6) Agriculture and biological sciences; 7) Engineering and applied sciences; 8) Medicine and dentistry; 9) Education 10) Health science College level: 1) Business and Commerce; 2) Arts and Humanities; 3) Social sciences and services; 4) Natural science and primary industries; 5) Engineering and Applied science; 6) Health science
Storen and Arnesen (2006); <i>What Promotes a Successful Utilization of Competence in the Labour Market Five Years after Graduation? Does Vocational Higher Education Result in a Better Match than Academic Generalist Education?</i>	Study based on: 2005-2006 REFLEX data Total sample: 2097 Type of calculation used: multinomial logistic regression Years: Graduates in 1990-2000, the study was taken in 2005-2006 Region looked at: Norway	The combination of being both vertically and horizontally mismatched. Horizontally mismatch: ... refers to persons who gave an answer to the question "What field of study do you feel is most appropriate for this work?" that indicated that their work did not correspond to their own or a related field. (subjective measure) Vertically mismatch: ... refers to those who gave an answer to the question "What type of education do you feel is most appropriate for this work?" ("type" is referring to "level" according to the response options in the questionnaire)	1) Generic, 2) Technical 3) Soft, 4) Legal
Heijke, Ming, and Ris (2003); <i>Fitting to the job: the Role of Generic and Vocational competencies in Adjustment and Performance</i>	Study based on: Data from a postal survey Total sample: 3087 Dutch graduates responded, but fewer than 2000 are covered in the paper because only graduates for whom data on the variables used are available are included. Type of calculation used: bivariate probit analysis Years: Graduates from 1994-1995, survey taken in 1998 Region looked at: The Netherlands	Measured by asking a question concerning the relationship between the graduate's field of study and his or her area of work. A horizontal mismatch occurs if the graduate reported that neither 'the own field of study' nor a 'related field of study' would have been the best preparation. (subjective measure)	1) Arts and Humanities 2) Social Sciences 3) Business 4) Law 5) Natural Sciences 6) Engineering 7) Health
Wolbers (2003); <i>Job Mismatches and Their Labour-market Effects Among School-Leavers in Europe</i>	Study based on: This data-set combines information from the original EU Labour Force Surveys with special topical information on the transition from school to work. Total sample: After omissions, 36,268 Type of calculation used: Logistic regression analysis Years: School-leavers from the past 5-10 years as of the year 2000 Region looked at: (13 European countries) Austria, Belgium, Denmark, Spain, Finland, France, Greece, Hungary, Italy, Luxembourg, the Netherlands, Sweden, Slovenia	A discrepancy between the current occupation a school leaver is working in and the field of education attended. (objective measure)	1) Education; 2) Social sciences/business/law; 3) Sciences; 4) Engineering/manufacturing/construction; 5) Agriculture; 6) Health/Welfare, Services

Table 2: Determinants of Education-job Match**Notes:**

(+) match means a greater, or a high probability of match

(-) match means a lesser, or a low probability of match

(=) match means an equal degree of match

NA means the data is not available for that category

M means male graduates or workers

F means females graduates or workers

Study	Nature/Field of education	Level of education	Additional determinants:												
Witte and Kalleberg (1995)	NA	NA	<p>Gender: F had (+)match over M.</p> <p>Age: Older school-leavers had (-)match than younger school-leavers.</p> <p>Time on the Job: Higher (+)match the longer the person has been at the job</p> <p>Size of firm: (-)match for M employed in larger firms, but no such association for women.</p> <p>Type of occupations (blue-collar, white-collar, and civil service): M had (=)match; F had (-)match in blue-collar occupations.</p> <p>Moving into fit: The 2 higher secondary tracks are able to obtain jobs that fit more rapidly than those with only a Hauptschule degree.</p> <p>Passage of time: The time immediately following completion of one's vocational education is crucial for obtaining a job match.</p>												
Grayson (2004)	<table border="1"> <thead> <tr> <th>(+)match</th> <th>(-)match</th> </tr> </thead> <tbody> <tr> <td>Schulich School of Business</td> <td>Arts degrees</td> </tr> <tr> <td>Fine Arts</td> <td></td> </tr> <tr> <td>Science graduates</td> <td></td> </tr> </tbody> </table>	(+)match	(-)match	Schulich School of Business	Arts degrees	Fine Arts		Science graduates		NA	<p>Grades: (+)match for better academic standing.</p> <p>Taking of additional courses: (+)match for graduates who took additional professional programs.</p> <p>How job was obtained: those who got jobs because they knew someone who worked there or because of help from friends (-)match over graduates who obtained their job through an advert.</p>				
(+)match	(-)match														
Schulich School of Business	Arts degrees														
Fine Arts															
Science graduates															
Garcia-Espejo and Ibanez; (2006)	<table border="1"> <thead> <tr> <th colspan="2">Humanities (the reference category)</th> </tr> <tr> <th>(+)match</th> <th>(-)match</th> </tr> </thead> <tbody> <tr> <td>Social science</td> <td></td> </tr> <tr> <td>Technical studies</td> <td></td> </tr> </tbody> </table>	Humanities (the reference category)		(+)match	(-)match	Social science		Technical studies		NA	<p>Gender: (=)match for M and F graduates</p> <p>Passage of time: (+) More time that passed, the greater the match</p> <p>Grades: (+)match for better academic standing.</p> <p>Type of occupations: Professionals had the highest (+)match</p>				
Humanities (the reference category)															
(+)match	(-)match														
Social science															
Technical studies															
Robst (2007a)	<table border="1"> <thead> <tr> <th colspan="2">The fields with the (+) and (-) match</th> </tr> <tr> <th>(+)match</th> <th>(-)match</th> </tr> </thead> <tbody> <tr> <td>Health professions</td> <td>English and foreign languages</td> </tr> <tr> <td>Library science</td> <td>Social sciences</td> </tr> <tr> <td>Engineering</td> <td>Liberal arts</td> </tr> <tr> <td>Architecture</td> <td></td> </tr> </tbody> </table>	The fields with the (+) and (-) match		(+)match	(-)match	Health professions	English and foreign languages	Library science	Social sciences	Engineering	Liberal arts	Architecture		Individuals with Masters, Professional, or Doctoral degrees had (+)match over Bachelors degree recipients	<p>Recentness of degree: The more recent the degree, the (+)match.</p> <p>Age: The higher the age, the greater the (-)match.</p> <p>Demographics: (-)match for the disabled, as well as people who've never been married; Whites and Asians have (-)match over Blacks and Hispanics.</p> <p>Marital status: Never married individuals had (-)match.</p> <p>Gender: F had (+)match over M</p>
The fields with the (+) and (-) match															
(+)match	(-)match														
Health professions	English and foreign languages														
Library science	Social sciences														
Engineering	Liberal arts														
Architecture															
Krahn and Bowlby	Health science graduates had the highest (+)match.	(In order) (+)match for Doctorate and Masters level,	<p>Gender: M had slight (+)match over F.</p> <p>Age: Older graduates had slight (+)match over younger graduates.</p>												

Study	Nature/Field of education	Level of education	Additional determinants:														
(1999)		then Trades/vocational and Career/technical, then Undergraduate	<p>Type of occupations (blue-collar, white-collar, and civil service): Grads in professional/Managerial jobs had (+)match over those in blue collar jobs.</p> <p>Level of service: Those employed in upper tier services (+)match over lower tiered services</p> <p>Permanence of job: Those in permanent jobs had (+)match over temporary positions</p>														
Storen and Arnesen (2006)	<table border="1"> <thead> <tr> <th>(+)match</th> <th>(-)match</th> </tr> </thead> <tbody> <tr> <td>Soft</td> <td>Generic group</td> </tr> <tr> <td>Legal</td> <td></td> </tr> <tr> <td></td> <td></td> </tr> </tbody> </table>	(+)match	(-)match	Soft	Generic group	Legal				NA	<p>Grades: (+)match for better academic standing</p> <p>Time on the Job: Lower mismatch the longer the person has been at the job</p> <p>Gender: (=)match for M and F graduates</p> <p>Skills:</p> <table border="1"> <thead> <tr> <th>(+)match</th> <th>(-)match</th> </tr> </thead> <tbody> <tr> <td>Mastery of one's own field</td> <td>Innovative</td> </tr> <tr> <td>Grades</td> <td>Language</td> </tr> </tbody> </table> <p>* The effect of the competency-factors on the dependent variable 'mismatch' may differ between the educational groups. A factor that increases the probability of being (for instance) vertically mismatched in one of the groups may decrease the probability in one of the other groups.</p>	(+)match	(-)match	Mastery of one's own field	Innovative	Grades	Language
	(+)match	(-)match															
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Legal																	
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Mastery of one's own field	Innovative																
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Heijke Meng Ris (2003)	<table border="1"> <thead> <tr> <th>(+)match</th> <th>(-)match</th> </tr> </thead> <tbody> <tr> <td>Law</td> <td>Generic</td> </tr> <tr> <td>Natural Sciences</td> <td></td> </tr> <tr> <td>Health</td> <td></td> </tr> </tbody> </table>	(+)match	(-)match	Law	Generic	Natural Sciences		Health		NA	<p>Skills:</p> <table border="1"> <thead> <tr> <th>(+)match</th> <th>(-)match</th> </tr> </thead> <tbody> <tr> <td>Vocational competencies</td> <td>Generic skills</td> </tr> <tr> <td></td> <td>Adaptability</td> </tr> </tbody> </table> <p>Work experience: Graduates with study-related working experience during their study time have a higher +match</p> <p>Motivation: The importance given to using acquired skills leads to +match</p>	(+)match	(-)match	Vocational competencies	Generic skills		Adaptability
(+)match	(-)match																
Law	Generic																
Natural Sciences																	
Health																	
(+)match	(-)match																
Vocational competencies	Generic skills																
	Adaptability																
Wolbers (2003)	<p>Reference category: Education</p> <table border="1"> <thead> <tr> <th>(+)match</th> <th>(-)match</th> </tr> </thead> <tbody> <tr> <td>Engineering / manufacturing / construction</td> <td>Humanities and arts</td> </tr> <tr> <td>health and welfare</td> <td>Agriculture</td> </tr> <tr> <td>Social sciences / business / law; services</td> <td>Sciences</td> </tr> </tbody> </table>	(+)match	(-)match	Engineering / manufacturing / construction	Humanities and arts	health and welfare	Agriculture	Social sciences / business / law; services	Sciences	The more postsecondary education a graduate had, the more the (+)match	<p>Gender: F had (+)match over M.</p> <p>Age: Older school-leavers had (-)match than younger school-leavers.</p> <p>Time on the Job: Higher (+)match the longer the person has been at the job</p> <p>Permanence of job: Those in permanent jobs had (+)match over temporary positions</p> <p>Full vs. part-time: Those with a part-time job had (-)match over those working full-time.</p> <p>Economic conditions: In times of high unemployment, the (-)match.</p> <p>Size of firm: larger firms the (+)match; / in small firms (-)match.</p> <p>Private vs. Public sector: public sector (+)match; private sector (-)match.</p> <p>Country difference: Countries in which the share of upper secondary education students in school-based vocational education is large, the (-)match</p>						
(+)match	(-)match																
Engineering / manufacturing / construction	Humanities and arts																
health and welfare	Agriculture																
Social sciences / business / law; services	Sciences																

2.3.1. SURVEY OF EXISTING STUDIES

Briefly describing Table 1, ten articles are examined. The definitions for match are not always consistent. Krahn and Bowlby (1999) note that even between the NGS/FOG studies, the definitions of match change, so measuring the match between education and employment can be difficult to compare.

Wolbers (2003), Heijke, Meng, and Ris (2003), as well as Robst (2007a and 2007b) refer exclusively to field of study. Wolbers (2003) relies on an objective measurement of match, based on category of occupation with the corresponding field, while Heijke, Meng, and Ris (2003) use a subjective method, asking respondents if they feel their job is related to their field of study. Robst (2007a and 2007b) uses the question “job related to highest degree field”. Krahn and Bowlby (1999) use a combined subjective and objective measure which asked respondents whether they needed a specific credential to obtain their employment, and whether they felt they used the skills and education learnt in school on their job, for a derived education-job match variable. Garcia-Espejo and Ibanez (2006) ask if graduates needed a specific credential pertaining to both level and field to get the job. Witte and Kalleberg (1995) ask a question about job related to training.

The remaining studies use a subjective measure of how they perceive the match to be, in questions that directly incorporate both horizontal and vertical definitions of match. Storen and Arnesen (2006) combine questions asking respondents if they felt their field of study was appropriate, with whether they felt their level was appropriate. Roterman (1999), as well as Grayson (2004), measure education-job match the same way we do in our project, by asking graduates about the relation of their job to their degree.

Two of the articles, Krahn and Bowlby (1999) and Roterman (1999) use National Graduate Survey data from the years 1990 and 1995 respectively, and thus their results should be quite transferable to ours. Wolbers (2003) looks at several countries, Garcia-Espejo and Ibanez (2006) and Grayson (2004) look at labour market results from one university (and thus have the smallest sample) while the rest look at either countries or

regions of countries, and have rather large samples, with Robst (2007a and 2007b) having the largest, being based on 124,063 respondents.

Witte and Kalleberg (1995) also use data from people who haven't necessarily taken postsecondary education, as in Germany the educational system is vocationally oriented and people are trained for specific occupations. This article was selected because most of the ideas are transferable, nevertheless.

The breakdown of fields were into as few as four categories, with Grayson (2004), and Storen and Arnesen (2006) breaking it down into only four categories. Robst (2007a and 2007b) has as many as twenty-three degree categories. Witte and Kalleberg (1995) look at secondary and postsecondary programs with fields arranged slightly differently, and thus were listed as "Not Available" (NA).

Most of the articles use different programs in their field of study category, and are sometimes considerably different from what is found in the NGS/FOG. This is more apparent in the articles using European data. For example, Storen and Arnesen (2006) put everything that wasn't deemed to be a "Vocational" education of some kind, to be in the "Generic" group which includes "Social Sciences", "Business", "Humanities", and "Science and Mathematics". In the Garcia-Espejo and Ibanez (2006) study, "Humanities" includes "Education", and "Experimental Studies" includes "Chemistry" and "Geology". These categories are quite different from what is included in the NGS/FOG 2000, "Business", and "Humanities" are considered separately. It is therefore difficult at times to make the connections between these articles and their field of studies with the data that we will be using.

2.3.2. DETERMINANTS OF EDUCATION-JOB MATCH

Because most of the articles use different definitions of match, and look at different determinants, as well as different categories for their fields of study, to some extent it is difficult to come up with precise conclusions. Most observations will be explored more

thoroughly in chapter three as we make our own hypotheses, aided by the observations here in our review of the literature section.

Characteristics common to all of the articles are that those from occupation-specific programs have a much higher degree of match than those in the more general programs (Wolbers 2003; Grayson 2004; Garcia-Espejo and Ibanez 2006; Robst 2007a; Krahn and Bowlby 1999; Storen and Arnesen 2006; Heijke, Meng and Ris 2003), and that good grades during school positively affects the education-job match as well (Grayson 2004; Garcia-Espejo and Ibanez 2006; and Storen and Arnesen 2006). This might be attributable to the fact that employers view this as an indicator of ability to perform a good job at the subject-related skills (Grayson 2004).

Roterman (1999) describes how different fields provide different forms of skills, some of which are general, and others are specific. She cites Paglin and Rufolo (1990) as describing how one reason why men have better labour market outcomes than women would be because the human capital they possess (the fields they enter) are more general, whereas the fields men enter are more specific, in shorter supply and higher demand. Similarly, Garcia-Espejo and Ibanez (2006) cite Wolbers (2003) as noting that in some jobs educational mismatches are more important than others. In jobs that are more general in nature, specific work skills are less important and a mismatch as to ones' degree does not necessarily have negative consequences for the firm, but in jobs that require highly specific skills, mismatches may be a major problem to perform work tasks. Witte and Kalleberg (1995) discuss the importance of different types of skills acquired in education (general and specific), and the importance of match. They note that general skills acquired in education can be used in a variety of occupations, but if the skills are narrow (i.e. specific) then it is important to have a job that matches the education. Match seems to be more important in some fields than others, perhaps in part explaining its higher prevalence in the fields which teach more occupation specific skills.

