Gender Wage Differential in Canada, 2000-2018

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Abstract

The main purpose of this research is to update the Canadian evidence on the gender wage gap and see if the results have changed since the Great Recession of 2008. Using public-use files of the 2018 National Graduates Survey, I find that the gender wage gap ten years after the Great Recession is essentially the same as it was in the years prior to this recession. Furthermore, employing a Blinder-Oaxaca decomposition, I find that mean characteristics have little explanatory power, other than industry. Industry is the greatest contributor in explaining the gender wage gap. However, the largest portion of the gender wage gap still remains unexplained.

Keywords: Gender, Wage Gap, Education, Great Recession, Graduates, Earnings

1. Introduction

The gender wage gap has declined over the past decades, but it remains high. Understanding the causes of this persistence of the gender wage gap has drawn a lot of attention by labour economists. Grybaite (2006) mentions two main factors have drawn the attention of economists with regard to gender wage differential, i.e. human capital accumulation and potential labour market discrimination. The former comprises of different factors such as training, skills, education and experience of an individual which will make workers' more productive, thus impacting the wage. While labour market discrimination, refers to the difference in treatment of labour in terms of payment, where, the favoured group might be paid more.[1]

In this paper, I update the gender wage gap evidence found in Boudarbat and Connolly (2013), relying as they did on the Canadian National Graduates Survey (NGS). More precisely, I want to see how the wage gap of recent post-secondary graduates has evolved since the Great Recession of 2008 and explore the reasons for any change.[2]

Many studies have used the Labour Force Survey (LFS) (e.g. Pelletier et al., 2019; Schirle, 2015; Fuller, 2005) or the Census (e.g. Baker et al., 1995; Christie and Shannon, 2001) to analyze the gender wage gap.[3] They are large datasets, and they each have a rich set of socio-economic variables.[4] However, both the LFS and the Census, provide limited information about labour market history and thus cannot account for the fact that some women have had career interruptions (e.g. to raise their children). A key strength of the NGS is that it interviews post-secondary

[1] Other observed characteristics could also affect the wage and not be a question of discrimination, for example location, occupation and industry. Having said this there could be discrimination on whether somebody is allowed to enter a certain occupation or industry.
[2] Boudarbat and Connolly (2013) data ends in 2007, a year prior to the Great Recession.
[3] These are traditional datasets and they are long-running and tend to be broad in scope.
[4] The LFS focuses on the hourly wage, whereas the Census asks about annual earnings. As such, the LFS can be used to look at the gender wage gap, and the Census the gender earnings gap.

graduates soon after graduation. As such, it abstracts from the issue of labour market experience which can be hard to measure.[5] By focussing on the early career of men and women, one can also better understand the origin of the gender wage/earnings gap, i.e. does it start early on or is it something that develops over time.[6]

To the best of my knowledge only one other paper has relied on the NGS to look at the wage gender gap (i.e. Boudarbat and Connelly, 2013). Their data, however, ends in 2007, just prior to the Great Recession. Given that there is much evidence that the Great Recession has had a long lasting impact on the labour market (employment and income: Yagan, 2019; retirement: Helppie, 2011; health: Jofre-Bonet et al., 2018), it is critical to see whether if it has also altered the gender wage gap.

My analysis relies on the public-use files of the NGS (whereas Boudarbat and Connolly (2013) use the master files). I was planning on using the master files and had been given access to use them at the Research Data Centre at the University of Ottawa, but the advent of the Coronavirus crisis made it impossible to finish my work using the master files.[7]

There are three main findings. First, the gender wage gap ten years after the Great Recession is essentially the same as it was in the years just prior to this recession. This is in direct contrast to papers that used earlier data and who found a narrowing gender wage gap over time (e.g. Pelletier et al., 2019; Schirle, 2015). Second, the gender wage gap is essentially unexplained by mean characteristics. The unexplained portion accounts for 103.75% of the gap when using the richest

[5] If we are trying to understand the wage gap it is very informative to know if it starts right away when an individual enters the workforce.
[6] Some studies (e.g. Drolet, 2001; Shannon and Kidd, 2001) have used the Survey of Labour and Income Dynamics (SLID) to look at the gender gap, as it does measure labour market experience, but this survey has been discontinued.
[7] Given that I did not have the chance to put a vetting request I cannot discuss any potential findings with the master files.

