

OVEREDUCATED GRADUATES IN THE CANADIAN LABOUR MARKET

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Abstract

The study investigates the influence of overeducation on annual earnings among recent Canadian post-secondary graduates. Using data from the National Graduate Survey – class of 2000, 2005, and 2009/2010, I find that overeducation is negatively associated with annual earnings. It is economically important and not sensitive to the choice of controls (gender, educational attainment, working experience, region, and occupational choice). Interestingly, the negative correlation between overeducation and earnings is even larger after the financial crisis in 2008. I also discover that through comparing those who have graduated for 5 years to those for 2 years, the penalty, though still significant, is reduced by half. Furthermore, this paper shows that males have more dominant earnings advantages over females', top education as well as professional experience also boost earnings considerably.

Key words: Overeducation, Earnings, Educational Attainment, Graduate

1. INTRODUCTION

Since World War II, as developed nations enjoy peace and low military spending, many started to endorse capital investment on education. After all, what better prepares a person for the future? Such ideals have created, at times, excessive resource input and gradually the notion that in order to succeed, one has to obtain advanced degrees and designations. No doubt, most students of higher education entered the workplace with high hopes, but it is believed by some that eventually many are fated to face the cruelty caused by the shortage of labour demand. Some, as other means are exhausted, are forced to compete with their less educated counterparts, with advantages few to none. Such trends have become common scenarios nowadays with some troubling consequences (e.g. Rubb 2003). On the personal level, one is discouraged from further learning as the hyped promises of education are unfulfilled. To the society as a whole, the core value of higher education diminishes due to its excess and homogeneity, and imbalance of labour market is resulted thereafter.

The recent literature has emphasized how employers' educational attainment change and increased overeducation have influenced education-job mismatch, resulting in some significant wage differentials (e.g. Korpi and Tahlin 2009). The evidence comes from several characteristics, such as gender, social mobility, and program choice. For example, the economic returns to overeducation is positive for male, while wage-education relationship seems insignificant for female (e.g. Vahey 2000); recent immigrants face an increased incidence of job-education mismatch and they earn less than Canadian-born workers (e.g. Wald and Fang 2008); graduates in some program like education and health are more likely to obtain a matched job (e.g. Boudarbat and Chernoff 2012).

However, this implication may not be the whole picture. Surplus education may have penalized early, but positive rate of economic return can tend toward zero over employee's career (e.g. Korpi and Tahlin 2009). Furthermore, since other human capital weakness commonly believed to be associated with overeducated workers is not transparent to external firms, this phenomenon leads overeducated workers to engage in firm switching behavior optimally in the labour market (e.g. Rubb 2013).

The purpose of this paper is to investigate the importance and impact of overeducation in Canada. Given that the recent global recession had a profound effect on the world economy, this research project is interested in seeing if the Canadian evidence (e.g. Boudarbat and Chernoff 2012; Frenette 2004; Wald and Fang 2008; Zarifa *et al.* 2015) still holds under the current economic scenario. This paper relies on National Graduates Survey (NGS) data for the graduating classes of 2000, 2005 and 2009/2010. In order to examine the correlation between overeducation and annual earnings, I regress the log of real earnings on an overeducation dummy where the controls are added sequentially. The OLS estimation is carried out for each graduate class separately. This is done for two reasons: 1) to replicate some of the earlier findings in the literature, and 2) see if the overeducation findings change over time.

Overall, overeducation is negatively correlated with annual earnings, which means that the excess of education investment fails to deliver justifiable financial returns. Those who hold at least bachelor's degrees tend to earn higher income, but overeducation hinder earnings' increase and decrease the original wage gap between different educational attainments. In addition, exterior factors are also identified, such as the preference of male over female, experienced over inexperienced, and occupational differences. However, the unexpected earnings gaps on different levels of education are still present given overeducation as a control. I also find that the negative

effect of overeducation on economic return tends to decrease five years' past graduation, but there's no evidence to show that this amount of earnings penalty will be eliminated in the end. Furthermore, the potential endogeneity problems cannot be neglected, including omitted variable bias, measurement error, and reverse causality.

The rest of the paper is organized as follows. Section 2 shows key findings from the literature review focusing on Canada, U.S., and European countries. Then the paper provides the background of the dataset, discuss sample restrictions, and presents summary statistics of the key variables in section 3. The econometric model is provided in section 4. In section 5, the paper interprets the empirical results and points out some limitations of the model. Section 6 performs robustness checks to test the relationship between overeducation and annual earnings. Last but not least, this paper offers a brief conclusion in section 7.

2. LITERATURE REVIEW

The structure of literature review is as follows: it first summarizes the findings on overeducated workers in Canadian labour market in terms of their earnings (e.g. Frenette 2004; Boudarbat and Chernoff 2012; Wald and Fang 2008; Vahey 2000), then compared their labour market performance to employment scenarios in U.S. (e.g. Duncan and Hoffman 1982; Verdugo and Verdugo 1989). Last but not least, overeducated workers in European countries (e.g. Korpi and Tahlin 2009; Kiersztyn 2013) will be mentioned at the end.

On the basis of Canada's conditions, Frenette (2004) is the first to investigate the overqualification among recent Canadian post-secondary graduates, and he believes that students enrolled in shorter programs are less likely to be overqualified. Overqualification has strong negative effects on earnings at the college and bachelor's level, while this is essentially no

effects on master's and doctoral levels. For co-op graduates, there is weak evidence to say they are less likely to be overqualified at the bachelor's and master's level. Frenette chooses data from the National Graduates Survey (NGS), using three cohorts of graduates include the classes of 1982, 1986, and 1990. It is worth mentioning that he expects overqualification to be a non issue given that graduates can get rid of overqualification for a short period of time. However, overqualification is state-dependent since those who are overqualified for two years will also be overqualified for five years. Moreover, the variation of economic returns in different programs is large, resulting in significant differentials between college and bachelor's level, but not for those who possess master's and doctoral degrees. The author is surprised by the large wage gap between master's and bachelor's degrees, but he thinks the non wage differential between doctoral level and master's level is reasonable.

Ferguson and Wang (2014) research recent Canadian graduates and their labour market outcomes. Using the NGS of the class of 2009/2010, they reveal that there is a relationship between graduates who pursue further education after graduation by field of study and employment rate. For example, biological has the highest proportion of graduates continue their education (77%), followed by psychology (75%), mathematics and statistics (71%). They also find that given educational attainment, the truth of gender wage gap cannot be neglected. Male full-time workers earn more than the female counterparts, and earnings rise with each education level. Additionally, the authors measure job quality and explore that master's and doctorate graduates have higher probabilities to report that their education-job match. Furthermore, they mention about the student debt at the time of graduation. In 2013, three years after graduation, across all levels of education, over one-third of graduates with student debt have paid off their

student loans. The proportion is lowest among bachelor graduates (34%) and highest for master's graduates (44%).

Lavigne *et al.* (2015) point out the limitations of government life long policies for graduates' progression to further post-secondary education. Exploring the data from the NGS of the class of 2009/2010, they believe that educational pathways do not reflect linear and upward pathways, which link lower level qualifications to higher level qualifications within the same field of study. In addition, they find that pathways can be within sector movement, such as college-college pathway, university-university pathway, or even university-college pathway. Furthermore, the authors believe that there is an insignificant relationship between work and broadly-structured fields of study that graduates' educational pathway can be varied by field. Since regulations influence labour outcomes, policy makers and institutional researchers should take student pathways into account.