In addition to looking at the possession of specific skills on education-job match, Storen and Arnesen (2006) and Heijke, Meng and Ris (2003) look at how the possession of

general skills effect the match. General skills can either increase or decreases the likelihood of a match, depending on the field. For example, Storen and Arnesen (2006) find that in general, low levels of leadership slightly decreases match, which would be consistent, as it decreased occupational outcomes in general. Those that see themselves as having strong innovative, professional ability decreases match, (to the authors' surprise) while having good language skills decreased the match, which was attributed to the fact that many "Humanities" graduates had strong language abilities. Heijke, Meng and Ris (2003) find that having a high level of adaptability decreases match, which is likely attributable to the fact that those who can adapt might be less inclined to obtain employment in a field that they studied in school.

Also as far as academic achievements go, the higher the postsecondary educational level, the more likely the match (Wolbers 2003; Robst 2007a; Krahn and Bowlby 1999). Robst (2007a) finds that the more recent the degree, the more likely the match, which might be attributable to the fact that people most likely took their most recent degree to specifically to find work in the labour market.

As for characteristics of the job itself that affect match, having a full-time job is associated with an increased match (Wolbers 2003). Having a permanent job generally is as well (Wolbers 2003; Witte and Kalleberg 1995; Krahn and Bowlby 1999), though this is not always the case, as in some situations having a temporary contract increases match (Garcia-Espejo and Ibanez 2006). This will also be explored to a greater extent in the next section.

There appears to be some discrepancy in effect firm size has, as Witte and Kalleberg (1995) show that for males, working in a larger firm decreases the match (with no association found for females) whereas Wolbers (2003) finds that larger firms generally increases the match. Witte and Kalleberg (1995) as well as Wolbers (2003) hypothesize that a larger firm might increase the match, because there are more positions available for one to find a position that matches their skills. Witte and Kalleberg (1995) also alternatively-hypothesize however, that a large firm might have more room for

advancement within the company, so an initial match might be taken away after promotion opportunities.

Those who found work in Blue-collar positions or lower tier services had less of a match than white-collar or professional professions (Witte and Kalleberg 1995; Garcia-Espejo 2006; Krahn and Bowlby 1999). This is likely attributable to the fact that the higher the position, the more likely it would be to require specific credentials, and thus a postsecondary education.

As for some demographic factors, there appears to be some contradictions concerning the effects of age, as Krahn and Bowlby (1999) found that older workers had a slightly higher match over younger workers, while Robst (2007a), Wolbers (2003), and Witte and Kalleberg (1999) find the opposite.

Other demographic results, as indicated in the Robst (2007a) study, show that people who were never married have less of a match, handicapped people are less likely to have a match, and Whites and Asians have less of a match than Blacks and Hispanics.

Being female slightly increases the likelihood of match in some studies (Wolbers 2003; Witte and Kalleberg 1995; Robst 2007a), slightly decreases its likelihood in others (Krahn and Bowlby 1999), and makes no difference in others (Garcia-Espejo and Ibanez 2006; Storen and Arnesen 2006). This discrepancy is difficult to explain.

Robst (2007b) provides further understanding into the determinants of mismatch, by looking at the explanations for why someone would take a job outside of their degree field of study (when graduates were working at a job for which they were not matched, they are asked why), and examines its subsequent effect on wages. The author shows that different reasons for accepting mismatched positions have different effects on salary. For example, for men, the wage loss ranges from 18% to 29%, when giving reasons such as job location, working conditions, or that none were available. Workers accepting mismatched jobs for pay or promotion opportunities earn more than correctly matched

workers. In addition, Grayson (2004) shows that obtaining a job through a connection negatively affects the education job match. This might also explain why proper match doesn't always lead to salary benefits (Allen and De Wert 2007; Allen and Van der Velden 2001).

It appears that a good match between education and subsequent employment is a combination of several factors. The clearest factors appear to be level and field of study. Obtaining good grades and possessing strong field specific skills also clearly lead to a good match. Characteristics of the job itself are important, as working in a full-time job increases the likelihood of education-job match, as well as belonging to a higher professional degree.

Robst (2007b) demonstrates that people have many reasons for accepting a position outside one's own degree field, and such reasoning depends on the individual. Of course, there will always be facilitating and restricting factors for someone to choose a job that is related to their field of study, but ultimately in a free society, it is individuals themselves who will choose what job they take. Along these lines, Heijke, Meng, and Ris (2003) specifically examine the characteristic of motivation, and its effect on match: they show that for the people who felt it important to use their knowledge and skills on the job have the higher match.

2.4. EDUCATION-JOB MISMATCH FROM A THEORETICAL PERSPECTIVE

Witte and Kalleberg (1995) note that: *“The issue of fit has considerable theoretical importance, since it focuses our attention on the mechanism by which persons are matched to jobs, a concern of many labour-market sociologists who seek to understand how individuals' human-capital investments are linked to jobs and work structures”* (p293-294). Therefore, we think it is relevant to see how some labour market theories would interpret the job-education match/mismatch. There are numerous theories concerning the role of formal education in labour market prospects. In Appendix A, we

succinctly present four general theories: *Human Capital* theory, *Credentialist* theory, *Job Matching / Assignment* theory, and *Technological Change* theory. These theories tend to look at educational mismatch in terms of level of education, and/or by skills.

At this point, we would like to mention that our study is purely applied, so, we do not aim to test theoretical aspects of match. We will just explore how some of our articles link the match/mismatch to labour market theories.

One example of a study which clearly attempts to test labour market theories is Walters (2004b), who compares Human Capital theory and Credentialist theory by cross tabulating a question about whether employers requested a specific postsecondary credential for the job, and compares this to whether graduates used the skills and knowledge they acquired in university on the job. Because Human capital theory states that education provides the necessary skills to perform complex work functions, it can be assumed that workers will indeed use these skills on the job, whereas Credentialism states that these degrees are merely credentials to obtain the job in the first place. Walters (2004b) finds that the more occupationally specific fields provide good support for Human Capital theory because graduates are indeed using the specific skills they learned in their education on their job. Conversely, the more general programs provide support for Credentialist theory, because even though the employer asked for a specific credential for the job, the skills learned in postsecondary education are not being used in the job.

Storen and Arneson (2006) attempt to compare Human Capital theory with the Assignment model as it pertains to match. They hypothesize that since Assignment model emphasizes the demand side of labour, if some fields have better labour market outcomes (such as education-job match), it gives support to the Assignment model. Conversely, Human Capital theory would be supported if the supply side of education (getting good grades, having strong field mastery) leads to good outcomes. Their results are mixed, noting that possessing good grades and strong field related mastery increased education-job match, which would give support to Human Capital theory. On the other hand, since some fields by and large had better labour market results than others, regardless of the

supply side of education, this would indicate an oversupply of labour, giving support to Assignment theory.

Although Grayson (2004) doesn't explicitly examine our labour market theories, he instead focuses on "status attainment" and "cultural reproduction" theories, which state that individuals possess different levels of cultural capital (i.e. gender, ethnicity, and family wealth), and social capital (i.e. social connections) which give them labour market advantages in addition to simply the human capital acquired in school (i.e. field of study, general and specific skills, and grades). His study aims to test these three forms of capital by comparing how individuals with different levels of these forms of capital perform on the labour market. He concludes by noting that graduates who had more human capital, in the form of better grades and different fields, regardless of their social or cultural capital had better career outcomes. This seemingly gives support to Human Capital theory.

In their conclusion, Witte and Kalleberg (1995) note that sociological labour market theories need to take into account variations at the individual level, as people at different life and career stages had significantly different outcomes in terms of having a match. They note that general skills and worker socialization are the most important benefit of the German education system, as: "This is particularly true in a rapidly changing economy; in such situations, specific skills rapidly become obsolete and too great an investment, by employers or employees, in training for specific, narrowly defined occupations may be unwarranted" (p313). This conclusion would appear to be a reference to Technological Change theory.

Although most of the literature about educational mismatch is based on the premise of overeducation or training/skills match, we feel we can further link this to fields of study match, largely thanks to insight of Robst (2007a). In Human Capital theory, a distinction is made between general and specific types of training. Although Becker defines training as an expense incurred by employers' to train their workforce, whereas our paper examines postsecondary education, a connection can be made between the two types of human capital.

Van de Werfhorst (2002) notes that paying attention to field of study is valuable because it allows for the analysing of different types of skill. He cites Kalmijn and Van der Lippe (1997) as noting that education not only provides general human capital, but particular fields of study also provide specific human capital, which according to Becker is acquired on the job.

Robst (2007a) has paid particular attention to the relationship skills, mismatch, and field of study. He notes that postsecondary studies provide both general and occupational skills, and that some majors, such as Engineering and Computer science focus more on occupation specific skills, while others, such as Liberal arts and English, focus more on general skills. He notes that people choose a major to develop the skills that will be used in a job that is related to the major, and feels that when individuals work in jobs unrelated to the college major, it implies choosing an occupation that differs from the intended occupation, and is thus conceptually similar to a change in occupations... "...as such, the literatures on overeducation and occupational skills can be used to link human capital theory and educational mismatch based on college major" (p4).

CHAPTER 3: THEORETICAL FRAMEWORK

After having defined the type of research we will be performing, as well as reviewing literature specifically about education-job match, we have been able to come up with many of our hypotheses, as well as our methodology. As research can take many forms, it is important to understand the type of research we will be doing in this study, as this affects both how the methodology is carried out, as well as how it is interpreted. This chapter outlines our research methods and tools, and then goes on to explain and justify our hypotheses, to provide the theoretical framework for our study.

3.1. RESEARCH APPROACH AND INSTRUMENT OF THE STUDY

This research is multi-disciplinary. Some disciplines involved would be Industrial Relations, Economics, Education, and Public policy. Our data source, the FOG 2000, collects labour market indicators. To answer our research question, we will be looking at the extensive data, and will use econometric techniques, which would fall in the Economics discipline. We are discussing education, and its importance in society, touching upon the disciplines of Education and Public policy.

The research is multi-disciplinary because each discipline is kept distinct and is not combined. For instance, our methodology is from the economics discipline, while our policy implications would be from the Education, Public policy, and Industrial relations disciplines. However, each discipline can understand and interpret the results without needing to resort to other disciplines.

Our research is applied because we are exploring real life situations with importance to real life situations. As Industrial Relations is generally an applied discipline, the phenomenon of education-job match on the labour market is pertinent and has immediately useable repercussions. We also believe that the results that stem from this research can be applied in further studies.

Our research is mainly deductive, because we are testing our hypotheses based on concrete data. We hope that upon observing our variables we will be able to come up with more concrete generalizations about education-job match, which can be used in future research.

Our research is quantitative, as we are using a large microdata set available to us through the FOG 2000, without going into the specifics of each case.

Our research is transversal because we are looking at labour market results five years after the year 2000 of postsecondary graduates. In the methodology of our research, we do not take into account results of past NGS/FOG studies, nor do we observe graduation results of respondents at a future date in time.

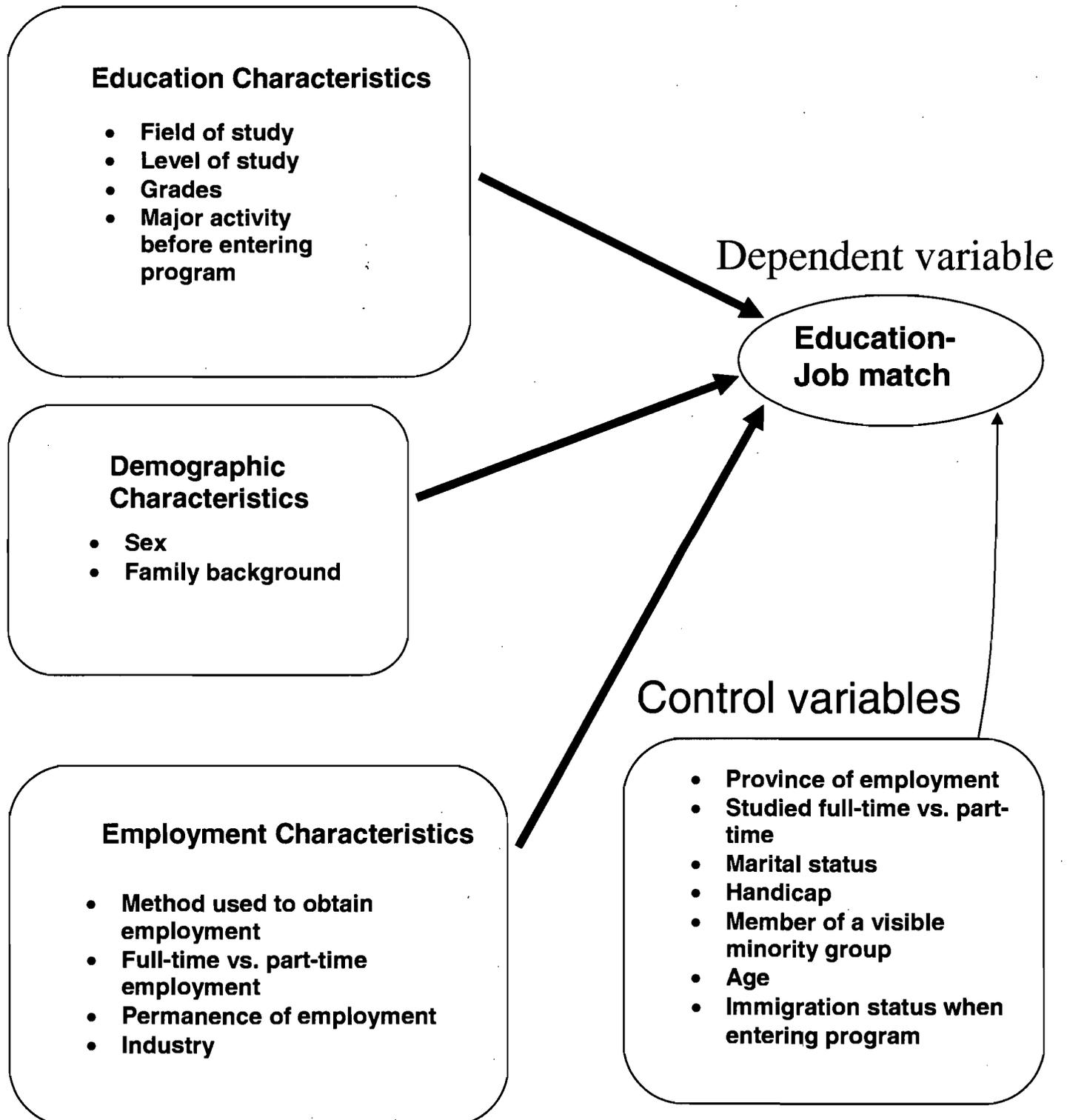
3.2. EMPIRICAL MODEL OF THE STUDY

Our study is empirically based, and thus, instead of having a conceptual model of education-job match, we instead show an empirical model of education-job match, as it is more appropriate for the type of research we are conducting.

Our study is relatively straight forward, with three types of variables: dependent, independent, and control. In our empirical model, represented in figure 1, this is shown by our various independent variables of education characteristics, demographic characteristics, and employment characteristics, along with their corresponding concepts, directed towards and affecting the dependent variable of education job match. The Province of employment, Age, Marital status, Handicap, Member of a visible minority group, Immigration status when entering program, and Studied full-time vs. part-time are put as control variables. For our purposes, this means that the results of our control variables will be looked at in our model but not explored in detail. The independent variables will be explored in the following section.

Figure 1: Empirical Model of Education-Job Match

Independent variables



3.3. HYPOTHESES

As indicated by our model and guided by our review of the literature, we have come up with the following three general hypotheses:

H1: *Education characteristics have an impact on education-job match*

H2: *Education-job match is associated with demographic characteristics*

H3: *Education-job match is associated with employment characteristics*

The more specific sub-hypotheses can be better explained as such:

H1a) Graduates of occupationally specific fields of study such as “Health sciences”, “Engineering”, and “Education” will have a greater probability of obtaining an education-job match than students in more general fields such as “Fine-Arts” and “Humanities”

All the observed articles show in their results that educational fields that provide occupationally specific skills such as “Health” and “Education” have the greatest probability of match, while the more general fields such as “Humanities” and “Fine Arts” have the least degree of match.