specification. This means that if we account for mean characteristics (i.e. give women the same mean characteristics as men) the gap would be 3.75% larger. Finally, only industry can partially explain this gap; industry explains approximately a third of the gender wage differential. This final finding coincides with the result of other researchers that have looked at the Canadian data (e.g. Boudarbat and Connolly, 2013 and Pelletier et al., 2019). It should be noted, however, that when focusing on individual categories within groups (for example, within the industry group) there is variation in contributions, but the contribution of the groups as a whole have little explanatory power, except for industry.

The rest of the paper is organized as follows: Section 2 provides an overview of the gender wage gap literature. In Section 3, I present the data and summary statistics. Section 4 covers the econometric model and section 5 discusses the empirical results. Section 6 performs a robustness check by including part-time workers in the analysis. Section 7 discusses the advantages of the NGS master files. Finally, section 8 presents conclusion.

2. Literature Review

This section presents an overview of the gender wage gap literature. I first cover the Canadian evidence. Then I move to the U.S. literature and lastly, I cover the international evidence of gender wage differential.

2.1.1 Canada Traditional Datasets

One of the focal points in literature is wage dissimilarity. Due to the larger sample sizes, traditional datasets (the LFS or the Census) are favoured by most of the researchers. By employing a Blinder-Oaxaca decomposition approach, Baker et al. (1995) explore the evolution of the gender wage differential using the Canadian Census from the time period of 1970 to 1990. They conclude that

the improvement in women's earnings is explained by a decline in unobservable characteristics rather than the observable. Furthermore, they find that the wage differential varies across age and education groups.

Christie and Shannon (2001) analyze how the gender gap in educational attainment could affect earnings differential for full-time workers in Canada using Census data. They consider public-use subsamples of the 1986 and 1991 Census. Christie and Shannon (2001) claim that differences in educational attainment do not explain the gap but once education details are taken into account, then this explains a part of the differences in wages. Finally, they advocate past literature and infer that the rise in women's educational attainment over time plays an important role in explaining why the gender wage gap has become smaller and most importantly, how the field of study could play an important role.

Fuller (2005) analyzes how the gender wage gap differs across public versus private sectors in British Columbia. She starts with mentioning the role played by public sector in giving employment to women in Canada and how the downsizing in British Columbia's public sector has affected this gap.[8] The data is collected from the LFS concerning 2002 (two months data, which are six months apart) to assess the public and private sector gender wage gap only on provincial level. Her research is centred on individuals below 65 years old and those who are part of the labour force. She finds that both personal and job characteristics of public workers can result in higher wages and benefit women more compared to men. Her main finding is that public sector employment benefits women more than men. Unions also play an important role here when

[8] Downsizing was mainly done due to the belief that public sector is inefficient and hinders private sector productivity. British Columbia announced in 2002 Budget plan to decrease the employment in public service and this downsizing presents 30% reduction in employment thus effecting the gender wage gap.

discussing wage in public sector and taking the assumption that in the public sector there is less gender discrimination compared to the private sector.

Compared to the above literature, Schirle (2015) studies the gender wage differential for full-time employees in the Canadian private sector, using the LFS from the time period of 1997 to 2014. Her focus in on individuals aged between 25 to 59-year old's who are full-time employees in the private sector. She concludes that all provinces have made progress in reducing the gap, except for Alberta and Newfoundland. However, by using a Blinder-Oaxaca decomposition technique, she also finds that the gender differences in industry and occupation can explain a large portion of the wage differential in each province.

Pelletier et al. (2019) use the Canadian LFS and focus on individuals aged between 25 to 54 years old. They employ a Blinder-Oaxaca decomposition method and find that distribution of men/women across industries and women's overrepresentation in part-time work explains the left-over gap in 1998 as well as in 2018. They find that the gender wage gap has narrowed by 5.5 percentage points compared to 1998 when it was 18.8 percentage due to the consideration of control variables such as the role of education, job attributes, occupation and industry. Occupation plays one of the major roles here as it contributes 26.3% towards narrowing of the gap. Furthermore, 43.4% of the gap that has narrowed is due to unexplained portion of the decomposition which includes field of study, work experience, discrimination (as unobservable factor) and these variables are not present in the reach of this study.