Boudarbat and Chernoff (2012) explore the determinants of education-job match among Canadian university graduates. Using data from the follow-up of Graduate Survey – class of 2000 (2000 FOG), they indicate that for one third of graduates (35.1 percent) cannot find their jobs close related to their majors. Therefore, large proportions of graduates (64.9 percent) find their education close impact on the job match. In particular, some programs like education and health science have highest probability to obtain an education-job match. For education characteristics, especially academic grades, the field and level of school, have strong effects on the education-job match. In addition, with respect to employment characteristics, such as previous working times (working part-time or full-time), along with the industry of employment, these factors have strongly influence on the match. While demographic and socio-economic characteristics, such as age, gender, and parents' education attainment, are far less important to

the job match. However, immigrants are significant disadvantaged in the Canadian labour market even they hold the domestic degrees.

Reynolds and Myers (2012) conclude with a discussion of the direction of causality between the incidence of underemployment and its negative consequence. They address the effects of youth underemployment are more severe than for adults after analyzing the datasets from the NGS. One reason is that overeducated youth bears a large and persistent wage penalty. The economic rate of return for one year of overeducation is 2.6% while the average rate of return of a year of education in Canada is 12%. Evidence also suggests that overeducated youth suffered lower career process and fewer opportunities for increasing their professional skills related to others with similar educational attainments who are adequately employed. As a result, it leads graduates to lower levels of self-confidence and self-esteem. Furthermore, they think overeducation careers can pose long-term health risks, including depression and anxiety, and are also associated with subsequent alcohol abuse. They argue that this situation causes a lower wage level and lower career process further.

Zarifa *et al.* (2015) examine the early workforce outcome of postsecondary graduates with disabilities. The data are drawn from the 2005 cohort of Statistics Canada's National Graduate Survey. Given postsecondary education plays a positive role for earnings, they discover that there is significant earnings gap between graduates with and without disabilities given large various fields of study and levels of education. However, since educational programs create benefits for the disabled, it is better for government still offer institutional support for graduates with disabilities. What is more, the disabled are significantly less likely to be a full-time worker, and are overrepresented among unemployed and part-time workers. Furthermore, they point out the limitations of the NGS. On one hand the dataset is unable to confirm who does not disclose a

disability. On the other hand, the NGS only include graduates who have obtained their degree from secondary institutions in Canada, and those who do not persist to graduate are excluded in the sample.

Uppal and LaRoche-Côté (2014) perform a study on a growing pool of university graduates in Canada and conclude many of those young people are considered to be “overqualified”. They focus on the 2011 National Household Survey (NHS) and census data from 1991 and 2006 to study the overeducation issue among employed young people from age 25 to 34. They talk about two methods to measure overqualification among graduates. One is based on subjective measures, like the NGS, by asking respondents if their job matched their qualifications. Alternatively, by grouping of occupations across skills levels, they want to see if the educational attainment is matched or not. They conclude that overeducation is more likely to be a concern for those who take a longer program, particularly university graduates. They also believe that compare with the Canadian-born and immigrant women with a Canadian or U.S. degree, more than two-thirds female immigrants who did not graduate in Canada or U.S. were employed in occupations requiring college education or less.

Wald and Fang (2008) address the impacts of overeducation on immigrants’ earnings in the Canadian labour market. They use 1999 Workplace and Employee Survey (WES) to present the employment disadvantage for overeducated immigrants with respect to their earnings. To be specific, the authors conduct an analysis and find that recent immigrants face an increased incidence of job-education mismatch since they earn relatively low returns compared with Canadian-born workers. Additionally, their paper shows the strong evidence that those in households where a languages other than French or English are more likely to be overeducated but indicating lower earnings, given the control for numerous individuals and workforce

characteristics. On the basis of the importance of job-education match, Wald and Fang suggest that attaching greater weight to the arranged employment criterion seems reasonable, and one might consider the visible-minority characteristics into the selection process. Similar to that selection system, the points system used for admitting immigrants needs to be fine-tuned. For example, since high-skilled immigrants are chosen based on their recent education attainment, one can argue that without a certain degree of language proficiency, education attainment is not truly reliable in the Canadian labour market.

Vahey (2000) surveys the economic returns on over and undereducation in the Canadian labour market. He states that overeducated people have received adequate income, and there are no lower income problems among this group. Data used for this paper are drawn from the National Survey of Class Structure and Labour Process in Canada (NSCS), those people who are self-employed or outside the age range of 18 to 64 are excluded from the analysis. He also identifies the wage gap between male and female. Males yield positive returns to overeducation as long as they obtain a bachelor's degree; otherwise the relationship is not statistically significant. As for females, the relationship between overeducation and income seems non-existent. The author finds that the wage gap between genders is due to geographic factors, since women may need more consideration for her family and geography brings work restrictions.

In the U.S., Thurow (1976) creates Job Competition Theory. He holds the belief that job openings are closely related to education levels in the labour market, and higher level of education creates increased employment opportunities. He suggests that all workers are ranked by a specific queue depending on firms' training costs. Companies save on budget as those who are more educated require less training for work. In addition, he also believes that job competitions are more reliant on employees' social backgrounds rather than education

advancement. For example, employees with privileged backgrounds tend to have access to a better workplace. Under these assumptions, wage is only dependent on labour market demands and the existence of overeducation, which is the outcome of labour market competition. Therefore, the economic returns such as premium and penalties for surplus and deficit education should be minimal.

Verdugo and Verdugo (1989) explore the impact of overeducation on earnings, and their concept of overeducation is defined as surplus schooling in relation to job requirements. By analyzing a random sample from 1980 Census in U.S., they state that after controlling for education attainment, in different occupations, workers who are overeducated earn less than their undereducated and adequately educated counterparts. The authors expand three possible explanations about this phenomenon. The first is that overeducation is more likely to happen in low-skilled jobs which require relatively low education levels rather than high-skilled jobs. The second explanation is that overeducated workers may not be as productive as the rest. In addition, since undereducated workers have a comparative earnings advantage relative to overeducated people, undereducated workers may tend to increase their job performance. Firms are more prone to hire this kind of workers though they have lower education levels. The paper shows further that the complexity associated with overeducation is resulting from the varieties of occupational placement.

Duncan and Hoffman (1982) also establish their theory. They analyze the overeducated situation in the U.S. and discover that nearly 40 percent of the U.S work force and about 50 percent of black males are more educated than their job requirement. They obtain information from the 1976 Panel Study of Income Dynamics (PSID), which is a survey that covers a representative sample of over 5,000 households. In the paper, the authors separate years of

completed schooling into three parts: surplus, deficit, and years of education required. The results suggest that education does create productivity and one additional year of education can receive positive individual return. It is statistically significant for all demographic groups. However, the real positive payoff on surplus education is only half, which points out that the problems of misallocation of educational resources need to be more closely examined and resolved based on cost-benefit analysis. Remarkably, because their regression may have unobservable variables, the heterogeneity issues would be taken into account in their future models.

Using the same dataset as Duncan and Hoffman (1982), Tsai (2010) reaches the conclusion that there is no relationship between overeducated status and earnings in the U.S. labour market. He examines the wage effect of overeducation based on longitudinal data drawn from PSID over the years from 1979 to 2005. He believes that the main differences for his outcome and most studies are due to research approaches. Most researches use cross-sectional data and assuming that workers are randomly assigned to being overeducated. Tsai figures out their methods have two major issues. One, is the problem of omitted variable bias due to unobservable variables, therefore the correlation between independent variables and error terms may not be zero. The other problem is that required schooling for each occupation causes measurement errors which undermine the OLS estimates. Tsai tries to emphasize the importance of time invariant using panel data, and addresses the potential problems when estimating required schooling. He concludes that if previous studies do not ignore the non-random assignment of workers, then, there is no wage differential in the end.