Robst (2007a) notes that some fields have a stronger demand for graduates than others, and that graduates from the “Health professions”, “Computer Science”, “Engineering”, and “Engineering-related technologies” likely have a low incidence of job mismatch for this reason. Berger (1988) finds that graduates of more general programs are less substitutable than graduates of more vocational programs, because they required less time to learn activities. Thus, when the supply of graduates increase, mismatch will occur more frequently for graduates of general programs.

H1b) Graduates with higher levels of degrees are more likely to obtain an education-job match than those with lower level degrees

Those with a higher degree level would be most likely to have a fit between their education and what is used on the job. Wolbers (2003) cites Borghans and De Grip (2000) as noting that there is a “bumping-down phenomenon”, where the more highly educated obtain jobs for which lesser education is needed, obtaining work in their field over the lesser educated. This would imply for example that even in a major where the match is relatively rare, such as for instance “History”, the professions where one might expect a history major to use what was learned in school (academia, museums...) on account of their relative rarity, would hire the more highly educated. Furthermore, one would expect people who are more passionate and better students to pursue higher levels of education, and thus be more inclined to pursue a career in their chosen field. This would increase the likelihood that the job will be related to education. It also might be deduced that those with higher degrees are more able, and/or have more ability, which would further increase the likelihood of them obtaining employment that is related to what they studied in school.

Several of the articles specifically examine how degree level affects match. Wolbers (2003), Krahn and Bowlby (1999), and Robst (2007a) all show that generally speaking, the higher the level of education, the more likely the match.

H1c) Graduates with good grades will have a greater probability of education-job match than those with poorer grades

Numerous articles (Grayson 2004; Garcia-Espejo and Ibanez 2006; Storen and Arnesen 2006) show that good grades during school positively affects the education-job match. As noted, employers might view this as an indicator of ability to perform a good job at the subject-related skills.

H1d) Graduates with work experience before entering their postsecondary institution will have a greater probability of obtaining an education-job match

Boudarbat (2008) specifically shows that those who worked immediately before entering their postsecondary institution are more likely to choose degree fields that lead to higher salary levels. The author shows that these graduates are well informed about the labour market and choose fields that lead to better outcomes, which likely means a stronger match.

Davies and Guppy (1997) note that people of working class (i.e. lower income) backgrounds are more likely to choose technical fields as a method to achieve upward social mobility. Grayson (2004) notes that since students working long hours are likely to come from relatively disadvantaged families, the need to work itself can be viewed as another way in which the dynamics of status attainment and cultural reproduction theory are reinforced. Again, they would likely choose education paths with more proven labour market results.

Heijke, Meng, and Ris (2003) note that graduates with study-related working experience during their study time have a higher probability of having a match. They theorise that this is because contacts are established within their educational domain.

H2a) The sex of the graduate will affect the education-job match

This hypothesis was a bit difficult to formulate, because as noted, the articles were quite divided over how this affects match. Again, it should be noted that men and women also enrol in very different programs and have different labour market considerations, and this likely will affect match. Slightly more articles indicated a higher match for females, but Krahn and Bowlby (1999), who use an earlier version of the National Graduates Survey and thus whose results should be the most similar to our own, indicate a higher match for males. We feel that all in all, because of the conflicting data, we are unable to say which direction it will be affected, just that there will be an association.

H2b) Graduates with more highly educated parents will have a greater probability of obtaining an education-job match than graduates with less highly educated parents

For this hypothesis, the link between level of education received by parents and how it pertains to education-job match has not been examined in any article we have found. However, there have been numerous studies showing the effect of parents' education on the educational and career prospects of their children (see Drolet 2005, for instance). These are often seen in theories such as Cultural Reproduction theory. Grayson (2004) discusses cultural reproduction theory and Status Attainment theory. These theories emphasize that parents transmit 'cultural capital' in the form of dispositions, habits and attitudes to their children. She notes that these theories are given credence by the fact that in Canada, the top income families attend postsecondary education institutions at a much higher rate than the lower income families.

In terms of studies that we have found which we can extrapolate into how they would pertain to our own research subject, there are factors that can either support or discredit this hypothesis.

In relation to the Cultural Reproduction theory, Van de Werfhorst (2002) notes that people invest in education that are related to the type of resources possessed by their families. The author cites studies showing that people who pursue the education fields of those of their parents have wage benefits in certain professions, and notes it is an incentive for children to pursue these educational directions.

Numerous studies that have been looked at show that students with high grades are more likely than others to say their job is related to their education. It is likely that graduates with more highly educated parents will have better grades, and thus makes it more likely that people with highly educated parents will have a match between their field and their employment.

Other findings however, seem to lead to alternative assumptions. Grayson (2004) finds that graduates from more well-to-do and educated families have better connections, which might help their job search. However, as was discovered, this actually hurt the

connection between field of study and job match, thus contradicting the hypothesis. In addition, Davies and Guppy (1997) note that working-class students who have reached college are more likely to view their undergraduate education as a route to upward mobility, and are more likely to enrol in lucrative degree fields that are of a relatively technical nature, which as we have seen, increase the probability of match. This would imply that such children choose a field in which they will most likely be working in.

We think that on account of the opposing reasoning, the rate of mismatch will not be tremendously affected by the presence of highly educated parents, but all in all, those with more highly educated parents will pursue the type of education advanced by their parents, and then work in this field, thus resulting in a higher rate of match.

H2c) Graduates who required a student loan for their education will have a greater probability of obtaining an education-job match

Many of the arguments for the previous hypothesis transfer over to this hypothesis. To some extent it conflicts with the previous hypothesis, as intuitively, graduates with more highly educated parents, likely have high family income, and therefore, they should not require a student loan. However, we hypothesize that those from a more difficult background, with less education and therefore most likely poorer parents, who do go on to postsecondary education, would likely be more inclined to choose a degree field with more guaranteed labour market outcomes, for salary and education-job match.

As noted, Boudarbat (2008) shows that those who worked immediately before entering their postsecondary institution are more likely to choose degree fields that lead to higher salary levels. This is because they have more information about the job market and therefore choose degrees that they are aware they will have favourable labour market outcomes. Therefore, we expect that those from poorer and less privileged backgrounds, who likely had to work more than students from more privileged backgrounds, would likely have chosen fields of more guaranteed labour market outcomes. Like our previous

hypothesis however, we think that on account of the opposing reasoning, the rate of mismatch will not be tremendously affected by the requirement of a loan.

H3a) Graduates who obtained their jobs through a connection are less likely to obtain a job that matches their education compared to those who found their job some other way

Grayson (2004) shows that those who found their job through a connection have less of an education-job match than those who find their job through another means. This might be attributable to the fact that an employer might be more willing to overlook a job mismatch if the referral was strong. In turn, the graduate might be more willing to accept a job they have a close connection; such a connection might ensure benefits such as a higher salary. It is also more likely that those who obtain their jobs specifically through the application process would be more likely to be seeking employment related to what they studied in school.

H3b) Obtaining an education-job match is positively associated with having full-time work status

Wolbers (2003) cites Groot and Maassen Van den Brink (1996) as noting that temporary and/or part-time employment often leads to a loss of productive skills and a lack of relevant work experience. Hence, it is possible that job mismatches are used here as compensation. His results confirm that those with a part-time job are more likely than full-time employees to have a mismatch. Krahn and Bowlby (1999) also show that full-time workers are more likely to report a match between their education and their employment.

H3c) Obtaining an education-job match is positively associated with having a permanent job

This hypothesis is less straightforward. It would seem plausible that an organization requiring a service for temporary work, such as the reprogramming of their computers, would hire people who specifically have been educated in this area. Garcia-Espejo and Ibanez (2006) do indeed demonstrate that those employed with temporary contracts in the public sector have a greater degree of match.

Conversely, similar to reasons cited in the above hypotheses, it would be likely that those who have found a career would be more likely to work in their chosen field, than those who are merely working in seasonal or temporary employment. Krahn and Bowlby (1999) show that those in permanent jobs are more likely to report a close job-education fit. It is also likely that people who are only working part-time would be more willing to compromise in their employment, and accept a position for which their education was not appropriate, in hopes of finding a better match later on.

H3d) Graduates who work in upper tier services such as Business, Education, and Health services will have a greater probability of match than those who work in lower tier services such as Trade, Accommodation, and Food/beverage services

Krahn and Bowlby (1999) show that graduates working in upper tier industries have a greater match. This is likely attributable to the fact that upper tier services are more prestigious, and thus likely have more specific hiring requirements, which would require more specific education credentials.

CHAPTER 4: METHODOLOGY

In this section we will describe the data source of our study, the research methodology, our population and sample, and our method of analysing our data.

4.1. INSTRUMENT OF THE STUDY

For our project, we will entirely rely on second-hand data; the Follow-up of Graduates Survey – Class of 2000 (FOG2000). The National Graduates Survey 2000, conducted in 2002, and its follow-up study, the FOG 2000, conducted in 2005, are studies designed to gauge the link between postsecondary education and career outcomes of graduates two and five years after graduation. These labour market results include such indicators as salary, satisfaction with employment, and education-job match. It is a vast reservoir of information on the subject, and was carried out by Statistics Canada, in collaboration with Human Resources and Skills Development Canada (HRSDC) and thus is reliable and comprehensive.

The FOG was collected via computer-assisted telephone, using a set questionnaire, from the period April 27th, 2005 to July 24th, 2005. The target population for the FOG 2000 are individuals who completed the requirements for their degrees, diplomas, or certificates in the calendar year 2000 from Canadian postsecondary public institutions. Excluded were those who graduated from private postsecondary institutions; completers of continuing-education programs (unless these led to a degree or diploma); graduates of skilled trade programs, graduates who completed vocational programs lasting less than three months; persons who completed vocational programs other than in the skilled trades (e.g. basic training and skill development) and graduates of apprenticeship programs (Follow-up of Graduates Survey - Class of 2000 – User Guide). The overall response rate for the FOG is 68.5%, and has a final sample size of 34,304. This represents NGS 2000 respondents, excluding graduates at the trade/vocational level (Follow-up of Graduates Survey - Class of 2000 – User Guide).

4.2. LEVEL OF ANALYSIS, UNIT OF ANALYSIS AND POPULATION OF THE STUDY

We will use select variables in the FOG 2000 with only slight modifications to certain answer categories. The unit of analysis for our project is a university graduate (Bachelor, Masters, or Doctorate) from Canada who has completed the requirements for his/her program during the year 2000. The population of the study includes all the 2000 university graduates in Canada, who are 25-60 at the time of the interview (5 years after graduation), who held a job during the week preceding the interview, and who did not take any further education since graduating in 2000, and thus is only a portion of the 34,304 respondents of the FOG.

More precisely, our study is based on a sample of 9940 graduates who meet the abovementioned criteria (i.e., being 25-60, having at least a Bachelor's degree, and not having taken any further education since graduating in 2000).

4.3. VALIDITY OF THE RESEARCH

Internal validity: It is important that research that discusses causal relationships have high internal validity. We are looking at the determinants of education job match, and thus hope that what appears to be a cause for a match really is one. Our study should have a high degree of internal validity for several reasons.

First of all, our Study is based on a Statistics Canada study The FOG 2000. Therefore, it can be assumed the original study was accurate and professionally collected. According to Statistics Canada (2007) questionnaire survey design specialists were used in the creation for the 2000 NGS study and its FOG follow-up. For the FOG 2000, Statistics Canada project supervisors and senior interviewers were trained for the project in a two-

day classroom training seminar (Follow-up of Graduates Survey - Class of 2000 – User Guide).

Furthermore, several error detection methods were used to ensure the accuracy of results. These methods included taking away answers or deducing answers to questions which were deemed to be improperly asked or answered. Imputation was used in some quantitative variables ... “when a realistic value could be deduced from the other variables” (Statistics Canada 2007). Furthermore, results were compared with other published sources such as “The Labour Force Survey”, “The Postsecondary Student Information System”, “The Survey of Graduates Who Moved to the United States”, and previous National Graduates Survey (NGS) releases.

As for how we analyse the data for the 2000 FOG, we are looking at numerous factors from an inductive point of view, and thus it would be expected that the causal mechanisms will be isolated and not mistaken for another. We plan to use a relatively in-depth econometric model, i.e. logistic regression analysis, as well as a large sample of graduates, we should be able to see the likelihood of the accurateness of each determinant’s causal relationship.

External validity: We would expect our project to have a very high degree of external validity, as the FOG 2000 took measures to maintain its external validity. As noted, the NGS/FOG is a professionally collected government study. Indeed, many government, university, and high quality journal studies have used NGS/FOG data in their studies, for a variety of purposes (See the Human Resources and Skills Development Canadian government website for a list of examples of studies that use NGS data from 1990, 1995, and 2000 - <http://www.hrsdc.gc.ca/eng/cs/sp/hrsdclp/publications/sp-654-09-06/page11.shtml>).

The survey frame for the 2000 graduates was made from a list of all graduates from universities, colleges and trade/vocational schools in Canada by Statistics Canada’s Centre for Education Statistics. The data on graduates was provided from two main

sources: the individual postsecondary institutions and provincial co-ordinating bodies, as well as from the Postsecondary Student Information System (PSIS), which is maintained by the Centre for Education Statistics (Follow-up of Graduates Survey - Class of 2000 – User Guide). Graduates were then systematically randomly selected for the study (Follow-up of Graduates Survey - Class of 2000 – User Guide).

The core sample of the FOG 2000 was designed to yield estimates with appropriate coefficient of variation levels for its marginals. It also consisted of over-sampling to compensate for expected non-responses (Follow-up of Graduates Survey - Class of 2000 – User Guide). To account for it being a sub-sample of the NGS, and with predicted non-responses, a sophisticated 3-phrase weighting system along with a post-stratification adjustment is used to ensure it is representative of the target population of the 2000 graduates (Follow-up of Graduates Survey - Class of 2000 – User Guide). Furthermore, because our sample is very large, it can be applied to the large majority of university graduates in Canada.

4.4. MEASUREMENTS

From our review of the literature, and as indicated in our hypotheses, we have chosen to categorize our results into three independent variables: 1) Demographic characteristics; 2) Education characteristics; and 3) Employment characteristics. We will see how these variables affect the dependent variable in our study, the education-job match, with Province, Studied full-time vs. part-time, Marital status, Handicap, Member of a visible minority group, Age, and Immigration status when entering program, as the control variables. The measurement of each variables is quite simple, as each has a corresponding question in the FOG 2000. Thus, the indicators can often be found in the responses with only slight modification required on our part to the answer categories of the original study.

As shown in Table 3, the dependent variable of education-job match is based on response to a question in the FOG data about whether individuals felt they were working in a job

that was related to their degree. For our results section, we will start by showing the bivariate correlation between the various independent variables and their match percentage by the three indicators in our table, 1) Closely related; 2) Somewhat related; 3) Not related.

For our logistic regression, we will use the indicator 1) Closely related; or 2) Not closely related (i.e. those who noted their employment was “Somewhat related” or “Not at all related” to their education). Despite its relative simplicity, we think this is adequate to gain a proper assessment of the education-job match.

Table 3: Dependent Variable (Education-job Match)

Variable	Concept / Dimension	Indicator	Questionnaire
<i>Education-Job match</i>	Match by relation to education	1) Closely related 2) Somewhat related 3) Not related at all	FLFQ55: How closely is the (main) job you held last week related to your certificate, diploma or degree? Is it...?

As for the independent variables and how they are looked at in our study (table 4), we break them down into three general categories of independent variables, as we have found this was the appropriate way to express the various concepts found in our review of the literature. To start, Education characteristics are among the main determinants of the education-job match. We will examine four concepts: 1) Field of study; 2) Level of study; 3) Grades; and 4) Recent work/school experience.

In the review of the literature section, we saw that all the articles examined field of study to some extent. There are numerous types of programs that postsecondary institutions offer. Some forms of education are more vocationally oriented, in the sense that they provide specific content that graduates would expect to use in the job market. Although in their study, Storen and Arnesen (2006) asked respondents to identify the extent to which they felt their program was vocationally oriented in order to classify the fields as general or vocational, they felt they were able to classify fields: “based upon our knowledge of the education system” (p5) and to judge which fields are geared to providing general skills, and which are considered to provide occupation specific skills.

We will use this approach of determining what fields are general and specific, by using our own judgement.