2.1.2 Less Traditional datasets

The traditional datasets did not account for labour market experience as indicated by Pelletier et al. (2019) where these factors are beyond the scope of study. While, with the passage of time, greater attention has been given to the questions related to role of education, field of study,

occupation and industry in general. For this reason, less traditional datasets come into play as they provide information on labour market experience and very detailed educational information (e.g. field of study) which the traditional datasets do not have.

Kidd and Shannon (1996) examine the reasons for the lower gender wage difference in Australia compared to Canada. They collect data from the 1989 Canadian Labour Market Activity Survey and Australia 1989-1990 Income Distribution survey to compare the gender wage gap. They justify a narrower gender wage gap in Australia compared to Canada, mainly due to stronger union organization and wider centralization in wage determination. Kidd and Shannon (1996) implement a Blinder-Oaxaca Decomposition technique and incorporate human capital characteristics (e.g. educational attainment, field of study, and experience) in the model similar to what other researchers did. The analysis covers individuals aged from 16 to 64, working as a full-time employee. They find a lower rate of return to education and to labour market experience and less wage inequality in Australia than in Canada. The main reason for a narrower gender wage gap in Australia is due to the role of the labour market structure (e.g. return to education, return to labour market experience and level of wage disparity) which accounts for 53% and 62% in the inter-country gender gap.

Drolet (2001) attempts to reconcile the finding of those that have looked at the gender wage gap to those that have looked at the gender annual earnings gap. To do so, she relies on the 1997 SLID which has information on both the wage and annual earnings. The analysis focuses on individuals, aged between 18 to 64 years old. Drolet (2001) concludes that gender differences in full-year, full-time work experience explain 12% of the gender wage gap when controlling for work experience and job-related responsibilities. Interestingly, she finds that the gender differences based on giving an individual the opportunity to supervise and perform certain tasks also account for gender wage

gap. She also finds that the gender earnings gap is narrower among young individuals who are more educated, single and are a part of unions.

Shannon and Kidd (2001) forecast the gender wage gap trend starting from the time period of 2001 to 2031. The analysis focuses on individuals aged 25 to 64 years old in Canada and mainly uses the data from the SLID. The main purpose of this research is to conduct a method for predicting the trends in the gender wage gap in the future. This projection method is further elaborated in five steps which includes using basic human capital equation and deriving predicted age-education structure in Canada. By using the assumption of improvement in educational attainment, the methodology first designs the distribution of human capital skills in future and then through this predicts the size of gender wage differential in the future. They find that the gender wage gap will get narrower in future by the time of 2031 due to improvements in skills of women and the role of educational attainment.

The above literature regarding gender wage differential mentions the role of work experience and education in narrowing the gap. However, these surveys are discontinued and cannot help in updating the research on gender wage gap. The NGS, on the other hand, provides up-to-date detailed information on these variables.

Boudarbat and Connolly (2013) rely on the NGS from the time period of 1988 to 2007. They focus on individuals who are aged 50 years or less at the time of graduation and who are employed full-time. They find that women, during the two or five years after their graduation, earn less (about 6% to 14%) compared to their male counterparts. They compare men and women just after they graduate which is never done in traditional datasets. Furthermore, Boudarbat and Connolly (2013) utilize a Blinder-Oaxaca decomposition approach and conclude that a tiny portion of wage difference is explained by observable characteristics and job attributes. They also use

unconditional quantile regression to examine the gap along the entire distribution of wages and find that in the lower half of the distribution women are in a better situation compared to upper half where the gap gets worse especially in the 2002 and 2005 NGS.

2.2 The U.S.

The U.S. literature mainly covers the data related to educational attainment, field of study, occupation, industry and the labour market experience in explaining the gender wage gap. Also, the findings from the U.S. and Canada regarding narrowing of gender wage gap are somewhat similar.