Rubb (2013) investigates the role of asymmetric information on job mobility of those over or undereducated workers. Based on his literature review, the previous findings conclude

that if individuals are undereducated, job tenure increases the probability of upward occupational mobility. Robb's paper proves this conclusion. The sample used in his survey is from 1999 and 2001 waves of the PSID conducted by University of Michigan, containing U.S. labour market data for 1998 and 2000. The PSID contains 260 separate occupational categories with six or more observations in the 1999 survey. He finds that since the other human capital weakness commonly believed to be associated with overeducated workers is not transparent to external firms, it is an optimal way for overeducated workers to engage in firm switching behavior. In contrast, it may be optimal for undereducated to seek intra-firm upward occupational mobility. This article also validates previous studies that overeducated workers are more likely to report their switching activities, and they experience upward job mobility than others.

Slonimczyk (2013) assesses the significant increase in wage differentials across the U.S from the period 1973 to 2002 and explores an alternative reason for wage dispersion. He thinks the existence of skill mismatch is the main reason for wage gaps even within the same education groups. The author extends earnings function which is created by Duncan and Hoffman (1982), and divides education into three parts: surplus, deficit, and required qualification. As a result, he shows skill mismatch factors are significantly increasing earnings inequality at any period of time, and not only the variance of earnings, but also the Gini coefficient. For example, the dramatic increase in overeducation rates and premia accounts for 20% and 48% of the increase in the Gini coefficient during the past 30 years. Log earnings differences between males and females can be explained by an increase in the surplus qualifications factor alone. He also considers educational attainment is of great importance in the study, but the scarcity of information cannot improve the imputation method for the certain groups.

Researchers in European countries also show the sounds of their voice. Kiersztyn (2013) examines long-term changes in the persistence of overeducation among Polish workers. The author uses the Polish Panel Survey (POLPAN) from 1988 to 2008 and finds that more than half of workers working in jobs with lower educational requirements and this situation remained for at least five years. He believes economic scenario strongly correlated with overeducation issue that the incidence of overeducation increases sensitively in economic recession period. The expected cohort effects are also significant in his research. His finding is that the younger cohorts are more likely to be facing an overeducation issue, which is consistent with Thurow's (1976) job competition theory but challenges the assumption of human capital theory and career mobility hypothesis.

McGuinness and Bennett (2007) perform a study on the overeducation graduates in the Northern Ireland labour market. Their research is based on the data drawn from a cohort study of all Northern Ireland domiciled students in 1991 and 1992. Instead of using a standard OLS methodology for testing the relationship between wage and overeducation, the authors use a quantile regression to see wage distribution as an indicator of students' unobserved ability. They reveal that the lower ability people are more likely to be overeducated. The paper indicates that relative to well-matched counterparts, lower-ability and mid-ability graduates have significant wage disadvantages. In addition, irrespective of female's ability level, for overeducated women, their wages are significantly less than their well-matched counterparts.

Korpi and Tahlin (2009) test the role of educational mismatch on wage and wage growth in Sweden during year 1974 to 2000. Their empirical research is based on the cross-sectional and panel data from the Swedish Level of Living Surveys (Levnadsnivaundersokningarna, LNU), using a sample of 6,000 adults over the span of 26 years. The researchers find that "the

overeducated are penalized early on by an inferior rate of return to schooling from which they do not recover” (Korpi and Tahlin 2009, 1). To be specific, the authors examine two hypotheses. One is that education mismatches reveal human capital compensation, and the other one is that education mismatches can be dissolved over a long time in the labour market, so that wage impact tends toward zero over worker’s career. They reject the null hypothesis and conclude that there are significant differences in economic returns on education after variations in ability are taken into account. What is more, there is some evidence that the rates of wage growth are not lower for mismatched workers than for others, but no evidence to show a higher growth rate. As a consequence, overeducation is penalized early on and education-job mismatches cannot recover in the end.

The above mentioned literature provides valuable evidence on the relationship between overeducation and earnings. Some identifies wage differentials between different groups (e.g. McGuinness and Bennett 2007; Duncan and Hoffman 1982; Frenette 2004), while others focus on the issue of endogeneity in models (e.g. Tsai 2010; Kiersztyn 2013).

This paper makes the following contribution to the literature. It is the first paper to use the most recent NGS datasets to explore the relationship between overeducation and annual earnings in the Canadian labour market. Given that the recent financial crisis had such a dramatic impact on the world economy, which included prolonged unemployment, this project would like to see whether the overeducation phenomenon has changed since the 2008 recession. This paper relies on the existing literature to help guide its process. In particular, the choice of model and controls is similar to that of Verdugo and Verdugo (1989).

3. DATA DESCRIPTION AND SUMMARY STATISTICS

3.1 DATA DESCRIPTION

This section provides an overview of the data. The main data used in this paper are from the master files of the National Graduates Survey (NGS).¹ I first provide a brief introduction about the datasets and how they are structured, and then show the importance of using the master files. The reason for using weights and the choice of data restrictions will be mentioned in the end.

The paper relies on NGS data for the graduating classes of 2000, 2005 and 2009/2010. More precisely, it will involve data collected at the initial interview for each of the graduating classes. For the 2000, 2005 and 2009/2010 classes, it means data are collected in 2002, 2007 and 2013, respectively. In addition, a follow-up survey for the class of 2000, which is conducted in year 2005 (three years after first interview in 2002) will be used in the robustness section.

Designed by Statistics Canada and Human Resources Development Canada, the NGS is a survey that examines labour market outcome of recent Canadian graduates and their career pathways. For example, the datasets give a chance to figure out which postsecondary programs has been successful in getting a high employment rate since graduation, and the types of jobs related to students' majors and their personal expectations. The target population are graduates of public postsecondary educational institutions, including trade schools, colleges, and universities. Those who graduated from private postsecondary education institutions, continuing-education programs, and completed vocational programs which last less than three months are, however, not covered by the NGS and therefore out of the scope of this study.

¹ Canadian Socio-Economic Information Management System (CANSIM) data are also used in this paper to supplement the main data. It is collected by Statistics Canada, and it contains database that covering various socio-economic aspects of Canadian life.

The NGS was first conducted for the graduating class of 1982. Each graduating class was typically interviewed twice, two years after graduation and in case of the early NGSs five years after graduation. It is only the 2009/2010 class for which the initial interview is not two years after graduation: it is carried out three years after graduation. Statistics Canada stopped doing follow-up interviews starting with the graduating classes of 2005, which means that for the two most recent graduating classes, there are only initial interview data. As such, the follow up data will only be used to carry out robustness checks.

The NGS examines whether graduates have been successful in obtaining employment and most importantly whether they are overeducated for their position. The latter is unique to the NGS, and is at the core of this research.²

A Key variable for this study is earnings, which comes from the NGS questionnaire that asks, “*What were your annual wage or salary, before taxes and other deductions for all jobs you had before this survey*”. Only in the master files are earnings provided as a continuous variable (in the public use files, annual earnings are only represented as earnings brackets). Given that earnings will be my dependent variable, it is critical to have it as a continuous variable, and as such a key reason for using the master files.