The 2000 FOG break down field of study into ten categories (See Appendix B). We decided to make some slight changes from how they appeared in the Appendix, as we felt some fields were inappropriately grouped with others for our purposes, and would not give a reliable estimate of education-job match. For example, for the field: “Health, parks, recreation and fitness”, we separated the “Health” field from this category, and placed the “parks, recreation and fitness” sub-sections into our “Other” category, as we felt that “Health” was distinct from these fields. In addition, we also separated the field: “Agriculture, natural resources and conservation; personal, protective and transportation services; and other” by putting the “Agriculture” subsection into its own Agriculture category, while adding the other sub-categories of this field in with our “Other” category. Therefore, our final field of study category is as such:

1) Education; 2) Visual and performing arts, and communications technologies (Arts); 3) Humanities 4) Social and behavioural sciences, and law (Social sciences & Law); 5) Business, management and public administration (Business); 6) Physical and Life sciences, and Technologies (Physical and Life sciences); 7) Mathematics, Computer and Information sciences (Mathematics/Computer/Information sciences); 8) Architecture, engineering and related technologies (Engineering); 9) Agriculture; 10) Health sciences; and 11) Other.

For our project, two fields will be considered general in nature: 1) Arts; and 2) Humanities. Another seven will be considered to provide specific occupational skills: 1) Education; 2) Business; 3) Physical and life sciences; 4) Mathematics/Computer/Information sciences; 5) Engineering; 6) Agriculture; and 7) Health sciences. We consider the final field, “Social sciences & Law”, to be somewhere in the middle, as some of the programs in this field are quite specific, while others are quite general. It is a little unclear as to where our “Other” category should go, because the subcategory “Personal, Protective and Transportation Services” would not be a common field at the

university level, and the multi-disciplinary components of “Other” would be difficult to qualify. Therefore, we will not give this a general or specific program label.

The level of education completed by graduates was seen to be another important determinant of education-job match in numerous articles in the review of the literature section. As mentioned earlier, people make choices in education primarily in terms of field as well as level. For our study, we have decided to focus exclusively on university-level graduates: 1) Bachelor’s degree; 2) Masters degree; and 3) Doctorate.

Grades are also expected to have a strong positive correlation with education job match and thus are also looked at in this section. One possible weakness with the way this is collected in the 2000 FOG data is that it is a self-assessment of grades, i.e. grades compared to others, which might display an upwards bias. We will keep the responses as they are seen in the NGS/FOG because it is suitable for our purposes; with individuals appearing 1) Top 10% of class grades; 2) Top 10-25% of class grades; 3) Top 25-50% of class grades; and 4) Below 50% of class grades.

The final concept for our first independent variable is major activities before enrolling in the completed program. We will again keep the responses mostly as they appear in the data: 1) Going to school before program; 2) Working before program; 3) Working and going to school before program; 4) Taking care of family before program; and 5) Doing other before program.

The “Demographics” variable will also provide some relevant insight, as nearly all of the concepts we chose were explored in the articles we examined in our review of the literature section. The demographic questions we will be exploring as independent variables are: 1) Sex; and 2) Family background.

We will look at gender in terms of a concept, and divide it into separate indicators: 1) Male; and 2) Female.

In the 2000 FOG, for our purposes, family background is based on the level of education obtained by the parents, as well as the use of a government student loan.

For level of education obtained by parents, we broke down this concept for both mother and father from 20 responses in the 2000 FOG data into eight indicators. We grouped together the highest level achieved between the parents, as it was assumed that there would be relatively few instances with one parent with a much a higher level of education than their spouse. Our final categories were: 1) Parents post-graduate degree; 2) Parents Bachelor degree; 3) Parents some postsecondary education; 4) Parents Trade degree; 5) Parents some postsecondary education; 6) Parents secondary education; 7) Parents less than secondary education; and 8) Parents other level of education.

We also consider the use of a government student loan in the family background, because it is an indicator of family wealth. Indeed, eligibility for a government student loan is only granted if the parents make less than a certain income; it is thus likely that people would have different job market considerations if this is required, and therefore it would likely affect the match. This category was divided into two categories: 1) Required a loan; 2) Didn't require a loan.

The final independent variable of employment characteristics allows us to see whether some job characteristics are associated with the education-job match. This variable includes: 1) Method used to obtain employment; 2) Full-time vs. part-time employment; 3) Permanence of employment; and 4) Industry.

For how job was obtained, we have broken this category down from ten into seven: 1) Referred; 2) Answered job ad; 3) Contacted employer directly, 4) Campus placement agency; 5) Employment agency; 6) Head hunter; and 7) Other method.

Full-time vs. part-time employment was looked at in numerous articles, and will be kept as it is in the NGS data; 1) Those who worked 30 hours or more per week (Full-time job); or 2) Part-time job.

Permanence of employment was also explored in many of the articles and was seen to be associated with education-job match. We broke this category down into 1) Permanent job; 2) Not permanent job.

For industry, we made slight modifications to what was originally in the FOG data (See Appendix C). On account of the many industries and small number of graduates found in certain industries, we grouped together industry 11) “Real Estate and Rental Leasing” and industry 13) “Management of Companies and Enterprises” into one category. Therefore, our final categories are: 1) “Agriculture, Forestry, Fishing and Hunting”; 2) “Mining and Oil and Gas Extraction”; 3) “Utilities”; 4) “Construction”; 5) “Manufacturing”; 6) “Wholesale Trade”; 7) “Retail Trade”; 8) “Transportation and Warehousing”; 9) “Information and Cultural Industries”; 10) “Finance and Insurance”; 11) “Professional, Scientific and Technical”; 12) “Administrative and Support, Waste Management and Remediation Services”; 13) “Educational Services”; 14) “Health Care and Social Assistance”; 15) “Arts, Entertainment and Recreation”; 16) “Accommodation and Food Services”; 17) “Other Services except public Administration”; 18) “Public Administration”; and 19) “Real Estate and Rental Leasing, as well as Management of Companies and Enterprises”.

Table 4: Independent Variables (Education, Demographic and Employment Characteristics)

Variable	Concept/ Dimension	Indicators	Questionnaire
<i>Education characteristics</i>	Field of study	1) Education 2) Arts 3) Humanities 4) Social Sciences & Law 5) Business 6) Physical and life Sciences 7) Mathematics/ Computer /Information sciences 8) Engineering 9) Agriculture 10) Health sciences 11) Other	PRCIPAGP: Aggregated classification of instructional program (CIP) at graduation in 2000. (SEE APPENDIX B)
	Level of study	1) Bachelor’s degree 2) Master’s degree 3) Doctorate	HLOS00: Highest level of studies completed by 2000. (Section: Derived Variables-Education programs)

Variable	Concept/ Dimension	Indicators	Questionnaire
	Grades	1) Top 10% of class grades 2) Top 10-25% of class grades 3) Top 25-50% of class grades 4) Below 50% of class grades	PR_Q05B: Compared to the rest of your graduating class in your field(s) of study, did you rank academically...?
	Major activity before entering program	1) Going to school before program 2) Working before program 3) Working & going to school before program 4) Taking care of family before program 5) Doing other before program	AB_Q04P During the 12 months before you enrolled in your (certificate / diploma / degree) program, what was your major activity?
<i>Demographic characteristics</i>	Sex	1) Male 2)Female	SEX_Q01 Sex of respondent
	Family background a) Father's education level b) Mother's education level	1) Parents post-grad 2) Parents bachelor 3) Parents postsecondary 4) Parents trade 5) Parents some postsecondary 6) Parents secondary 7) Parents less than secondary 8) Parents other	a) DE_Q08 / b) DE_Q09: What is the highest level of education completed by your father/mother (or father/mother's substitute or male /female guardian)?
	c) If a government student loan was required for education	1) Required a loan 2) Didn't require a loan	SL_Q01D: What were your <u>two main</u> sources of funding for all of your postsecondary education...? Government student loans
<i>Employment characteristics</i>	Method used to obtain employment	1) Referred 2) Answered job ad 3) Contacted employer directly 4) Campus placement agency 5) Employment agency 6) Head hunter 7) Other method	LF_Q53P & FLFQ53: What was the main method you used to find this job? (That you worked at last week)
	Full-time vs. part-time employment	1) Full-time job 2) Part-time job	FLFQ79P: How many (paid) hours a week do you usually work at this job?
	Permanence of employment	1) Permanent job 2) Not permanent job	LF_Q25: Was this a permanent, temporary, or seasonal job?
	Industry	1) Agriculture, Forestry, Fishing and Hunting 2) Mining and Oil and Gas Extraction 3) Utilities 4) Construction 5) Manufacturing 6) Wholesale Trade 7) Retail Trade 8) Transportation and Warehousing 9) Information and Cultural Industries 10) Finance and Insurance 11) Professional, Scientific and Technical	FLFIND2: Sectors for job held last week. (SEE APPENDIX C)

Variable	Concept/ Dimension	Indicators	Questionnaire
		12) Administrative and Support, Waste Management and Remediation Services 13) Educational Services 14) Health Care and Social Assistance 15) Arts, Entertainment and Recreation 16) Accommodation and Food Services 17) Other Services except public Administration 18) Public Administration 19) Real Estate and Rental Leasing, as well as Management of Companies and Enterprises	

As shown in Table 5, several control variables are examined: 1) Province of employment; 2) Studied full-time vs. part-time; 3) Marital status; 4) Handicap; 5) Member of a visible minority group; 6) Age; and 7) Immigration status when entering program.

Province of employment was chosen to account for differences between provincial labour markets. We will group together the provinces of Atlantic Canada, and chose to omit the territories. The territories were excluded from the scope of the survey.

Studied full-time vs. studied part-time would be interesting to control for, because whether a student devotes their entire effort into education might be different from those who did not, or those who did a mix of activities. As far as we know, no studies have examined this variable before. We break this category down into 1) Studied full-time, 2) Studied part-time and 3) Studied a mix of full-time and part-time.

For simplicity's sake, for the concept of marital status we will break down the six response categories from the NGS data into three categories, 1) Married or living common law (Married); 2) Separated/Divorced/Widowed and 3) Single (never married).

Handicap was included as a control variable because it allows us to see how being disabled affects job-education match. The indicators used will be the same as those used in the 2000 NGS, with 1) Handicapped; and 2) Not handicapped.

Similar to Robst (2007a), we control for racial background because discrimination possibly will play a role in education-job mismatch, and use the concept Member of a visible minority group. We will use 1) Member of a visible minority); and 2) Not member of a visible minority.

Age is listed as age in years at the time of the interview, and we omit those who are younger than 25 and older than 60, allowing us to keep the vast majority of our sample.

Immigration status when entering program is interesting to control for, because immigrants have different labour market outcomes than Canadian citizens, and it will be interesting to see how being educated in Canada will affect the match. It has been documented that immigrants to Canada have less favourable labour market results than Canadians, although these results appear to be present but less severe when their university degree is obtained in Canada (Ferrer, Green, and Riddell 2004, Gilmore and Le Petit 2008, Hawthorne 2008...). It would be interesting to see how this translates to an education-job match when the degree is obtained in Canada when entering program. We break the immigration status when entering program into: 1) Canadian citizen; 2) Immigrant; and 3) Student visa.

Table 5: Control Variables

Variable	Indicator	Questionnaire
<i>Province of current employment</i>	1) Atlantic Canada 2) Quebec 3) Ontario 4) Manitoba 5) Saskatchewan 6) Alberta 7) British Columbia	FLFQ19: In what province or territory was this job located?
<i>Studied full-time vs. part-time</i>	1) Studied full-time 2) Studied part-time 3) Studied a mix of full-time and part-time	PR_Q07: Did you take your (certificate / diploma / degree) program...?
<i>Marital status</i>	1) Married	FDEQ01P: What is your marital status?

	2) Separated/Divorced/Widowed 3) Single (never married)	
<i>Handicap</i>	1) Handicapped 2) Not handicapped	DE_Q33 (p105): (FDEQ09): Do you have any long-term disabilities or handicaps, that is, ones that have lasted or are expected to last six months or more?
<i>Member of a visible minority group</i>	1) Member of a visible minority 2) Not member of a visible minority	VISBMIN: Variable indicating whether the respondent has identified himself / herself as a member of a visible minority ethnic or racial group, as defined by interdepartmental agreement in the spring of 1992.
<i>Age</i>	Current age in years (25 to 60)	Respondent's age at interview
<i>Immigration status when entering program</i>	1) Canadian citizen; 2) Immigrant; 3) Student visa.	DE_Q21: When you first registered in your (certificate / diploma / degree) program, were you a...?

4.5. METHODS OF ANALYSIS OF THE RESULTS

To analyze our FOG2000 data, we will first produce descriptive statistics about the percentage of each category in our dataset.

We will proceed to produce a bivariate distribution of our dependent variable, calculating the percentage of match for each of the individual variables in terms of whether they produce a closely related match, somewhat related, or not related match. Then, we test whether the proportion of “closely related match” is the same across groups, using the Chi-square test of equality of proportions.

Afterwards, similar to Krahn and Bowlby (1999), we will look at our results through a multivariate regression analysis to control for the some of the many factors which might have an influencing effect on education-job match. For our dependent variable, we will use a binary measure, of whether graduates have a job that is closely related to their degree (value 1), or otherwise (value 0). We consider a *logit* model to model the relationship between our dependent variable and the rest of variables. A *probit* is also suitable when the dependent variable is dichotomous. However, both models (*logit* and *probit*) give similar results in practice (Greene, 2003).

For each independent variable, because of collinearity, we will omit a base category in our regression equation. We will also produce the correlation matrix for the dependent and control variables in order to uncover any potential collinearity problem.

Practically, we will compare our variables through the means of an odds-ratio, which tells us how much more or less likely the variable is to produce a match compared to the base category. For example, a variable with an odds ratio of 0.5 means that that variable has half the likelihood of closely related match as the base category. Any odds ratio above 1 would mean it is more likely than the base category of producing a closely related match. We feel this is a convenient way to demonstrate the effect on match while controlling for other contributing determinants.

CHAPTER 5: EMPIRICAL RESULTS

In this chapter we present our empirical results. First we shall present the descriptive statistics of our variables in the 2000 FOG, giving the proportions of each variable that make up our determinants. We will then test our hypotheses both with our bivariate results, then by our logistic regression analysis results, in which we will use to comment on discrepancies between our two forms of calculations.

5.1. DESCRIPTIVE STATISTICS

As shown in Table 6, our dependent variable is based on 9940 respondents, who had obtained a Bachelor's, Master's, or Doctorate degree, who were 25 to 60 years old at the time of the interview (i.e. in 2005), and who hadn't taken additional programs since graduation.

Now we will begin to observe the makeup of our independent variables, starting with education characteristics. In field of study, as was the case with the previous NGS/FOG studies, it would appear that these so called "soft science" credentials such as "Business", "Education", and "Social Sciences & Law" were awarded more than "hard science" credentials such as "Engineering", "Mathematics/Computer/Information sciences", and "Health sciences" (Krahn and Bowlby 1999).

"Business" made up the largest category of graduates in 2000, at 19.3% of the sample, followed by "Education" (16.3%), "Social Sciences & Law" (18.7%), "Engineering" (9.7%), "Health sciences" (8.7%), "Humanities" (7.7%), "Physical and life Sciences" (6.1%), "Mathematics/Computer/Information sciences" (5.5%), "Arts" (3.2%), "Agriculture" (2.4%), and last was "Other" (2.3%).

In level of study, the almost four out of five graduates in our sample (77.9%) had Bachelor degrees, and even this number under represents the actual proportion of

Canadian university graduates, as we had chosen to exclude from our sample those who had gone back to school since getting their degree. 18.6% had a Masters degree, and 3.5% had a Doctorate.

As for grades, it is quite obvious from the self-ranking system used in the FOG 2000 that graduates rank themselves upwards as far as their own grades are concerned. For example, 30.7% of those surveyed felt their grades were in the top 10% of the class, and more than two thirds of those surveyed, (67.3%) felt they were somewhere in the top 25% in their class for grades. Only 9% felt they were in the bottom 50% of their class.

As far as their major activity before graduation, more than half the sample (53.2%) listed their major activity before entering their program as going to school, while nearly a third (32.1%) were working; 10.2% listed a combination of the two. A small percentage (2.3%) listed taking care of family as their number one activity, and 2.2% said they were doing something else (other) before entering their university program.