The NGS master files have some additional features that will be helpful for this study. Compared to the public use files, the master files have larger samples, which allow for more precise subgroup analysis. For example, the total sample size by level of certification is 60,701 in the NGS 2005 datasets (for the class of 2005). However, the public use microdata files only have 31,192 observations.

² Other related Canadian studies, which focus on overeducation and mismatch in the Canadian labour market (e.g. Ferguson and Wang 2014; Boudarbat and Chernoff 2012; Zarifa *et al.* 2015) rely on this dataset as well.

Finally, CANSIM data are used as a supplemental dataset to get real earnings, i.e. the Consumer Price Index (CPI) is required.³ Since the NGS covers 10 provinces and the three northern territories, CPIs by country will be used to compare across time.

As with other datasets, the NGSs face non-response problems. For instance, the initial interview for the class of NGS 2000 attempted to reach 61,558, but only 38,483 interviews were obtained (i.e. a non-response rate of 34.4%). The non-response rate appears to be significant and increasing over time. A comparison with two flagship surveys of Statistics Canada, the LFS and the General Social Survey (GSS), will put these numbers into perspectives. The non-response rate is 25% and 34.3% in 2002 and 2012, respectively. From these numbers one can conclude that the non-response rate is similar in magnitude, but a bit larger to those of the GSS. The LFS numbers are much smaller, but this may be due to the fact that participation in the LFS is mandatory (approx. 10%). The relatively high non-response rate of the NGS will require the use of weights in the empirical analysis.⁴

A final data problem is that of attrition. The sample size of the initial survey of the class of 2000 is 38,483, whereas that of the follow-up three years later is 34,304. As a result, the problem of attrition is raised in the follow-up. As exhibited in the robustness check section, the follow-up sample is a representation of the initial survey, and therefore can be used to carry out its own summary statistics and regressions, and conclude whether the outcome conforms to the initial dataset.

There are two major limitations to the NGS. Firstly, regarding annual earnings, the NGS

³ The CPI reports overall changes in prices of all goods and services bought for use by urban households. The CPI series number is 62-001-X. Real earnings = Nominal earnings_t × $\frac{CPI_0}{CPI_t}$, where CPI₀ is CPI of reference period. In this paper, 2002 is the reference year.

⁴ This paper uses weights to correct for the non-random sampling in the NGS. As with other surveys like the LFS, the NGS under samples those from Ontario, while over samples from areas like Prince Edward Island.

normalizes all hourly, weekly, and monthly earnings into annual sums. For example, if a respondent provides an hourly rate, the NGS assumes that the employee works 40 hours per week and 52 weeks in total, which converts to 2080 hours per year. This over simplification causes measurement errors because the process of conversion does not reflect exact hours worked. Secondly, it should be mentioned that for the class of 2009/2010, the survey is carried out three years later instead of two years. The extra year elapsed effect cannot be justified and causes potential problem.

As this paper aims to find the influence of overeducation on earnings, it restricts the sample to full-time workers aged 18 to 64 living in Canada who are not self-employed but with available earnings numbers, education attainments, regions, and occupations. On one hand, the population must contain someone who is employed as it is assumed such group have available wage data, which is essential in the model. On the other hand, populations who are self-employed are excluded since their wages are obtained by themselves and real wages are ambiguous. For respondents aged 18 to 64, the upper age limit accounts for the retirement issue, while the lower age limit accounts for the majority of people is still in school. Therefore, all data with missing earnings numbers are excluded. The same is done to entries with missing education attainments, occupations, and regions.⁵

3.2 SUMMARY STATISTICS

Table 1 provides the mean values and standard deviations for my sample, for each year separately. These variables include annual real earnings, overeducation, educational attainment,

⁵ The proportion of sample size is roughly reduced by three-fourths. However, educational attainment accounts for the majority of the drop since this paper only focuses on postsecondary graduates. Those students who get professional association diploma or certificate are excluded in the sample. Meanwhile, a small minority of dataset is dropped due to lack of earnings information, which is common in the survey.

gender, working experience, occupation, and region.⁶ All means and standard errors are calculated under weighted methods.

In table 1, the statistics match expectations. It shows that the number of observations for each estimate is around 8,500. Females have relatively higher participation rate than males, which confirms the fact that more women than men enroll in college and university programs. Table 1 also indicates that 90% of the samples are composed of graduates of either college or universities and only 10% possess a master's degree or a PhD.⁷ This conforms to the generic impressions of the public that only a small minority of people take their degree equal or higher than master. The group of graduates with full-time working experience marks at 80%.⁸ For occupation, the highest percentage of broad occupational category is those working for education, law, social, and community, while working participation rate for natural resources and agriculture is the lowest among all sectors. For regions, more than 70% of the total respondents are from Ontario and Quebec, while the proportion of three territories is only at above 0.25%.

As an overall trend, the real average annual earnings changes from 40,205 to 43,285 from 2002 to 2013, along with increased standard deviation from 26,278 to 40,507.⁹ The average annual earnings are higher and the larger standard deviation means that the earnings disparities have also become greater. Meanwhile, it seems that approximately 25% of graduates are overeducated, and this percentage continuous to increase over the 11-year span from 2002 to

⁶ Occupation categories for the NGS 2009/2010 and the NGS 2005 are from the North Occupational Classification (NOC) 2011 and the NOC-S 2001 respectively. Since occupational classifications have been sustained, the broad category comparisons are still valid.

⁷ College includes college or CEGEP diploma or certificate, and university diploma or certificate below bachelor level. University includes bachelor's degree or first professional degree, and university diploma or certificate below master level. Master's and PhD include master's degree and doctorate.

⁸ Working experience indicates whether the students worked more than 30 hours per week before they completed their program.

⁹ The average annual earnings refer to real earnings that have been adjusted for inflation or deflation. Equivalently, nominal wages in terms of the amount of goods and service can be bought.

2013.¹⁰ The proportion of males, decreases over time. For educational attainment, the percentage of college students rises steadily to 44.3% by 2007 and then drops slightly, while master and PhD student exhibit the opposite pattern. Furthermore, the proportion for most occupations fluctuates, and only two occupation classes have demonstrated sustained growth rate. They are business, finance and administration, as well as sales and service.

In particular, after the financial crisis of 2008, the percentage of overeducated graduates shifts from 24.8% to 25.6%, and the two population means are different at 5-percent significant level. Although the numbers of graduates who hold equal or higher than master's degree are relatively lower, the more noticeable increases are found particularly after economic recession. Master's or PhD graduates account for 6.8% in 2007, but changes to 7.4% in 2013. The proportion of workers with pre-graduation working experience also shows a drop from 82.1% to 78.7%.

4. CONCEPTUAL MODEL

This section provides a basic wage model to estimate the influence of overeducation on earnings. The baseline model is similar to Verdugo and Verdugo (1989) model,¹¹ and is written as:

¹⁰ Overeducation refers to individuals have their distinct feelings towards the education and trainings they receive. If they feel education and training is more than job required, overeducation is considered compared with those people who fell just qualified and undereducated.

¹¹ Similar to the Verdugo and Verdugo (1989) model, the natural log of real annual earnings is used as the dependent variable as the influence of overeducation on earnings is analysed in this paper. Factors such as educational attainment, male binary variable, working experience, occupation, and a set of region dummies are used as controls. However, the approach in this paper differs from Verdugo and Verdugo's efforts in a set of notable ways. Unemployment rate, weeks unemployed in specific year, working hours per year, and married status are used in their paper. Also, in the Verdugo and Verdugo model, working experience is defined as the estimated years of work experience, while in the NGS the concept of aggregated years of working experience is lacking, and therefore is treated as a dummy variable in this particular analysis.

$$\log w_i = \beta_0 + \beta_1 \text{Overeducation}_i + X_i\psi + \varepsilon_i \quad (1)$$

where the dependent variable $\log w_i$ represents the log of real yearly earnings of individual i ;¹² Overeducation_i is a dummy variable equal to 1 if workers' feelings toward their educational condition is above the required schooling or required range for their job, and otherwise equal to 0; The vector, X_i , includes controls for educational attainment, gender, working experience, occupation, and a region of residence. To be specific, there are two educational attainment dummies, one for bachelor's degree and the other for equal or higher than master's degree.¹³ I have a male binary variable that is equal to 1 if male, and 0 otherwise. There is a working experience dummy that is equal to 1 if the individual worked full time before completing the program, and 0 otherwise.¹⁴ I also include nine occupation dummies,¹⁵ and twelve province/territory dummies.¹⁶ This equation will be estimated for each year separately.

5. RESULTS OF EMPIRICAL ESTIMATION

5.1 DISCUSSION OF RESULTS

Table 2 shows the OLS regression results for the class of 2000 for the three specifications

¹² The NGS questionnaire asks “*what were your total earnings from wages and salaries, before taxes and deductions for all jobs you had before this survey.*” Real earnings are earnings adjusted for the effects of inflation or deflation, and it calculated as $\text{Real Earnings}_t = \text{Nominal Earnings}_t * (\text{CPI}_0 / \text{CPI}_t)$. Please note that this paper uses Canadian CPI and 2012 is the base year.

¹³ The two educational attainment dummies are: university diploma/first professional degree, master's degree/doctorate. College/CEGEP/technical institution/school of nursing is used as the reference group.

¹⁴ Working experience is measured by asking “*before you complete your program, did you ever work full-time, that is, usually 30 or more hours a week?*” If the answer is yes, the individual is considered as have working experience, otherwise no working experience.

¹⁵ The nine occupational dummies are: 1) Management occupations, 2) Business, finance and administration occupations, 3) Natural and applied sciences and related occupations, 4) Health occupations, 5) Occupations in art, culture, recreation and sport, 6) Sales and service occupations, 7) Trades, transport, equipment operators and related occupations, 8) Natural resources, agriculture, related production occupations, and 9) Occupations in manufacturing and utilities. Occupations, education, law, social, community, and government services are the reference group.

¹⁶ The twelve region dummies are: 1) Newfoundland and Labrador, 2) Prince Edward Island, 3) Nova Scotia, 4) New Brunswick, 5) Quebec, 6) Ontario, 7) Manitoba, 8) Saskatchewan, 9) British Columbia, 10) Yukon, 11) Northwest Territories, 12) Nunavut. Alberta is the reference group.

of equation (1), where the controls are added in a sequential manner.¹⁷ The first specification only includes controls for overeducation, gender, and region. The second specification is expanded by adding education and working experience. Occupational dummies are added in the third and final specification.¹⁸

For class of 2000, in specification (1), overeducation is statistically significant at the 1-percent level. Overeducation is the key variable that has a negative correlation with annual earnings. It means that overeducated workers make 21.9% less than those adequately educated or undereducated counterparts. Therefore, overeducation is correlated with earnings negatively, which partially confirms Frenette's (2004) findings.¹⁹ The male's coefficient estimate is positive, meaning holding other variables constant, males earn 29.6% more than females. However, Baker and Drolet (2010) conclude that male-female wage ratio for full-time workers is 20.5% in 2002, which shows the unexpected high gender pay gap in my findings.

After adding education dummies and working experience, p-values of overeducation, male, and education dummies are showing highly statistically significant at the 1-percent level. Annual earnings are decreases by 22.5% for an overeducated worker. Men's earnings is 25.2% high than women. Notably, earnings by educational attainment increases when achieve higher level of education. For example, graduates with bachelor's degree earn 45.1% more than college students, and those graduates get master or PhD degree earn even more. In robustness section, overeducation will be dropped to examine if educational attainment still has such a big influence on earnings. Working experience also has expected coefficient estimate. The more working

¹⁷ I use robust standard errors in all regressions, and the regressions are weighted.

¹⁸ There are two reasons for controlling for occupation. Firstly, it is commonly done in the literature (e.g. Frenette (2004)). Given that one goal of this paper is to update the existing evidence, I thought it appropriate to use controls that were commonly used in the literature. Secondly, there are also good reasons for wanting to control for occupation. One can think that there are returns to certain occupations that go beyond just the level of education.

experience an individual has, the more earnings he/she can gain.

The coefficient estimates in the full model keeps the same sign and has similar magnitude. Overeducated workers earn 24% less compared to other counterparts. Males' earning advantage is not as high as in previous regressions, but still their earnings are 18.3% more than women. Moreover, master and PhD graduates have a larger earnings, and the earnings gap between different education levels are even larger. For example, graduates with bachelor degree earn 47.3% more than college graduates, and master and PhD earn 74.7% more than college graduates. In addition, workers who have full-time working experience before graduating, earn 31.4% more than the rest, which seems entirely reasonable given the hypothesis. It is logical because more previous working experience better prepares workers in the workplace and thus results in higher wages. For occupation, only three coefficient estimates are statistically significant. For those work in management field, they earn 60.9% more than those work for education, law, social, community, and government service. On the contrary, employees who work for natural resources and agriculture earn 93.5% less than the reference group.

For the class of 2005, in the first specification, there is a negative correlation between overeducation and annual earnings. It shows that overeducated workers earn 33.6% less than those who are just qualified or are underqualified. Males earn, on average, 17.9% more than females. When including educational attainment and working experience controls into the regression, earnings gaps among different education level is still exist. Working experience and higher level of education are positively correlated with economic returns. In the full regression, the job field like management gets the highest earnings. However, those work for trades, transport and equipment operators earn 74.5% less compared to those work for education, law, social, community, and government service.

For the class of 2009/2010, almost all coefficient estimates keep the same sign, but the estimated magnitudes for determinants of annual earnings fluctuate. For overeducation, the negative magnitude is even larger on earnings after Canada suffered an economic recession in 2008. Table 4 shows that the coefficient estimates of overeducation are far more negative (and still highly statistically significant). Earnings of overeducated graduates' drops by more than 42% compare to those adequately educated or undereducated counterparts. Surprisingly, the gender pay gap is larger as well. As compared to the results of the class of 2005, male's earnings advantages change from 10.5% to 31.1%, which is almost triple. However, since interviews were conducted three years post graduation instead of two, the estimation onto the dataset is on the conservative side. It means that the effects of overeducation may even worse after the 2008 economic turmoil, and all coefficient estimates can be underestimated due to one-year time impact.

However, the economic return to university education is not as large as before. Bachelor degree graduates earn 36.7% more than college graduates, and who get equal or higher than master's degree earn 64.6% more than those complete a college program. Working experience shows a fairly positive link with annual earnings, but this positive return is slightly lower than in previous survey. It indicates that people with full-time working experience before graduation earn 30% more when compared to unexperienced graduates.

Most occupational coefficient estimates are said to be economically and statistically significant except those occupations related to art, sales, trades, and utilities field. Management receive the highest earnings, which is 82.9% higher than the base group. Occupations like business and finance, natural and applied sciences also offer considerable earnings each year,

with 55.2% and 51.8% more compared to education, law, social, community, and government services.