Now we will look at demographic characteristics to see what kind of people make up Canadian university graduates in the year 2000. Females make up 59% of our population. It would appear that Canadian graduates are not extremely wealthy, as 41.3% used a government student loan of some kind.

Approximately 37% of graduates had at least one parent holding a university degree, and 64% had a parent with at least some postsecondary education. Approximately 23% had parents whose highest level of education was a high school degree, and 12.6% had parents who had not obtained a high school diploma. Overall, it seems that Canadian graduates have parents who are well-educated. This is in line with Drolet (2005) study, which finds that parents' education stand out as being an important determinant in the decision to attend university.

As for employment characteristics, in terms of method used to obtain employment, it would appear that Canadian graduates obtain their jobs through a variety of sources.

Approximately one quarter (24.3%), were referred by a friend or family member. 26.9% answered a job ad, and 24.8% contacted the employer directly. 8.8% got their job through a head hunter, 4.7% got their job through their campus, and 3.0% through an employment agency. 3.7% listed another method.

Some additional employment characteristics found in our table are that for full-time vs. part-time, the vast majority of those in our sample, 92.4% listed they were working full-time (30 hours or more per week) while only 7.6% were working less. As for permanence of employment, 89.6% said they had a permanent job. Clearly, most graduates were full-time and permanent employees, which would appear to bode well for the educational system, although it should be noted that unemployed graduates were excluded from the sample.

The FOG 2000 lists many industries (see Appendix C). "Educational Services" makes up the largest proportion with 26.9% of graduates working in this industry, followed by "Health Care and Social Assistance" (14.2%), "Professional, Scientific and Technical" (12.6%), "Public Administration" (10.2%), "Manufacturing" (8.2%), "Finance and Insurance" (6.8%), and "Agriculture, Forestry, Fishing and Hunting" (5%). No other of the remaining 13 industries had more than 5% of graduates working in it. "Accommodation and Food Services" (0.9%), "Utilities" (0.9%), "Construction" (0.8%), and "Real Estate and Rental Leasing, as well as Management of Companies and Enterprises" (0.4%) all had less than 1% of graduates employed in that sector. It is apparent that most 2000 graduates do not work in primary sector industries.

As for the control variables, briefly, many of these figures represent the relatively young age of the graduates. In terms of age, the mean average age was 33.1 years old at the time of the survey, five years after graduation. In terms of marital status, most were married (58.3% of our population), while 37.3% were single (never married). 19.2% of graduates considered themselves members of visible minorities, and 3% said they were handicapped.

As for province of employment, expectedly, Ontario, as the country's biggest province, made up the largest percentage where graduates were working (42.5%), followed by Quebec, (23.5%), British Columbia (11.8%), Alberta (10.7%), and then Atlantic Canada (6.2%). The other prairies provinces each made up less than 3% of the graduates, with Saskatchewan at 2.5%, and Manitoba, 2.8%.

In terms of studied full-time vs. part-time, it is clear, most graduates in our sample considered themselves to be students first. Indeed, more than three quarters (76%) of the 2000 graduates studied full-time, compared to 11.2% studied part-time, and 12.8% who said they did a mix.

As for the immigration status when entering program, 15.6% were immigrants when starting their program, 1.70% were on a student visa, while the rest are Canadian born. It might be noted that this proportion was probably skewed upwards towards Canadian born, on account of the above average propensity for immigrants to taking continuing education in Canada, even after their degree was finished (Gilmore and Le Petit 2008), and thus they would have been excluded from our sample.

Table 6: Descriptive Statistics

Variable	Percentage
<i>Education Characteristics</i>	
<i>Field of study:</i>	
• Education	0.163
• Arts	0.032
• Humanities	0.077
• Social Sciences & Law	0.187
• Business	0.193
• Physical and Life sciences	0.061
• Mathematics/Computer/Information sciences	0.055
• Engineering	0.097
• Agriculture	0.024
• Health sciences	0.087
• Other	0.023
<i>Level of study:</i>	
• Bachelor	0.779
• Master	0.186
• Doctorate	0.035
<i>Grades:</i>	
• Top 10% of class grades	0.307
• Top 10-25% of class grades	0.366
• Top 25-50% of class grades	0.172
• Below 50% of class grades	0.009
• Grades unknown	0.146
<i>Activity before entering program:</i>	
• Going to school before program	0.532
• Working before program	0.321
• Working & going to school before program,	0.102
• Taking care of family before program	0.023
• Doing other before program	0.022
<i>Demographic Characteristics</i>	
Female	0.590
<i>Family background</i>	
Required a student loan	0.413

Variable	Percentage
<i>Parent's highest level of education:</i>	
• Parents post-grad	0.160
• Parents bachelor	0.210
• Parents postsecondary	0.148
• Parents trade	0.049
• Parents some postsecondary	0.073
• Parents secondary	0.229
• Parents less than secondary	0.126
• Parents Other	0.011
<i>Employment Characteristics</i>	
<i>Method used to obtain employment:</i>	
• Referred	0.243
• Answered job ad	0.269
• Contacted employer directly	0.248
• Campus placement agency	0.047
• Employment agency	0.030
• Head hunter	0.088
• Other method	0.037
• Not stated	0.038
Full-time job	0.924
Permanent job	0.896
<i>Industry:</i>	
• Educational Services	0.269
• Health Care and Social Assistance	0.142
• Professional, Scientific and Technical	0.126
• Public Administration	0.102
• Manufacturing	0.082
• Finance and Insurance	0.068
• Information and Cultural Industries	0.042
• Retail Trade	0.030
• Other Services except public Administration	0.025
• Administrative and Support, Waste Management and Remediation Services	0.018
• Wholesale Trade	0.017
• Arts, Entertainment and Recreation	0.016
• (Mining and Oil and Gas Extraction)	0.014
• Transportation and Warehousing	0.013

Variable	Percentage
• Accommodation and Food Services	0.009
• Utilities	0.009
• Construction	0.008
• Agriculture, Forestry, Fishing and Hunting	0.005
• Real Estate and Rental Leasing, as well as Management of Companies and Enterprises	0.004
<i>Control Variables</i>	
<i>Province of employment:</i>	
• Atlantic Canada	0.062
• Quebec	0.235
• Ontario	0.425
• Manitoba	0.028
• Saskatchewan	0.025
• Alberta	0.107
• British Columbia	0.118
<i>Studied full- time vs. part-time:</i>	
• Studied full-time	0.760
• Studied part-time	0.112
• Studied a mix of full-time and part-time	0.128
<i>Marital status:</i>	
• Married	0.583
• Separated/Divorced/Widowed	0.039
• Single (never married)	0.373
• Handicapped	0.030
Member of a visible minority	0.192
Age at interview	33.054 (Std.Dev.=7.4)
<i>Immigration status when entering the program:</i>	
• Immigrant	0.156
• Student visa	0.017
# observations	9940

Note: Data are weighted. Sample includes graduates, who had obtained a Bachelor's, Master's, or Doctorate degree in 2000, who were 25 to 60 years old at the time of the interview (i.e. in 2005), and who hadn't taken additional programs since graduation

5.2. BIVARIATE ANALYSIS

We will now use our bivariate analysis, with match being closely, somewhat, or not related by each independent variable, and briefly compare these results to our hypotheses, before using our logistic regression model. For each category of the independent variables, we use the equality of proportions test (Chi-square test) to see whether the proportion of “closely related” is different compared to the rest of categories. This test ensures that observed and expected frequencies are not too far apart, and that the differences of percentages between the percentage of two variables are significant (WMU Statistics, 2003). In Table 7, we indicate if the difference is significant at the 1% level (highly significant), 5% level, 10% level, or not significant. All results described in this section are highly significant unless noted otherwise.

Overall, regarding our dependant variable, 64.9% of graduates said their job closely matched their education, 22.5% said it was somewhat related, and 12.6% said it was not related at all.

H1a) *Graduates of occupationally specific fields of study such as “Health sciences”, “Engineering”, and “Education” will have a greater probability of obtaining an education-job match than students in more general fields such as “Fine-Arts” and “Humanities*

As we can see in Table 7 as for education characteristics are, in field of study, the field of study with the highest rate of match was “Education”, at 88.63% having a job closely related to their education, while only 2.78% said their job was not at all related to their education. Next was “Health sciences” at closely related match rate of 86.92%, followed by “Engineering” (66.42%), “Mathematics/Computer/Information sciences” (65.90% - significant at the 10% level), “Business” (62.34%), “Agriculture” (58.54%), “Physical and life sciences” (57.28%), “Social Sciences & Law” (51.94%), “Humanities” (47.28%), then “Other” (46.46%). The field with the lowest percentage of match is “Arts”, with a

closely related match prevalence of 44.04%, and with fully 29.48% feeling their job was not at all related to their degree.

Our bivariate analysis supports our hypothesis, as all fields produced significant results, and the more occupation specific fields did indeed produce the higher matches.

H1b) Graduates with higher levels of degrees are more likely to obtain an education-job match than those with lower level degrees

As for level of study, Bachelor graduates had a closely related education-job match rate of 62.69%, compared to 14.34% who felt their job was not at all related to their education. Next was a Master's degree, at 70.58% closely related vs. 7.22% not at all related, and finally, a Doctorate degree had a closely related education-job match rate of 83.91% vs. only 3.08% who felt their job was not at all related to their education.

These results clearly support our hypothesis, as each ascending level of education had a progressively better match, and the differences across levels are all highly significant.

H1c) Graduates with good grades will have a greater probability of education-job match than those with poorer grades

In terms of grades, graduates in the top 10% of their class had a closely related education-job prevalence of 72.05%, while only 9.65% felt their job was not at all related to their education. Those who said they were in the top 10 to 25% of their class had a closely related match rate of 66.56%, while the then top 25 to 50% had a closely related match rate of 55.98%. Finally, those who finished in the bottom 50% of their class grades had a closely related match rate of 31.45% only, compared to 20.64% who said they felt their job was not at all related to their education.

These results support the hypothesis, with each ascending category of grades having a better match, and proportion differences being highly significant.

H1d) Graduates with work experience before entering their postsecondary institution will have a greater probability of obtaining an education-job match

By activity before graduation, those who went to school beforehand had a closely related match rate of 63.3%, compared to 13.52% who felt their job was not at all related to their education. Those who worked beforehand had a higher rate of match, with a closely related match rate of 66.28%, compared to 11.10% who said their job was not at all related to their education. Those who did a combination of both working and going to school before entering their last program had a closely related match prevalence of 61.70%, compared to 16.25% who felt their job was not at all related to their education. These categories comprise the large majority of our sample. As for those who were not going to school or working before entering their program, those who were taking care of their family had a closely related match rate of 83.87%, the highest of all categories of activities before entering ones' program. Only 3.47% felt their job was not at all related to their education. The final category for activity before entering program, doing other before entering their program also had a high match percentage, at 72.85% saying their job was closely related to their education. 7.71% felt their job and education were not at all related.

These results partially support our hypothesis. If we exclude those who were either taking care of their family and not working or going to school (representing a total of only 4.5% of our population), those who worked beforehand had, as expected, a slightly better education-job match compared to those who went to school or were studying and working at the same time. Unexpectedly, those who both worked and went to school before entering their program had the lowest match, while those who did neither had the highest match.

H2a) The sex of the graduate will affect the education-job match

By gender, the closely related match rate for females was 65.87%, while 13.55% felt their job was not at all related to their education. Males had a closely related match rate of 63.50%, compared to 11.29% who felt their job was not at all related to their education, making females more likely than males to get a closely related job. Though the difference in the proportion of closely related match between the two genders is small, it is highly significant, and therefore these results support our hypothesis.

H2b) Graduates with more highly educated parents will have a greater probability of obtaining an education-job match than graduates with less highly educated parents

By family background, as for the highest level of education achieved by parents, those who had parents who did not complete high school had a closely related match prevalence of 69.87%, vs. 10.87% who felt their job was not at all related. Those with parents who had completed a high school education had a closely related match of 59.18%, vs. 14.78% who said their job was not at all related to their degree. At some postsecondary education, the match prevalence was 62.42%, at a trade degree the match was 60.08%, and a postsecondary degree had a match of 66.73%. As far those graduates whose parents had completed university, those with a parent whose highest level of education was a bachelor degree had a match percentage of 67.34%, compared to 12.54% who felt their job was not at all related to their education. Those who had completed a post graduate degree had a closely related match percentage of 65.16%, compared to 9.59% who felt their job was not at all related to their education, but this result is not significant.

These results do not seem to support our hypothesis, with different categories of level having more or less match than the next one. Those with parents which possessed the highest level of education in our study, a post-graduate degree, did not produce significant results. The category with the highest match percentage (excluding “other”) is “Less than secondary”, clearly contrary to our expectations, while after this came those with a Bachelor degree. Yet, those with parents who had completed high school as their

highest level of education had the lowest match percentage. These results are difficult to interpret, as progressive levels of education did not affect match in a monotonic fashion.

H2c) Graduates who required a student loan for their education will have a greater probability of obtaining an education-job match

As for the other indicator of family background, the requirement of a loan did not produce significant results. Those who did require a loan had a closely related match percentage of 64.96%, compared to 13.61% who felt their job was not at all related to their education, while those who did not require a loan had a nearly identical closely related match percentage at 64.81%, while 11.93% said their job was not at all related to their education. These results don't support our hypothesis, as education-job match seems to have no connection with the requirement of a student loan.

H3a) Graduates who obtained their jobs through a connection will have less education-job match than those who found their job some other way

In the employment characteristics category, by method used to obtain employment, all results were highly significant. Those who were referred had a closely related match prevalence of 58.73%, the second lowest of all the methods. 17.45% in this category reported that their job was not at all related to their education. In our bivariate analysis, finding work through an employment agency produced slightly worse results, with 56.15% saying their job was closely related to their education, compared to 21.53% who said their job was not at all related to their education.

The method which produced the highest prevalence of a closely related education-job match was obtaining by those who found a job through the campus placement agency, with a match rate 76.75%, with only 3.29% saying their job was not at all related to their education. This was followed by those who contacted the employer directly with a closely related match percentage of 70.74%, followed closely by those who used the services of a head hunter (69.57%) and then those who used an "other" method (69.51%).

This was followed by those who answered a job ad, at 62.73%. The method with the least incidence of closely related match was obtained by those who used the services of an employment agency at 56.15%.

These results don't quite support our hypothesis, as those who got their job through a referral had a low match percentage in comparison to the other methods, but the lowest match percentage was obtained by those who used an employment agency.

H3b) Obtaining an education-job match is positively associated with having full-time work status

Those who worked full-time had a match prevalence of 65.39%, with only 11.87% saying their job was not at all related to their education. Those who worked part-time had a closely related match percentage 56.23%, compared to 22.86% who said they felt their job was not at all related to their education. These results clearly support our hypothesis.

H3c) Obtaining an education-job match is positively associated with having a permanent job

Those who had a permanent job had a closely related match percentage of 64.92%, compared to 65.27% for those who did not have a permanent job, but the difference between the two percentages is not statistically significant. Consequently, our hypothesis is not supported by our results, as the permanence of employment did not seem to matter in terms of its association of having a closely related education-job match.

H3d) Graduates who work in upper tier services such as Business, Education, and Health services will have a greater probability of match than those who work in lower tier services such as Trade, Accommodation, and Food/beverage services

The industry with the highest percentage of match percentage was "Educational Services", at 85.7% with a closely related job, compared to only 3.35% who felt their job

was not at all related to their education. By closely related match percentage, next was “Health Care and Social Assistance” (75.28%), then “Professional, Scientific and Technical” (69.86%). The remaining industries display closely related match percentages below the average: “Manufacturing” (61.28%), “Mining and Oil and Gas Extraction” (59.42%), “Utilities” (57.84%), “Public Administration” (54.34%), “Other Services except public Administration” (52.95%), “Agriculture, Forestry, Fishing and Hunting” (52.93%), “Information and Cultural Industries” (51.41%), “Arts, Entertainment and Recreation” (47.63%), “Transportation and Warehousing” (43.32%), “Finance and Insurance” (38.54%), “Administrative and Support, Waste Management and Remediation Services” (37.51%), “Construction” (37.34%), “Real Estate and Rental Leasing, as well as Management of Companies and Enterprises” (35.26%), and “Retail Trade” (30.72%).