5.2 LIMITATIONS OF THE EMPIRICAL RESULTS

A common issue faced by all empirical researchers is the problem of endogeneity. Within the scope of this paper, three major endogeneity problems are identified: 1) omitted variable bias, 2) measurement error, and 3) reverse causality.

First, there may be an omitted variable bias problem since some unobservable variables may belong in to the equation, and be correlated with an explanatory variable. For instance, field of study (for which I do not have information) may have a large influence on earnings and also be correlated with overeducation. Other factors such as ability, parents' education attainment, and marriage status could also affect education choices, and be related to earnings. One would expect ability, for example, to positively affect earnings, and be negatively correlated with overeducation (i.e. more able individuals can get better quality jobs). In this case the bias would be downward. As for field of study, it is not clear which way the bias would go.

Second, measurement error may be present with respect to the dependent variable and also the key explanatory variable of interest. When asked about annual earnings, many respondents may not know the precise amount. This may be particularly problematic for those that are paid by the hour. The fact that there is measurement error in earnings will not cause a bias if one is dealing with classical measurement error (i.e. it will not cause a bias) – because it is the dependent variable. It will be problematic, however, if it is correlated with a variable like education which is very possible. Given that overeducation, the key explanatory variable of interest, is subjective, there is good reason believe that it is measured with error. Even if it is not

correlated with any other explanatory variables (which are highly unlikely) it would result in an attenuation bias.

Finally, there is reason to believe that there is a problem of reverse causality. It is possible that earnings affects how a person answers the overeducation question. Given that overeducation negatively affect earnings and that those with higher earnings are probably less likely to state that they are overeducated one would expect the overeducation coefficient to be even more negative.

Overall it is not clear which effect will dominate thereby making it hard to sign the overall bias. A potential solution would be to use instrumental variable, but this is beyond the scope of this paper.

6. ROBUSTNESS CHECK

6.1 THREE INITIAL SURVEYS

In order to examine the robustness of the relationship between overeducation and annual earnings, I carry out three robustness checks using the class of 2000, 2005, and 2009/2010.

First, unweighted estimation is carried out to verify the robustness of my findings. I believe it would be a concern if the findings were sensitive to the use of weights. Fortunately this is not the case. The coefficients estimates are very similar in terms of sign and magnitude.

Second, since the educational attainment effects are larger than those found in the human capital literature, I verify to see whether it is due to the inclusion of the overeducation. When I drop the overeducation variables from the model, I find that the size of the education coefficients becomes slightly smaller but not much, which is not in line with the literature.

Third, as done in Frenette (2004) I include education-overeducation interaction terms in two educational levels since there may be a statistical relationship between variables. Table 5 shows that the coefficient estimates of overeducation keeps the negative relationship with earnings, and they are all statistically significant at the 1-percent level. Males earn more than females, the experienced out earns the inexperienced, and the earnings advantage of higher educational attainment is also assessed. Occupation coefficient estimates follows the previous results. The management job discipline provides highest earnings among all. The interaction terms with two different education levels all have negative correlations. The coefficient estimates measure how much the effect of overeducation on earnings change along with educational attainment.

6.2 FOLLOW-UP SURVEY FOR THE CLASS OF 2000

As previously mentioned in the data section, only 34,304 interviews were conducted in the follow-up survey for the class of 2000, which lost roughly 4,000 respondents compared to the initial one. However, the follow-up survey can be used to test robustness of the relationship between earnings and overeducation to see if results are similar to the initial ones.

Table 6 compares the summary statistics for the follow-up survey with the initial interview. It indicates that the average real annual earnings have increased by around \$10,000 after three years. The proportion of overeducated graduates has also increased from 24.1% to 25.0% and the means different are statistically significant at 5-percent level. At the same time, the male participation rate has become slightly higher, and the proportion of workers with pre-graduation experience has increased as well. For educational attainment, college graduates have a lower proportion (from 34.8% to 34.3%), while the proportions of those with bachelor, master

or PhD degree are higher than before. Earnings differences on occupational categories fluctuant barely.

Table 7 provides the estimated coefficients for determinants of real annual earnings. Overeducation is still statistically significant at the 1-percent level, but the negative coefficient estimate is much lower compared to previous findings. In the full regression, annual earnings has decreased by 15.3% for overeducated workers. It means that the wage penalty on overeducation has shrunk because of the three years' time effect. Males earn 24.5% more than the female, which is partially consistent with the results from Baker and Drolet (2010). The effect of educational attainment is also lower than before. With regard to workers with a college degree, graduates with bachelor degree get 32.4% more earnings than college graduates, and master and PhD graduates can earn 59.6% more than college graduates. It indicates that economic return on educational attainment is not as much as before. One possible scenario can be workers' earnings are promoted by five years' working experience, and level of education is not as important as the recent graduates. Full-time working experience before completing the program brings a smaller effect, it is shown that graduates with full-time working experience before completing the program earn 21.9% more than those without experiences in school, which indicates that employers may give preference to those with more working experience after school. Occupation categories keep similar trends compared to the previous findings.

7. CONCLUSIONS

The topic of overeducation is very important in the recent labour market. This paper elaborates on the determinants of annual earnings and explores the relationship between earnings

and overeducation. By using repeated cross-section data from the NGS, four important findings were discovered.

First, overeducation has negatively correlated with earnings. Overeducation is penalized, as it fails to bring economic benefit. In particular, since Canada suffered an economic recession after 2008, the effect of overeducation is strengthened. Second, higher level of education leads to higher earnings, but the earnings gaps among different educational levels have shrunk after recession. Male workers earn more than females, and experienced workers can earn more than those who do not have full-time working experiences before they graduate. At the same time, occupational dummies do not change the sign of coefficient estimates between variables, which further shows the negative payoff from overeducation. Third, even without overeducation, the fairly large and direct earnings gaps between groups with different levels of education cannot be eliminated. Fourth, compared to two years after graduation, the wage penalty of overeducation decreases about 10% five years after graduation. Moreover, real return on educational attainment has decreased, and this may be due to using skilled workers as substitutes.

The above analysis shows that overeducation is not only penalized amongst higher educated graduates, but also for people with lower education levels, as they would also receive a “crowding out” threat in the labour market. If education cannot obtain the expected returns on investment, then overeducation would mean that the investment is a failure. Even though overeducation will not be resolved in a short period of time, the issue is still urgent. For employers, with gradually standardized human resources market, education is no longer the first criterion. On the basis of job performance, staff with the same academic qualifications may have a big income gaps. If the employee is efficient and produce high quality work, career

development opportunities and income may then be related to work contribution rather than education received.

To the society as a whole, indeed, the source of economic development is to enhance human capital and to promote scientific and technological progress, but this does not mean that increased investment in education or expansion of educational institutions will automatically achieve economic and social development. Higher education is a progressive structure to match the social development and simple expansions in the educational fields cannot achieve the desired effect in society.

In addition, the weakness of this model is apparent. Firstly, there may have been some extra variables, which should be considered into this model. The omitted variables may cause bias during the predicting process. Secondly, measurement error creates bias when misleading questions or changed classification is used in the survey. Thirdly, a strong correlation cannot infer causation between overeducation and annual earnings, which can be problematic. Last but not least, the problem of survey attrition cannot be neglected, which seems common in a follow-up survey.

There are several plans for future research. On one hand, since interaction terms show economic values of overeducation, they can be used in the model. For example, the interaction between occupational placement and overeducation can be set to see the wage differentials cross occupations, which better explains the related topic. On the other hand, since dummy variables decrease the precision of the estimation, it can cause larger measure errors. When examining the model, some dummy variables can be replaced by general variables from other datasets. Besides, the model can be expanded by using more considerable variables such as field of study or parents' education, which may reduce the omitted variable bias. Last but not least, for directly dropping

missing random variables, missing variables can be replaced and imputation can be done to reduce amount of bias in the future.

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Table 1: Summary Statistics: Means and Standard Deviations

Variables	Class of 2000		Class of 2005		Class of 2009/2010	
	Mean		Mean		Mean	
<i>A. Annual Earnings</i>						
Real Earnings	40,205	(26,278)	39,702	(28,613)	43,285	(40,507)
<i>B. Overeducation</i>						
Overeducation	0.241	(0.427)	0.248	(0.432)	0.256	(0.437)
<i>C. Gender</i>						
Male	0.417	(0.493)	0.413	(0.492)	0.390	(0.488)
<i>D. Education</i>						
College	0.348	(0.476)	0.443	(0.497)	0.437	(0.496)
Bachelors	0.567	(0.496)	0.490	(0.500)	0.489	(0.500)
Master/PhD	0.085	(0.279)	0.068	(0.251)	0.074	(0.262)
<i>E. Experience</i>						
Work Experience	0.798	(0.401)	0.821	(0.383)	0.787	(0.409)
<i>F. Occupation</i>						
Management	0.107	(0.309)	0.130	(0.336)	0.095	(0.294)
Business, finance and administrations	0.157	(0.364)	0.165	(0.372)	0.216	(0.412)
Natural and applied sciences	0.163	(0.370)	0.146	(0.353)	0.130	(0.337)
Health	0.073	(0.259)	0.088	(0.283)	0.101	(0.301)
Education, law, social, community	0.392	(0.488)	0.352	(0.478)	0.336	(0.472)
Art, culture, and sport	0.042	(0.201)	0.038	(0.191)	0.029	(0.168)
Sales and service	0.047	(0.212)	0.054	(0.227)	0.071	(0.258)
Trades, transport, equipment operators	0.01	(0.099)	0.015	(0.121)	0.011	(0.106)
Natural resources, agriculture	0.001	(0.037)	0.003	(0.054)	0.002	(0.043)
Manufacturing and utilities	0.008	(0.087)	0.010	(0.098)	0.008	(0.089)
<i>G. Region</i>						
Newfoundland and Labrador	0.011	(0.107)	0.012	(0.109)	0.013	(0.115)
Prince Edward Island	0.003	(0.052)	0.003	(0.055)	0.003	(0.057)
Nova Scotia	0.023	(0.150)	0.027	(0.162)	0.024	(0.152)
New Brunswick	0.013	(0.112)	0.013	(0.113)	0.015	(0.122)
Quebec	0.360	(0.480)	0.394	(0.489)	0.416	(0.493)
Ontario	0.388	(0.487)	0.324	(0.468)	0.311	(0.463)
Manitoba	0.019	(0.137)	0.025	(0.157)	0.023	(0.150)
Saskatchewan	0.017	(0.128)	0.017	(0.127)	0.019	(0.135)
British Columbia	0.095	(0.293)	0.099	(0.298)	0.100	(0.300)
Alberta	0.069	(0.253)	0.084	(0.277)	0.074	(0.261)
Yukon	0.001	(0.030)	0.001	(0.033)	0.001	(0.029)
Northwest Territories	0.001	(0.036)	0.001	(0.033)	0.002	(0.042)
Nunavut	0.000	(0.022)	0.001	(0.036)	0.000	(0.013)
Observations	7,921		9,184		8,179	

Note: All observations are restricted to full-time employed workers aged 18 to 64 with available earnings, educational attainments, regions and occupations. All means are weighted. Standard deviations are in parentheses.

Table 2: Estimated Coefficients for Determinants of Real Annual Earnings (Class of 2000)

	(1)	(2)	(3)
<i>A. Overeducation</i>			
Overeducation	-0.219*** (0.071)	-0.225*** (0.070)	-0.240*** (0.070)
<i>B. Gender</i>			
Male	0.296*** (0.057)	0.252*** (0.056)	0.183*** (0.058)
<i>C. Education</i>			
Bachelors		0.451*** (0.069)	0.473*** (0.067)
Master's/PhD		0.718*** (0.104)	0.747*** (0.106)
<i>D. Experience</i>			
Work Experience		0.345*** (0.075)	0.314*** (0.075)
<i>E. Occupation</i>			
Management			0.609*** (0.087)
Business, finance and administrations			0.362*** (0.083)
Natural and applied sciences			0.365*** (0.080)
Health			-0.102 (0.117)
Art, culture, and sport			-0.164 (0.157)
Sales and service			0.013 (0.135)
Trades, transport, equipment operators			-0.543 (0.347)
Natural resources, agriculture			-0.935 (0.738)
Manufacturing and utilities			0.326 (0.227)
<i>F. Region Controls (9)</i>			
	Yes	Yes	Yes
Constant	9.975*** (0.073)	9.329*** (0.104)	9.235*** (0.111)
R ²	0.018	0.048	0.074
Observations	7,921	7,921	7,921

Note: All regressions are weighted. The dependent variable is log of real annual earnings. Robust standard errors are in parentheses. *** p<0.01, **p<0.05, *p<0.1.

Table 3: Estimated Coefficients for Determinants of Real Annual Earnings (Class of 2005)

	(1)	(2)	(3)
<i>A. Overeducation</i>			
Overeducation	-0.336*** (0.075)	-0.309*** (0.073)	-0.366*** (0.072)
<i>B. Gender</i>			
Male	0.179*** (0.060)	0.138** (0.060)	0.105* (0.061)
<i>C. Education</i>			
Bachelors		0.427*** (0.063)	0.463*** (0.064)
Master's/PhD		0.825*** (0.078)	0.886*** (0.083)
<i>D. Experience</i>			
Work Experience		0.472*** (0.084)	0.430*** (0.082)
<i>E. Occupation</i>			
Management			0.781*** (0.091)
Business, finance and administrations			0.550*** (0.087)
Natural and applied sciences			0.378*** (0.086)
Health			-0.070 (0.113)
Art, culture, and sport			0.210 (0.136)
Sales and service			-0.017 (0.173)
Trades, transport, equipment operators			-0.745*** (0.277)
Natural resources, agriculture			-0.545 (0.408)
Manufacturing and utilities			0.467** (0.209)
<i>F. Region Controls (9)</i>			
	Yes	Yes	Yes
Constant	10.021*** (0.081)	9.336*** (0.115)	9.173*** (0.121)
R ²	0.014	0.052	0.093
Observations	9,184	9,184	9,184

Note: All regressions are weighted. The dependent variable is log of real annual earnings. Robust standard errors are in parentheses. *** p<0.01, **p<0.05, *p<0.1.