The two industries at the bottom end are “Wholesale Trade” with a closely related match percentage of 29.93%, compared to 25.46% who felt their job was not at all related to their education, and finally, “Accommodation and Food Services”, with a closely related match percentage of 21.93%, compared to 59.06% who felt their job was not at all related to their education.

These results support our hypothesis, as all industries produced significant results, and the upper tier services did indeed produce the stronger matches.

Table 7: Level of Match for Independent Variables (%) and Test of Equality of Proportions for “Closely related” (Chi-square Test)

Variable	Closely related	Somewhat related	Not related
• <i>Overall education-job match</i>	64.9	22.48	12.62
<i>Education Characteristics</i>			
<i>Field of study:</i>			
• Social sciences & Law	51.94***	26.99	21.07
• Education	88.63***	8.59	2.78
• Arts	44.04***	26.48	29.48
• Humanities	47.28***	27.66	25.06
• Business	62.34***	28.98	8.67
• Physical and Life sciences	57.28***	24.64	18.09
• Mathematics/Computer/Information sciences	65.9*	24.07	10.03
• Engineering	66.42***	25.85	7.73
• Agriculture	58.54***	25.25	16.21
• Health sciences	86.92***	10.71	2.37
• Other	46.46***	24.6	28.94
<i>Level of study:</i>			
• Bachelor's degree	62.69***	22.97	14.34
• Master's degree	70.58***	22.2	7.22
• Doctorate degree	83.91***	13.01	3.08
<i>Grades:</i>			
• Top 10% of class grades	72.05***	18.3	9.65
• Top 10-25% of class grades	66.56***	21.47	11.96
• Top 25-50% of class grades	55.98***	27.43	16.59
• Below 50% of class grades	31.45***	47.92	20.64
<i>Major activity before entering program:</i>			
• Going to school before program	63.3***	23.19	13.52
• Working before program	66.28***	22.62	11.1
• Working & going to school before program	61.70***	22.04	16.25
• Taking care of family before program	83.87***	12.66	3.47
• Doing other before program	72.85***	19.44	7.71
<i>Demographic Characteristics</i>			
<i>Sex:</i>			
• Male	63.5***	25.21	11.29

Variable	Closely related	Somewhat related	Not related
• Female	65.87***	20.58	13.55
<i>Family background:</i>			
<i>Requirement of a loan:</i>			
• Required a loan	64.96	21.43	13.61
• Didn't require a loan	64.81	23.25	11.93
<i>Parent's highest level of education:</i>			
• Parents less than secondary	69.87***	19.38	10.75
• Parents secondary	59.18***	26.04	14.78
• Parents some postsecondary	62.42***	26.37	11.2
• Parents Trade	60.08***	23.11	16.81
• Parents postsecondary	66.73***	19.14	14.13
• Parents Bachelor	67.34***	20.13	12.54
• Parents Post-grad	65.16	25.25	9.59
• Parents other	72.45***	16.36	11.2
<i>Employment Characteristics</i>			
<i>Method used to obtain employment:</i>			
• Referred	58.73***	23.82	17.45
• Answered job ad	62.73***	26.00	11.27
• Contacted employer directly	70.74***	18.10	11.17
• Campus placement agency	76.75***	19.97	3.29
• Employment agency	56.15***	22.33	21.53
• Head hunter	69.57***	22.36	8.07
• Other method	69.51***	20.42	10.07
<i>Working full- time vs. part-time:</i>			
• Full-time job	65.39***	22.74	11.87
• Part-time job	56.23***	20.92	22.86
<i>Permanence of employment:</i>			
• Permanent job	64.92	22.99	12.08
• Not permanent job	65.27	18.31	16.42
<i>Industry:</i>			
• Agriculture, Forestry, Fishing and Hunting	52.93***	26.98	20.09
• Mining and Oil and Gas Extraction	59.42***	33.5	7.08
• Utilities	57.84***	25.76	16.4
• Construction	37.34***	27.22	35.44
• Manufacturing	61.28***	25.25	13.47

Variable	Closely related	Somewhat related	Not related
• Wholesale Trade	29.93***	44.61	25.46
• Retail Trade	30.72***	28.16	41.13
• Transportation and Warehousing	43.32***	15.05	41.63
• Information and Cultural Industries	51.41***	33.89	14.7
• Finance and Insurance	38.54***	36.66	24.8
• Professional, Scientific and Technical	69.86***	24.5	5.64
• Administrative and Support, Waste Management and Remediation Services	37.51***	37.27	25.23
• Educational Services	85.7***	10.95	3.35
• Health Care and Social Assistance	75.28***	17.67	7.05
• Arts, Entertainment and Recreation	47.63***	18.12	34.25
• Accommodation and Food Services	21.93***	19.01	59.06
• Other Services except public Administration	52.95***	31.74	15.32
• (Public Administration	54.34***	29.11	16.55
• Real Estate and Rental Leasing, as well as Management of Companies and Enterprises	35.26***	31.38	33.36
<i>Control Variables</i> ³			
<i># observations</i>	9940		

Notes: for each category, the table indicates if the proportion of "Closely related" is statistically different from the proportion of "Closely related" in the rest of categories pooled together: *** at 1%; ** at 5%; * at 10%.

5.3 LOGISTIC REGRESSION ANALYSIS

The results of the Logistic Regression are reported in Table 8. We also report the odds ratios. The results are based on the equation of being closely related to education versus otherwise. The odds ratio represents the number of times the probability of match is greater compared to the reference category⁴, thus any number above one is positive when compared to the base category, and any number below is negative. For our logistic regression analysis, we have estimated and examined the correlation matrix and didn't find any potential collinearity problem⁵.

³ Although not the subject of this paper, for a breakdown of the match percentage of the control variables see Appendix D. We will explore the control variables in more detail in our multivariate analysis.

⁴ See Appendix E for an explanation of our choice of reference category for each variable.

⁵ Because of CIQSS confidentially rules pertaining to minimum sample sizes, it is not possible to publish the matrix at this moment.

All results described in this section are based on odds ratios and are highly significant unless noted otherwise. We will compare our results with our bivariate analysis, and then with our hypothesis.

H1a) *Graduates of occupationally specific fields of study such as “Health sciences”, “Engineering”, and “Education” will have a greater probability of obtaining an education-job match than students in more general fields such as “Fine-Arts” and “Humanities*

Field of study definitely influenced the match, as most fields affected match strongly and were highly significant. Not surprisingly, as documented in numerous studies, graduates in field specific programs had the best chance of finding employment related to their studies. Compared to the base category of “Social sciences & Law”, the highest education-job match was clearly “Health sciences” with an odds ratio 5.267, followed by “Education (2.018)”, then “Mathematics/Computer/Information sciences” (1.951). Perhaps surprisingly, “Business” (1.835) was next ahead of “Engineering” (1.716), though “Business” is a broad program encompassing some field specific programs such as accounting, and some perhaps less so, like marketing. “Agriculture” was positive when compared to “Social sciences & Law”, but not significant, while “Physical and Life sciences” and “Other” were negative but not significant. The fields with the least incidence of match were “Arts” with an odds ratio of 0.588 (significant at 10%), and “Humanities”, at 0.584.

Like our bivariate results, our logistic regression results indicate a confirmation of hypothesis H1a), as the more specific fields had the greater match, while the more general fields had less of a match.

H1b) *Graduates with higher levels of degrees are more likely to obtain an education-job match than those with lower level degrees*

Indeed, compared to the base category of a Bachelor's degree, the higher the degree, the better the match, with a Masters degree obtaining an odds ratio of 1.325, and a Doctorate degree (odds ratio = 2.539) having the strongest probability of a match of all degree levels. These results are consistent with our bivariate results, and support our hypothesis.

H1c) *Graduates with good grades will have a greater probability of education-job match than those with poorer grades*

Compared to the base category of those who considered themselves to be in the top 10% of the class, each lower grade category had progressively less an education-job match, though not all categories were significant. Compared to the top 10% of class grades, the category top 10-25% has a negative but not significant estimated coefficient. Those who were considered to be in the top 25 to 50% of their class had a likelihood of match 0.580 times that of the top 10%. Finally, the bottom 50% had a likelihood of match 0.265 times that of the top 10%.

These results are fairly consistent with our bivariate results, and support our hypothesis; good grades tend to increase the likelihood for graduates to obtain employment that is closely related to their studies.

H1d) *Graduates with work experience before entering their postsecondary institution will have a greater probability of obtaining an education-job match*

We decided to group together the categories of those who were taking care of their family, and those whose who were doing other before program as these comprised a very small portion of our sample (at less than 5 percent) and use it as our reference category. Compared to this category, all results were negative and highly significant. Those who worked before entering their program had the least poor incidence of mismatch compared to the base category with an odds ratio of 0.564. This was followed by those whose major activity was going to school (0.544). For reasons that cannot be explained at the moment, those who both went to school and worked before entering their program had the highest

incidence of mismatch, at 0.434 the odds. Yet, we find that the coefficients on the three categories “Going to school before program”, “Working before program” and “Working & going to school before program” are not statistically different. These three categories cover 96% of graduates.

Overall, these results do not support our hypothesis. Those who worked beforehand had a slightly better match than those who just went to school, but the difference is not significant.

H2a) *The sex of the graduate will affect the education-job match*

In our study, females were very slightly negative when compared to males, and this was not statistically significant, in contrast to our bivariate results, where females had a slightly greater match, and the difference was statistically significant. Overall, it would appear here that gender is not a determinant of education-job match, and that our hypothesis is not supported by our results.

H2b) *Graduates with more highly educated parents will have a greater probability of obtaining an education-job match than graduates with less highly educated parents*

Level of education achieved by the parents of the graduates does not seem to matter for the most part. As noted, there was conflicting reasoning behind this hypothesis. Compared to the base category of graduates whose parents' highest level of education was less than a secondary degree, there was only a single category of the eight categories of parental education that has a significant coefficient. Interestingly, when the highest level of education completed by the graduates' parent was a trade's degree, this noticeably reduced the education-job match with an odds ratio of 0.598 (significant at the 5% level). Having a post-graduate degree, some postsecondary education, and a secondary education produced slightly negative coefficients, while having unidentified postsecondary education, and a bachelor degree produced slightly positive coefficients, but none of these results is significant.

In our bivariate results, the results of this category were significant, but different levels seemed to have different effects on the match. In our logistic regression, only a single variable produced significant results. Overall, it would appear our results do not support this hypothesis.

H2c) *Graduates who required a student loan for their education will have a greater probability of obtaining an education-job match*

The requirement of a student loan does not affect education-job match by much. Those who required a loan had a slightly negative coefficient, but the latter is not significant. Again, there were conflicting reasoning as to how a loan would affect match, and therefore this finding is not particularly surprising. Like our bivariate analysis, this hypothesis is not supported by our data.

H3a) *Graduates who obtained their jobs through a connection will have less education-job match than those who found their job some other way*

Next to the base category of graduates who had found through a referral, only those who found their job through their campus produced significant results, at 1.775 the odds ratio (significant at the 10% level). All other methods produced positive but insignificant coefficients, except finding employment through an employment agency, which produced a negative but insignificant coefficient.

It would appear our regression results are quite different from those of our bivariate analysis, which produced highly significant results, and do not support our hypothesis. The method used to obtain employment for the most part did not produce significant results, and thus for the most part does not seem to matter for education-job match.

H3b) *Obtaining an education-job match is positively associated with having full-time work status*

Compared to the base category of working part-time, having a full-time job does indeed strongly increase the likelihood of education-job match, with an odds ratio of 2.227. Like our bivariate results, our regression results clearly support our hypothesis.

H3c) *Obtaining an education-job match is positively associated with having a permanent job*

Compared to the base category of a having a non-permanent job, having a permanent job only very slightly increased match, but the difference is not statistically significant. Similar to our bivariate analysis, our multiple regression results do not support our hypothesis.

H3d) *Graduates who work in upper tier services such as Business services, Education, and Health services will have a greater probability of match than those who work in lower tier services such as Trade, Accommodation, and Food/beverage services*

Industry turned out to be the single most significant determinants of all the variables, as all the categories of industries have large and statistically significant coefficients. What is immediately evident, is how negative each of the other industries were compared to the base category of Educational Services. The industry with the least incidence of education-job mismatch in comparison was “Professional, Scientific and Technical” with an odds ratio of 0.359, followed by “Health Care and Social Assistance” (0.347), “Other Services except public Administration” (0.245) and then “Information and Cultural Industries” (0.199). At the bottom end was “Construction” (0.078), “Retail Trade” (0.068), “Accommodation and Food Services” (0.061), and lastly, “Wholesale Trade” (0.057). All in all, similar to our bivariate results, these results give support to the hypothesis, with the strongest match being in the upper tier sectors, and the worst match being in the lower tier ones.

5.3.1 CONTROL VARIABLES

Briefly, we will examine the results of some of the control variables. By province, next to the base category of working in the province of Ontario, the only province with a significant result was Quebec, which displays an odds ratio of 1.631. Saskatchewan, Atlantic Canada, and British Columbia, are all slightly positive, while Alberta and Manitoba are slightly negative.

As for age, the coefficient for this variable produced a slightly negative but insignificant coefficient. Increased age reduced the likelihood of match, but to a limited extent. The fact that age did not seem to matter, as it might be expected that people would have different motivations for working at different ages.

Marital status did not produce significant results. Compared to the base category of being single (never married), being married and separated/divorced widowed produced positive, not significant, coefficients.

As for studied full-time vs. part-time, it appears that studying full-time significantly increases the probability of education-job match.

Being handicapped decreased match slightly, with an odds ratio 0.617 (significant at the 10% level). As for visible minority status, being a member of a visible minority group has a negative coefficient, but this coefficient is not significant.

Finally, the fact of being an immigrant decreases the probability of education-job match with an odds ratio of 0.718 (significant at the 5% level). Moreover, possessing a student visa produces a negative but non-significant coefficient.

Table 8: Results of Logistic Regression for Obtaining a Job Closely Related to Education

<u>Variable</u>	<u>Coefficient</u>	<u>Standard-error</u>	<u>Odds Ratio</u>	<u>Standard-error</u>
<i>Education Characteristics</i>				
<i>Field of study (Ref. = Social sciences & Law):</i>				
• Education	0.702***	0.222	2.018	0.449
• Arts	-0.530*	0.29	0.588	0.171
• Humanities	-0.538***	0.201	0.584	0.117
• Business	0.607***	0.16	1.835	0.294
• Physical and Life sciences	-0.139	0.194	0.870	0.169
• Mathematics/Computer/Information sciences	0.668***	0.225	1.951	0.439
• Engineering	0.540***	0.175	1.716	0.301
• Agriculture	0.233	0.225	1.263	0.284
• Health sciences	1.661***	0.204	5.267	1.073
• Other	-0.529	0.383	0.589	0.226
<i>Level of study (Ref. = Bachelor's degree):</i>				
• Master's degree	0.282***	0.107	1.325	0.142
• Doctorate degree	0.932***	0.189	2.539	0.479
<i>Grades (Ref. = Top 10% of class):</i>				
• Top 10-25% of class	-0.184	0.115	0.832	0.096
• Top 25-50% of class	-0.545***	0.143	0.580	0.083
• Below 50% of class	-1.327***	0.386	0.265	0.103
<i>Major activity before entering program (Ref. = Not working or going to school before entering program):</i>				
• Going to school before program	-0.608***	0.211	0.544	0.115
• Working before program	-0.573***	0.216	0.564	0.122
• Working & going to school before program	-0.834***	0.264	0.434	0.114
<i>Demographic Characteristics</i>				
• Female	-0.091	0.105	0.913	0.096
<i>Family Background (Ref. = Didn't require a loan):</i>				
• Required a loan	-0.018	0.099	0.982	0.098
<i>Parent's highest level of education (Ref. = Parents less secondary):</i>				

<u>Variable</u>	<u>Coefficient</u>	<u>Standard-error</u>	<u>Odds Ratio</u>	<u>Standard-error</u>
• Parents secondary	-0.197	0.158	0.821	0.130
• Parents some postsecondary	-0.203	0.227	0.817	0.185
• Parents Trade	-0.514**	0.213	0.598	0.127
• Parents postsecondary	0.112	0.195	1.119	0.218
• Parents Bachelor	0.023	0.167	1.023	0.171
• Parents Post-grad	-0.066	0.168	0.936	0.158
<u>Employment Characteristics</u>				
<u>Method used to obtain employment (Ref.= Referred) :</u>				
• Answered job ad	0.035	0.129	1.036	0.133
• Contacted employer directly	0.113	0.128	1.120	0.143
• Campus placement agency	0.574*	0.311	1.775	0.551
• Employment agency	-0.118	0.262	0.889	0.233
• Head hunter	0.234	0.188	1.264	0.238
• Other method	0.324	0.283	1.383	0.391
• Full-time job	0.801***	-0.169	2.227	0.377
• Permanent job	0.146	-0.159	1.158	0.184
<u>Industry (Ref. = Educational Services):</u>				
• Agriculture, Forestry, Fishing and Hunting	-1.718***	-0.4	0.179	0.072
• Mining and Oil and Gas Extraction	-1.709***	-0.517	0.181	0.094
• Utilities	-1.670***	-0.382	0.188	0.072
• Construction	-2.545***	-0.372	0.078	0.029
• Manufacturing	-1.663***	-0.229	0.190	0.043
• Wholesale Trade	-2.861***	-0.318	0.057	0.018
• Retail Trade	-2.683***	-0.246	0.068	0.017
• Transportation and Warehousing	-2.275***	-0.332	0.103	0.034
• Information and Cultural Industries	-1.616***	-0.283	0.199	0.056
• Finance and Insurance	-2.479***	-0.251	0.084	0.021
• Professional, Scientific and Technical	-1.024***	-0.216	0.359	0.078
• Administrative and Support, Waste Management and Remediation Services	-2.045***	-0.426	0.129	0.055
• Health Care and Social Assistance	-1.060***	-0.214	0.347	0.074
• Arts, Entertainment and Recreation	-1.686***	-0.425	0.185	0.079
• Accommodation and Food Services	-2.792***	-0.496	0.061	0.030
• Other Services except public Administration	-1.407***	-0.348	0.245	0.085
• Public Administration	-1.758***	-0.2	0.172	0.035

<u>Variable</u>	<u>Coefficient</u>	<u>Standard-error</u>	<u>Odds Ratio</u>	<u>Standard-error</u>
• Real Estate and Rental Leasing, as well as Management of Companies and Enterprises	-2.060***	-0.715	0.127	0.091
<u>Control Variables</u>				
<u>Province of employment (Ref. = Ontario):</u>				
• Atlantic Canada	0.116	-0.135	1.123	0.151
• Quebec	0.489***	-0.126	1.631	0.205
• Manitoba	-0.018	-0.163	0.982	0.160
• Saskatchewan	0.118	-0.171	1.125	0.192
• Alberta	-0.07	-0.147	0.932	0.137
• British Columbia	0.051	-0.156	1.052	0.165
<u>Studied full-time vs. part-time (Ref. = Studied full-time):</u>				
• Studied part-time	-0.307*	-0.173	0.736	0.127
• Studied a mix of full-time and part-time	-0.351**	-0.14	0.704	0.098
<u>Marital status (Ref. = Single):</u>				
• Married	0.162	-0.102	1.176	0.120
• Separated/Divorced/Widowed	0.347	-0.243	1.415	0.344
• Handicapped	-0.483*	-0.292	0.617	0.180
• Member of a visible minority	-0.219	-0.154	0.803	0.123
• Age at interview	-0.014	-0.009	0.986	0.009
<u>Immigration status when entering program (Ref. = Canadian Born):</u>				
• Immigrant	-0.332**	-0.167	0.718	0.120
• Student visa	-0.342	-0.298	0.710	0.212

Observations: 9335. * significant at 10%; ** significant at 5%; *** significant at 1%

CHAPTER 6: DISCUSSION

In this section, we will discuss our three main hypotheses and see whether they are supported or rejected by our results. We will also compare our general results with that of similar studies. We will then discuss our contribution to the literature, as well as some of the implications of our findings. Finally, we will discuss the limitations of our study, and conclude by making suggestions for future studies.

We will start by going over our general hypotheses, and comparing them to previous studies. In our results section, we assess our hypotheses in two ways, by bivariate analysis and by logistic regression. In this section, we will focus on our multivariate analysis to help compare general hypotheses. As noted, in general these results are quite similar.

6.1. SUMMARY OF HYPOTHESES

As for the first hypothesis, **H1: *Education characteristics have an impact on education-job match***, these do indeed significantly affect the education-job match among university graduates. Almost all the categories in the field of study variable proved noticeable and significant. This is not surprising as these fields provide specific skills for specific occupations in the labour market, while the more general programs are not geared for specific careers, and thus would presumably have less of a match. All of the articles make the distinction between these types of skills, and some (Robst 2007a; Garcia-Espejo and Ibanez 2006; and Wolbers 2003) specifically note the importance of having education-job match in these types of programs, where the labour market penalties for mismatch is more severe.

In addition, both the level of study and grades influence the education-job match as well. Again, these results are consistent with the findings of studies on education-job match that we have looked at.

By field of study, as noted, Wolbers (2003); Grayson (2004); Garcia-Espejo and Ibanez (2006); Robst (2007a); Krahn and Bowlby (1999); Storen and Arneson (2006); Heijke, Meng and Ris (2003) show the more field specific programs obtain a higher match, while Wolbers (2003); Robst (2007a); Krahn and Bowlby (1999) all clearly showing the higher the level of education, the better the match. Grayson (2004), Garcia-Espejo and Ibanez (2006), and Storen and Arneson (2006), all show the better grades obtained during education increases the match.

These results would appear to give some tentative support to the Human Capital theory, at least according to the logic used by Grayson (2004), who in his articles views knowledge and skills developed in school as pure human capital in the pursuance of career outcomes, one of which being the education-job match. The fact that the large majority of university graduates, 64.90% said they felt their job was closely related to their education seems to show that most graduates are indeed using what they learnt in school in their employment. Furthermore, this relation is affected by how and what they studied in school, as well as how they did in school. If the credential was all that mattered, it would seem that such details would matter less than they did.

As for the second hypothesis **H2: Education-job match is associated with demographic characteristics**, these did not appear to matter very much, and thus our hypothesis has not been supported. The sex of the graduate, as well as nearly all of the various characteristics of family background that we looked at, i.e. the highest level of education obtained by parents, as well as the requirement of a loan, produced for the most part produced insignificant coefficients in our logistic regression analysis.

As noted, the evidence behind demographic characteristics increasing or decreasing match is mixed. The sex of the graduate for example, had some studies with females having a higher match (Wolbers 2003; Witte and Kalleberg 1995; Robst 2007a), other studies showing males with the higher match (Krahn and Bowlby 1999), and this making no difference in others (Garcia-Espejo and Ibanez 2006; Storen and Arneson 2006).

As for level of education level achieved by parents as well as the requirement of a loan, as noted, these variables have not been investigated before in any study we have found. This in and of itself is a little surprising, as people come from many walks of life and of many backgrounds, and it would seem almost inevitable that this would affect education-job outcomes.

As for our third hypothesis **H3**: *Education-job match is associated with employment characteristics*, the results were mixed, with some strongly affecting the match, while others being insignificant in our regression analysis. The single determinant with the strongest influence on match in our entire study is the industry the graduate works in. Certain industries, such as “Educational services”, had match rates many times that of other industries, such as “Accommodation and Food Services” and “Wholesale Trade”. Other characteristics of the job itself, such as working full-time also strongly positively affected the match.

By employment characteristics, Wolbers (2003) found that full-time employment is associated with education-job match. As found by Krahn and Bowlby (1999), industry heavily affected match. This makes sense as some industries like teaching or professional services would seem far more likely to require specific education credentials to be allowed in it, whereas industries like trades and accommodation would seem far less inclined to require such education.

The variables in employment characteristics which did not seem to matter were how the job was obtained, as well as the permanence of employment. These were perhaps surprising as the studies which included these characteristics clearly demonstrate that they affect the match. For example, for the method used to obtain employment, although in our bivariate analysis those who were referred had a low match (behind only those who used an employment agency), our regression analysis gave mostly insignificant results for the most part. This is in clear contrast to the Grayson (2004) study.

The fact that using a head hunter has no significant impact on match in our logistic regression analysis is a bit surprising, as these are people who are paid to find specific careers for people with specific credentials. It is also interesting that those who found their job through a campus placement agency is the only category that produced statistically significant and positive results. Perhaps this is because campus placement agencies would have connections to certain industries, and be specifically geared to set up graduates from its universities with jobs in their fields.

All in all, our results are mostly line with previous studies. Clearly, some variables are strongly associated with an education-job match, while other variables don't seem to matter very much. Interesting, for several of the categories which indicated a mix of activities (i.e. those who did a mix of working and studying for major activity before graduation, those who studied a mix of both full-time and part-time for studied full-time or part-time...), this lead to a noticeable and significant decrease in match. It would appear that being focused on one's activity is associated with a higher match.

It would also appear that the variables associated with the choices made by graduates (i.e. the field and level of study, grades, studying full-time vs. part-time, the types of employment chosen afterwards, etc.) matter far more than the variables than variables that are not pre-determined (demographic characteristics, being handicapped, etc.). Perhaps these results are therefore also as a positive observation. It would seem to bode well that any graduate in Canada, regardless of their sex, parental background or social status can obtain employment that matches what they learnt in school.

6.2. CONTRIBUTIONS TO THE LITERATURE AND IMPLICATIONS OF THE STUDY

As noted, our study contributes to the literature for two main reasons. To our knowledge, we have the most up-to-date scientific analysis available for education-job match pertaining to job related to degree of study. Using an in depth econometric techniques on data from a professionally and nationally representative study, we have thoroughly

investigated how numerous variables affect this match five years after graduating from university programs in the year 2000. Our other main contribution is that we investigate the concepts of how family background and activity before entering program affect match, variables which to our knowledge, have not been looked for this purpose before.

This up-to-date information can immediately benefit numerous stakeholders. For example, it might influence the selection of a field of study. If, for example, a perspective student is considering their education enrolment choices, and is equally passionate about the “Arts” and “Education” fields, and hopes to get a job related to what he/she studied in school, it might be beneficial for this graduate to know that “Education” has a considerably higher likelihood of obtaining employment related to their degree. Understanding the determinants of education-job match might also influence students/graduates to pursue higher levels of degrees, work harder to achieve good grades, and to possibly select types of industries to work in.

Although our new variables of family background and major activity before entering program proved insignificant in our regression analysis, this too can be useful information to have. For example, it might affect recruiting policies of employers. If, for example, an engineering company is looking to hire a very specific type of engineering graduate from a specific program to match a specific occupation, and wants the match to be as strong as possible, it might be beneficial to know that a graduate’s previous work experience is not important for the education-job match, but that the grades obtained in school are.

From the perspective of public policy planning and/or education institutions, it might be useful to scrutinize some of the fields of education with a very low incidence of match. For example, if over 10% of students are graduating with either an “Arts” or “Humanities” degree, and relatively few obtain employment that is closely related to what they studied, this might indicate a problem. Perhaps this indicates an oversupply of graduates in these fields, and either universities should take measures to modify programs so that the match is greater, and/or the government can either make or take away

bursaries encouraging students to enrol in more occupation specific programs where the match is more pronounced.

6.3. LIMITATIONS OF THE STUDY AND AREAS OF INTEREST FOR FUTURE RESEARCH

The fact that our study was based on the 2000 FOG, a reputable study with thousands of respondents using an in-depth questionnaire and many thousands of respondents enables us to be confident that our study has a large degree of internal and external validity. Nevertheless, certain variables were not found in the study, and could potentially have been interesting to have explored to provide us with a more thorough understanding of education-job match, both from a practical and theoretical standpoint.

Some independent variables which were explored in other studies and would have been interesting to investigate, but were not found in the 2000 FOG. For example, it would have been interesting to include how possessing various general skills such as good leadership skills and good ability to think analytically affect match, as these were shown to have interesting repercussions in the Storen and Arnesen (2006) and Heijke, Meng and Ris (2003) studies. In addition, as for employment characteristics, firm size would have been interesting to investigate, as Wolbers (2003) and Witte and Kalleberg (1995) have some interesting, though conflicting results with this variable. Presumably, larger firms have more opportunity to use one's education on the job, but also potentially more opportunity for advancement to a position not requiring one's education.

It also would have been interesting to have questions asking graduates about motivation to find employment related to their education, as Heijke Meng Ris (2003) did. Along the same lines, Robst (2007b) asks graduates who were not working in a job related to their education what their motivation for this was. Exploring these questions would give some important insight into how and why education-job mismatch comes about.

As for dependent variables, it would have been particularly interesting to look at education-job match just by field as well as by skill use on the job. As noted, many studies have looked at education-job match by level, so it would have been interesting to isolate this variable.

In addition, some variables which were found in our study were difficult to categorize. For example, the self-rating system of grades used in the NGS/FOG lead to a clear upward bias as far as how graduates perceived themselves. Information on actual grade point average would have been more reliable.

For future areas research, it might be interesting to look at various other education-job match through the lens of various labour market theories. For example, to compare Human Capital theory with Credentialist theory as Walters (2004b) did, it would have been interesting to have been able to have cross tabulated the credential required for school, with whether the skills learnt in school were used on this job. This would have made for a more dynamic framework of comparing Human Capital theory with Credentialism. Unfortunately, neither of these variables were available in the 2000 FOG.

To look at Job matching / Assignment theory, it would be interesting to investigate other career outcomes of graduates such as salary level, turnover rate, and satisfaction with employment, and how much affected these outcomes. According to Job Matching / Assignment theory, if graduates have a good match, it should increase salary and decrease turnover.

It also would have been interesting to explore how match changes over time, to see how variables were associated with match in the short term and the long term. This would have allowed us to gauge whether match decreases over time, as technological theory states.

Finally, in future areas of research, it might be interesting to explore some of our independent variables more thoroughly. In particular, it might be interesting to put

Immigration status as a moderating variable in order to see how it affects match, as Canada receives a tremendous number of immigrants each year, and the labour market outcomes of immigrants is an important policy area in Canada (Picot, 2008).

CHAPTER 7: CONCLUSION

Canada has put a tremendous investment into its postsecondary education system. If one of the main functions of education is to provide skills that will be used in subsequent employment, then it would be considered an inefficient use of resources for both individuals and society as a whole for graduates not to use their education in their jobs. This notion has spawned a great deal of research comparing education and its relation to subsequent employment. In most studies, the concept of education-job match is looked at in terms of years of schooling required to get the job and years of schooling obtained, however the level of education is not the only choice students make when taking education. We chose to look at this education-job match through work and its relation the degree obtained, which encompasses both the level and field of study obtained in a graduate's education.

Our research question is: "*What are the determinants for obtaining employment that is related to one's university degree?*" To answer this question, we use bivariate and multiple regression techniques to look at many variables found in data from the 2000 FOG, a vast and comprehensive study collected by Statistics Canada on labour market outcomes of graduates from the year 2000, five years later concerning their career outcomes.

We use several education-job match studies to help us formulate three broad categories of hypotheses; that education-job match would be influenced by 1) Education characteristics 2) Demographic characteristics, and 3) Employment characteristics. We further divide these categories into numerous sub-groups, and our multivariate analysis contains a set of variables to control for many factors that might affect the education-job match.

Our results are similar to those of other studies pertaining to education-job match by degree of study. A large percentage of graduates (64.90%) found their education to be "closely related" with their job. By and large, education characteristics affect match,

employment characteristics affect match to a fair extent, while demographic characteristics are far less important.

For our education characteristics, in particular, the field and level of school, as well as grades obtained, highly increase match, in accordance with previous studies. We also attempt to look at the activity before entering program to see if a better understanding of the labour market would increase match, though our results here are inconclusive. The activity before entering one's program affects match, but in ways in which we did not foresee; working before entering one's program produced a better match when compared to those who just studied, but those who did both had the weakest connection to match, while those who neither studied nor worked had the highest match. The latter result should be considered with caution, since less than 5% of graduates were neither studying nor working before starting their university program.

For our employment characteristics, in accordance with previous studies, working full-time (vs. working part-time), and the industry of employment in particular, strongly affect the education-job match. Conversely, the permanence of employment has little effect on match in our study, as did method used to obtain employment, in contrast to what our review of the literature had lead us to expect.