Table 4: Estimated Coefficients for Determinants of Real Annual Earnings (Class of 2009/2010)

	(1)	(2)	(3)
<i>A. Overeducation</i>			
Overeducation	-0.435*** (0.090)	-0.429*** (0.090)	-0.421*** (0.093)
<i>B. Gender</i>			
Male	0.384*** (0.071)	0.371*** (0.071)	0.311*** (0.069)
<i>C. Education</i>			
Bachelors		0.328*** (0.083)	0.367*** (0.083)
Master's/PhD		0.604*** (0.092)	0.646*** (0.099)
<i>D. Experience</i>			
Work Experience		0.358*** (0.099)	0.300*** (0.100)
<i>E. Occupation</i>			
Management			0.829*** (0.110)
Business, finance and administrations			0.552*** (0.110)
Natural and applied sciences			0.518*** (0.094)
Health			0.251* (0.152)
Art, culture, and sport			-0.162 (0.193)
Sales and service			-0.239 (0.188)
Trades, transport, equipment operators			-0.121 (0.447)
Natural resources, agriculture			-1.354* (0.736)
Manufacturing and utilities			0.003 (0.423)
<i>F. Region Controls (9)</i>			
	Yes	Yes	Yes
Constant	10.195*** (0.093)	9.676*** (0.129)	9.441*** (0.143)
R ²	0.033	0.055	0.097
Observations	8179	8179	8179

Note: All regressions are weighted. The dependent variable is log of real annual earnings. Robust standard errors are in parentheses. *** p<0.01, **p<0.05, *p<0.1.

Table 5: Estimated Coefficients for Determinants of Real Annual Earnings (Include Interaction Term)

	Class of 2000	Class of 2005	Class of 2009/2010
<i>A. Overeducation</i>			
Overeducation	-0.347*** (0.116)	-0.415*** (0.121)	-0.265*** (0.095)
<i>B. Gender</i>			
Male	0.183*** (0.057)	0.105* (0.061)	0.312*** (0.069)
<i>C. Education</i>			
Bachelors	0.427*** (0.074)	0.437*** (0.070)	0.445*** (0.091)
Master's/PhD	0.721*** (0.117)	0.872*** (0.090)	0.696*** (0.109)
<i>D. Interaction</i>			
Bachelors*Overeducation	-0.096** (0.047)	-0.051*** (0.013)	-0.032** (0.016)
Master's/PhD*Overeducation	-0.183* (0.100)	-0.101*** (0.034)	-0.087** (0.043)
<i>E. Experience</i>			
Work Experience	0.311*** (0.075)	0.429*** (0.082)	0.301*** (0.010)
<i>F. Occupation</i>			
Management	0.605*** (0.087)	0.782*** (0.091)	0.836*** (0.110)
Business, finance and administrations	0.362*** (0.082)	0.551*** (0.087)	0.553*** (0.109)
Natural and applied sciences	0.361*** (0.080)	0.374*** (0.086)	0.521*** (0.094)
Health	-0.103 (0.117)	-0.072 (0.113)	0.256* (0.151)
Art, culture, and sport	-0.166 (0.158)	0.211 (0.136)	-0.145 (0.195)
Sales and service	0.017 (0.136)	-0.014 (0.174)	-0.230 (0.187)
Trades, transport, equipment operators	-0.549 (0.345)	-0.747*** (0.277)	-0.121 (0.440)
Natural resources, agriculture	-0.959 (0.743)	-0.548 (0.409)	-1.357* (0.742)
Manufacturing and utilities	0.325 (0.224)	0.462** (0.209)	0.021 (0.428)
<i>G. Region Controls (9)</i>			
Yes	Yes	Yes	Yes
Constant	9.267*** (0.113)	9.188*** (0.122)	9.392*** (0.147)
R ²	0.074	0.094	0.099
Observations	7,192	9,184	8,179

Note: All regressions are weighted. The dependent variable is log of real annual earnings. Robust standard errors are in parentheses. *** p<0.01, **p<0.05, *p<0.1.

Table 6: Summary Statistics for the Class of 2000 (Follow-up Survey): Means and Standard Deviations

Variables	Class of 2000 (Initial)		Class of 2000 (Follow-up)	
	Mean		Mean	
<i>A. Annual Earnings</i>				
Real Earnings	40,205	(26,278)	49,753	(46,061)
<i>B. Overeducation</i>				
Overeducation	0.241	(0.427)	0.250	(0.433)
<i>C. Gender</i>				
Male	0.417	(0.493)	0.425	(0.494)
<i>D. Education</i>				
College	0.348	(0.476)	0.343	(0.475)
Bachelors	0.567	(0.496)	0.570	(0.495)
Master/PhD	0.085	(0.279)	0.087	(0.282)
<i>E. Experience</i>				
Work Experience	0.798	(0.401)	0.802	(0.398)
<i>F. Occupation</i>				
Management	0.107	(0.309)	0.112	(0.316)
Business, finance and administrations	0.157	(0.364)	0.157	(0.364)
Natural and applied sciences	0.163	(0.370)	0.168	(0.374)
Health	0.073	(0.259)	0.076	(0.265)
Education, law, social, community	0.392	(0.488)	0.384	(0.486)
Art, culture, and sport	0.042	(0.201)	0.038	(0.192)
Sales and service	0.047	(0.212)	0.049	(0.216)
Trades, transport, equipment operators	0.01	(0.099)	0.007	(0.086)
Natural resources, agriculture	0.001	(0.037)	0.001	(0.023)
Manufacturing and utilities	0.008	(0.087)	0.008	(0.089)
<i>G. Region</i>				
Newfoundland and Labrador	0.011	(0.107)	0.010	(0.100)
Prince Edward Island	0.003	(0.052)	0.003	(0.051)
Nova Scotia	0.023	(0.150)	0.024	(0.152)
New Brunswick	0.013	(0.112)	0.136	(0.116)
Quebec	0.360	(0.480)	0.353	(0.478)
Ontario	0.388	(0.487)	0.393	(0.488)
Manitoba	0.019	(0.137)	0.019	(0.136)
Saskatchewan	0.017	(0.128)	0.016	(0.127)
British Columbia	0.095	(0.293)	0.099	(0.298)
Alberta	0.069	(0.253)	0.069	(0.253)
Yukon	0.001	(0.030)	0.000	(0.019)
Northwest Territories	0.001	(0.036)	0.001	(0.033)
Nunavut	0.000	(0.022)	0.000	(0.206)
Observations	7,921			

Note: All observations are restricted to full-time employed workers aged 18 to 64 with available earnings, educational attainments, regions and occupations. All means are weighted. Standard deviations are in parentheses.

Table 7: Estimated Coefficients for Determinants of Real Annual Earnings (Class of 2000: Follow-up)

	(1)	(2)	(3)
<i>A. Overeducation</i>			
Overeducation	-0.128*** (0.008)	-0.128*** (0.008)	-0.153*** (0.013)
<i>B. Gender</i>			
Male	0.349*** (0.068)	0.313*** (0.066)	0.245*** (0.069)
<i>C. Education</i>			
Bachelors		0.432*** (0.086)	0.324*** (0.085)
Master's/PhD		0.524*** (0.144)	0.596*** (0.146)
<i>D. Experience</i>			
Work Experience		0.236** (0.096)	0.219** (0.096)
<i>E. Occupation</i>			
Management			0.504*** (0.122)
Business, finance and administrations			0.300*** 0.103
Natural and applied sciences			0.352*** (0.093)
Health			0.012 (0.167)
Art, culture, and sport			-0.063 (0.170)
Sales and service			0.185 (0.175)
Trades, transport, equipment operators			-0.182 (0.450)
Natural resources, agriculture			-0.330 (0.483)
Manufacturing and utilities			0.244 (0.481)
<i>F. Region Controls (9)</i>			
	Yes	Yes	Yes
Constant	10.003*** (0.088)	9.476*** (0.136)	9.338*** (0.141)
R ²	0.017	0.037	0.050
Observations	6,572	6,572	6,572

Note: All regressions are weighted. The dependent variable is log of real annual earnings. Robust standard errors are in parentheses. *** p<0.01, **p<0.05, *p<0.1.