In our multivariate analysis, our demographic characteristics did not produce significant results for the most part. In our bivariate analysis, females experience a slightly higher match percentage, but the difference is not significant in the logistic regression. The level of education achieved by parents produced inconclusive results in our bivariate analysis, with progressively higher levels of education achieved by the parent affecting the match in a non-linear way. These results are, for the most part, insignificant in our logistic regression. Also, the requirement of a loan did not produce significant results in either analysis. By and large, we felt it positive that demographic characteristics did not affect match, as it shows that employment outcomes, at least in the form of match, is not particularly influenced by discriminatory factors.

Our study contributes to the research in this area for several reasons. As noted, our dependent variable of match includes field of study, which is a neglected area of research. Furthermore, no other study we have found looks at education match using the FOG 2000. We also use several variables which have not been looked at before to our knowledge; the requirement of a loan and the highest level of education obtained by parents, both of which allow us to explore how demographic characteristics affect match. We also use the variable “activity before entering one’s program” which allows us to explore how knowledge of the labour market affects match.

Due to the comprehensive nature of our data source, Statistics Canada collected information on many thousands of university graduates throughout Canada, our study has strong internal and external validity, and our results can assumed to be fairly transferable to graduates across Canada. We felt in future studies, for a more dynamic comparison of labour market theories, it would have been interesting to study the requirement of a degree to work on the job, to skills learnt from education used on the job, as Walters (2004b) did in his study. It also would be interesting to question graduates about their understanding of the labour market to investigate how this affects choices. Other future areas of interest to study include looking at such as labour market consequences of match, and how match changes over time. These latter two variables are found in the FOG 2000, and would allow us to have a more practical understanding of educational mismatch, as well as explore our two other labour market theories of job matching / assignment, and technological change, providing for a better theoretical understanding.

Although not the key part of our study, we have mentioned that labour market results of education-job match, as mentioned, results are mixed. Witte and Kalleberg (1995) note that a close fit between training and employment is not necessarily a good thing; In many cases, maintaining a very close fit between training and employment would represent a career constraint, as higher positions might require new skills sets, not taught in postsecondary education.

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APPENDIX A

1. HUMAN CAPITAL THEORY

The economist Gary Becker popularized this theory with his 1964 book entitled “Human Capital”. According to Becker, economists in the 20th century began to realize that the presence of natural wealth (i.e. abundance of natural resources) does not alone explain the income growth in most countries in today’s world. A noted example is that of Japan, with its emphasis on development of its skilled human capital has helped contribute to its status as a world economic leader even though it has few natural resources.

In Human Capital theory, a distinction is made between general and specific types of training. Becker notes that general training is useful in many firms besides those providing it; for example, a machinist trained in the army finds his skills of value in steel and aircraft firms. Firms who train their workers with general skills will see the worker’s productivity increase, but the worker can take these skills and use them elsewhere. Whereas specific training increases productivity more in firms providing it, and gives as example, the military, which offers some forms of training that is only of minor use to civilians, i.e., astronauts, fighter pilots, and missile men. The skills gained in this type of training are not particularly transferable to other domains.

Human Capital theory paints a positive picture of higher education, saying it provides the skills needed to perform complex jobs, making people more productive, thus sustaining economic growth. Human capital theory asserts that within a society, individuals compete on an open and competitive labour market. People with the most human capital, the highest level of education, training, experience, are the most productive, and thus secure the best jobs and the highest salaries.

Human Capital theorists might view educational mismatch as a part of an efficient labour market. There are numerous aspects to human capital besides education, such as

experience, training, tenure... An educational mismatch might be a temporary phenomenon to temporarily replace one form of human capital to gain another, and upon acquiring the lacking human capital, job changes (ideally in the form of a promotion) will follow, to more adequately match all forms of human capital (Chiswick and Miller 2007). It might follow logically, that education mismatch in any form is a way to gain additional human capital in other forms, and might be beneficial in the long run.

2. CREDENTIALIST THEORY

Credentialism is another labour market theory explaining labour market transition of graduates. It questions whether postsecondary education provides necessary skills used in employment. In the credentialist viewpoint, skills are by and large acquired on the job, and employers see education as a predictor of the future productivity and trainability of employees.

Randal Collins (1979) was one of the first influential writers against Human Capital theory. In his book, "The Credentialist Society", he rejects the notion commonly cited by Human Capital theorists that the industrial society requires more skills. He feels that the growth of educational institutions was the response to people living in an industrial society where machines do most of the work, but is not actually benefiting society. He questions the notion that education makes people more productive. He feels education is more to socialize people in appropriate cultures, business or otherwise. Collins feels employers use credentials obtained by graduates as a sort of currency, hiring only those who have their degree papers, but these papers have very little actual worth.

Since credentialists assert that education does not produce skills necessary to obtain work, education mismatch by level or field of employment is problematic but might be expected in the Credentialist theory. If a graduate spends an extra few years earning a particular degree, it might demonstrate to the employer that the graduate's intelligence and their abilities to be disciplined and to learn have presumably already been demonstrated in school. The employer might therefore hire this graduate ahead of

someone without this degree, or with a lower degree, even if it is not necessary to perform the job itself. However, as the credentialist critique goes, the three years and many tens of thousands of dollars this investment takes is not worth its subsequent screening advantage to employers.

3. JOB MATCHING / ASSIGNMENT THEORY

There are also numerous theories of education-job matching that we will generally call Job-matching / Assignment theories. The basic idea behind these theories is that in the modern economy, the labour market is composed of jobs of many different skill and experience levels, as well as workers of many different skill and experience levels. The most skilled workers (i.e. the most educated) should occupy the most skilled positions, and there is a mismatch if either the supply of educated workers or skilled positions surpasses the other (Sorenson and Kalleberg 1981; Jovanovic 1979).

In Job Matching theories, if the best person finds the best job, i.e. are matched correctly, it is beneficial for all parties involved. Workers prefer such a match because they have the opportunity to utilize all of their skills, increasing their feelings of usefulness, and have more “control over their job” (Sorenson and Kalleberg 1981) which allows them to command higher salaries. Employers prefer such a match because individuals who are optimally utilizing their skill sets will maximize productivity for their firm, and will stay longer at the firm (Jovanovic 1979). Non-matched workers will therefore seek out a better match.

Our dependent variable that we use in our study of job related to education should be relevant to job-matching theorists; a mismatch by degree would not allow one to use the skills and knowledge acquired in education on the job, and that people will suffer a wage effect and be compelled to change jobs until a better match is found.

4. TECHNOLOGICAL CHANGE THEORY

Another theory of education job is Technological Change theory. Chiswick and Miller (2007) cite Kiker et al.'s (2000) article, and note that in the modern and advanced economy, the rate of technology progresses quite rapidly. In the short term, the firm cannot replace their work force to meet the evolving technological advancements that must be met. Those with seniority within the firm are therefore likely to be undereducated. As the hiring requirements adapt, however, the new workers who received an education which is more appropriate to the technology of the days, are more likely to be considered overeducated compared to the older workers.

In terms of how this might be related to mismatch by education, it might be presumed that graduates who were hired at one point because their degree was appropriate for the job requirements, might find that this same degree, because of technological advancements, becomes less relevant than another degree. Under this theory, education mismatch should increase over time.

APPENDIX B

Classification of Instructional Programs (CIP) broad category inclusions as used in the Follow-up of Graduates Survey - Class of 2000 Public Use Microdata File

PRCIPAGP 1 Education

CIP 010 Education

Education (13)

PRCIPAGP 2 Visual and performing arts, and communications technologies

CIP 020 Visual and Performing Arts, and Communications Technologies

Visual and Performing Arts (50)

Museology/Museum Studies (30.14)

Communications Technologies and Support Services (10)

PRCIPAGP 3 Humanities

CIP 030 Humanities

Liberal Arts and Sciences, General Studies, and Humanities (24)

Philosophy and Religion (38)

Theological Studies and Religious Vocations (39)

History (54)

Medieval and Renaissance Studies (30.13)

Holocaust and Related Studies (30.21)

Classical and Ancient/Asian Studies (30.22)

English Language and Literature/Letters (23)

French Language and Literature/Letters (55)

Foreign Languages, Literatures, and Linguistics (16)

PRCIPAGP 4 Social and behavioral sciences, and law

CIP 040 Social and Behavioral Sciences, and Law

Social Sciences (45)

Intercultural/Multicultural and Diversity Studies (30.23)

Peace Studies and Conflict Resolution (30.05)

International/Global Studies (30.20)

Science, Technology, and Society (30.15)

Gerontology (30.11)

Psychology (42)

Behavioral Sciences (30.17)

Cognitive Science (30.25)

Biopsychology (30.10)

Area, Ethnic, Cultural and Gender Studies (05)

Family and Consumer Sciences/Human Sciences (19)

Communication, Journalism, and Related Programs (09)

Law, Legal Services, and Legal Studies (22)

PRCIPAGP 5 Business, management and public administration

CIP 050 Business, Management and Public Administration

Business, Management, Marketing, and Related Support Services (52)

Accounting and Computer Science (30.16)

Public Administration and Services (44) Follow-up of Graduates Survey – Class of 2000 –

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PRCIPAGP 6 Physical and life sciences, and technologies

CIP 060 Physical and Life Sciences, and Technologies

Physical Sciences (40)

Biological and Biomedical Sciences (26)

Biological and Physical Sciences (30.01)

Natural Sciences (30.18)

Nutrition Sciences (30.19)

Neuroscience (30.24)

Science Technologies/Technicians (41)

PRCIPAGP 7 Mathematics, computer and information sciences

CIP 070 Mathematics, Computer and Information Sciences

Mathematics and Statistics (27)

Mathematics and Computer Science (30.08)

Computer and Information Sciences and Support Services (11)

Systems Sciences and Theory (30.06)

Library Science (25)

PRCIPAGP 8 Architecture, engineering and related technologies

CIP 080 Architecture, Engineering and Related Technologies

Architecture and Related Services (04)

Historic Preservation and Conservation (30.12)

Engineering (14)

Engineering Technology (15)

Construction Trades (46)

Mechanic and Repair Technology (47)

Precision Production Trades (48)

PRCIPAGP 9 Health, parks, recreation and fitness

CIP 100 Health, Parks, Recreation and Fitness

Health Professions and Related Clinical Sciences (51)

Dental, Medical, and Veterinary Residency Programs (60)

Parks, Recreation, Leisure and Fitness Studies (31)

PRCIPAGP 10 Agriculture, natural resources and conservation; personal, protective and transportation services; and other

CIP 090 Agriculture, Natural Resources and Conservation

Agriculture, Agricultural Operations, and Related Sciences (01)

Natural Resources and Conservation (03)

CIP 110 Personal, Protective and Transportation Services

Personal and Culinary Services (12)

Protective Services (43)

Military Technologies (29)

Reserve Officer Training Corps Programs (28)

Transportation and Materials Moving Services (49)

CIP120 Other Follow-up of Graduates Survey – Class of 2000 – Appendix A *Centre for Education Statistics 3*

Multi/Interdisciplinary Studies, Other (30.99)

Problem codes (89)

APPENDIX C

Follow-up of Graduates Survey - Class of 2000 - Appendix B

3. Sectors (ABCIND2, LFCIND2, EMNIEND2 - EMN6IND2, FLFIND2)

1	Agriculture, Forestry, Fishing and Hunting	1100-1129, 1131-1142, 1151-1152, 1153
2	Mining and Oil and Gas Extraction	2100-2131
3	Utilities	2211-2213
4	Construction	2311-2329
5	Manufacturing	3111-3169, 3211-3219, 3221-3262, 3271-3279, 3311-3379, 3391-3399
6	Wholesale Trade	4111-4191
7	Retail Trade	4411-4543
8	Transportation and Warehousing	4811-4931
9	Information and Cultural Industries	5111-5142
10	Finance and Insurance	5211-5269
11	Real Estate and Rental and Leasing	5311-5331
12	Professional, Scientific and Technical Services	5411-5419
13	Management of Companies and Enterprises	5511
14	Administrative and Support, Waste Management and Remediation Services	5611-5629
15	Educational Services	6111-6117
16	Health Care and Social Assistance	6211-6244
17	Arts, Entertainment and Recreation	7111-7139
18	Accommodation and Food Services	7211-7224
19	Other Services (except Public Administration)	8111-8141
20	Public Administration	9110-9191

APPENDIX D

Level of match for control variables (%)

<u>Variable</u>	Closely related	Some-what related	Not related
<u>Control Variables</u>			
<u>Province of employment:</u>			
• Ontario	60.22***	24.55	15.23
• Atlantic Canada	66.93***	20.23	12.84
• Quebec	73.73***	16.85	9.42
• Manitoba	63.26	21.4	15.34
• Saskatchewan	71.01***	17.9	11.09
• Alberta	64.56	25.65	9.79
• BC	61.41***	25.21	13.39
<u>Studied full- time vs. part-time:</u>			
• Studied Full-time	66.27***	21.05	12.68
• Studied Part-time	65.96**	24.74	9.3
• Studied a mix of full-time and part-time	55.66***	29.07	15.28
<u>Marital status:</u>			
• Single (never married)	59.07***	24.43	16.51
• Married	68.34***	21.34	10.32
• Separated/Divorced/Widowed	69.41***	20.29	10.31
<u>Handicap:</u>			
• Handicapped	56.9***	30.59	12.51
• Not Handicapped	65.19	22.20	12.61
<u>Member of a visible minority group:</u>			
• Member of a visible minority	54.05***	29.76	16.19
• Not member of a visible minority	67.65***	20.53	11.82
<u>Age:</u>			
• Age 25 to 42	64.65***	22.54	12.81
• Age 43 to 60	66.78***	21.34	11.88
<u>Immigration status when entering the program:</u>			
• Immigrant	54.73***	28.63	16.64
• Student Visa	58.93***	32.29	8.77
• Canadian	66.96***	21.07	11.97

APPENDIX E

Choice of reference category for each variable

Education Characteristics

Field of study: the field of “Social sciences & Law” was chosen as the reference category because as noted, this field is considered to be somewhere in the middle of being a general and occupation specific program, and thus it is interesting to see how the other programs compared to it. Furthermore, as Industrial Relations is found in “Social sciences & Law”, it is interesting to compare this field to the other categories for this reason as well.

Level of study: Bachelor degree was chosen as the reference category because the large majority of students had a Bachelor degree, and it was interesting to see how progressively higher levels of education affect the education-job match.

Grades: the top 10% was chosen as the base category because it was interesting to see how progressively lower grade levels affect the education-job match.

Major activity before entering program: our main interest was to look at how previous school and work experience before entering program compared with working before program. To see this, we decided to look at how these activities would compare with the two other categories in this section.

In addition, on account of their small size of these other categories, we also decided to observe how just the three main categories we were interested in “going to school before program”, “working before program”, and “working & going to school before program” compare with each other as well.

Demographic Characteristics

Sex: we chose male as our reference category, as it was the smaller of the two categories, and we wanted to see how the larger category of female would compare, but as is the case with all of our categories with only two variables, either one would have been suitable as choices.

Family background - Requirement of a loan: we chose as the reference category those who didn't require a loan, as we wanted to see how requiring a loan affects the match.

Family background - Parents highest level of education: we chose the category of Less than a secondary education, to see how progressively higher levels of education would affect the education-job match.

Employment Characteristics

Method used to obtain employment: we chose those who were referred as our reference category, as in our hypothesis for the method used to obtain employment, we wanted to explore how other methods used to obtain employment compare with this category.

Full-time vs. part-time employment: we chose working part-time as the reference category, as we were interested to see what the main category of working full-time would compare to this.

Permanence of employment: similar to the above reasoning, we chose not working in a permanent job as the reference category, as we wanted to see how the main category of having a permanent job compare to this.

Industry: we chose "Educational services" as our reference category as it was the largest category, and thus it was interesting to see how the other categories compare to this one.

Control Variables

Province of employment: we chose Ontario as the reference category as it was the largest of all the categories, and we wanted to see how other provinces compare to this one.

Studied full-time vs. part-time: we chose studied full-time as the reference as it was the largest category, and we wanted to see how the other categories compare to this one.

Marital status: we chose single as the reference category, because although not the largest of the categories, as all people start off as Single, it was interesting to see how those who got married, as well as those who subsequently divorced, compare to this category.

Handicap: we chose not handicapped as our reference category, because we wanted to see how the fact of being handicapped affect the match.

Immigration status when entering the program: we chose Canadian born as the reference category, as it was the largest category, and we wanted to see how those who are immigrants compare to this category.