Eide (1994) analyzes how the change in college major choice among individuals could cause a change in the gender wage gap in the U.S. from the time period of 1970s to 1980s. The author uses two surveys to get detailed education information i.e. the National Longitudinal Study of the High School Class of 1972 (NLS72) and the High School and Beyond survey which is also a follow-up to NLS72. He justifies that over the time, women went from choosing majors from low-skill fields to high-skills fields (such as engineers, doctors). Eide (1994) focuses on college graduates who worked as full-time employees and not enrolled in school during the survey. In simpler terms, the survey includes individuals who earn hourly wage between 1 dollar to 100 dollars. He finds that this shift from low-skill fields to high-skill fields have narrowed the gender wage gap for college graduates.

Petersen and Morgan (1995) conduct an analysis of within-job wage gap across gender in the same occupation and establishments in the U.S.[9] The paper collect data from 16 Industry Wage Surveys (IWSs) from the time period of 1974 to 1983 and the National Survey of Professional,

[9] Within-in job wage discrimination is when women receive a lower pay compared to men within a given establishment and occupation.

Administrative, Technical, and Clerical employees in 1981. By employing linear regression analysis, they find that for observed wage gap, the gender wage difference within occupation and establishments level is more important than just within-job wage gap. Another main conclusion drawn is if we consider blue-collar and clerical employees then establishment segregation plays an important role compared to occupation segregation in defining the gender wage gap.[10]

Weinberger (1998) studies whether the race and gender wage gap is due to educational attainment of an individual or due to the labour market discrimination. She uses the 1985 Survey of Recent College graduates and focuses on individuals no more than 30 years old and the same restriction is used for each category of educational attainment. In addition, she uses controls of detailed educational attainment and the quality of education. Her main findings are that white male and Hispanic male graduates are likely to earn 15 percent more per hour compared to white or black female, black male or Asian male in the U.S. She concludes that the labour market discrimination exists since individuals with same productive characteristics are valued differently in the labour market.

Similarly, Blau and Kahn (2006) examine the trend of gender wage gap in 1980s and compared it to 1990s. The main purpose of the research is to analyze the decline of convergence of gender wage in the 1990s as compared to the 1980s. For this purpose, they collect data from three waves of Michigan Panel Study of Income Dynamics and restrict the analysis to non-agricultural workers of age between 18 to 65, excluding self-employed. By using decomposition approach, Blau and Kahn (2006) find that unexplained gender wage gap is the main contributor towards a slowdown. First, they find that human capital factors did not lead to this slowdown as women start valuing

[10] Occupational segregation is the distribution of employees across and within occupation mostly on the basis of gender.

education more with the passage of time. The second main finding is that occupation upgrade and de-unionization could explain a slower 1990s convergence as these two factors had a more positive impact on female wages in 1980s compared to 1990s. Lastly, changes in gender disparity in unmeasured characteristics and labour market discrimination could also be the reason for this decline in convergence.

Fortin (2008) uses The National Longitudinal Study of the High School of 1972and The National Education Longitudinal Study of 1988/94 to examine the gender wage gap among young individuals in the United States. She acknowledges the effect of mainly four noncognitive characteristics, such as self-esteem, external locus of control, the value of money and lastly the importance of people or family, on the gender wage gap of young individuals. These factors effect gender wage gap through the individuals or workers demand of wages, ability to work or responsibility, and selfless rewards on the job. Among all these factors, she finds that importance of money plays the most significant role in gender wage differential.

Blau and Kahn (2017) offer an update to the evidence on the gender wage gap and claim it has declined over time. They advocate occupation and industry to be significant factors as mentioned by Schirle (2015) and state that human capital explains little of the gender wage gap. Furthermore, this gap declines more slowly on the upper wage distribution compared to the middle or lower level of wage. Blau and Kahn (2017) acknowledge new factors that have come in to play in explaining gender wage gap such as psychological attributes and noncognitive skills. These new factors as mentioned above explain a small portion of the gender wage differential compared to occupation and industry factors.

2.3 International Evidence

The international literature also aligns with what have been found in Canada. Appleton et al. (1999) study the gender wage gap in three African countries i.e. Ethiopia, Uganda, and Cote d'Iviore. For Ethiopia, they use the data from the Survey of Adolescent Fertility, Reproductive Behaviour and Employment Status of the Youth Population in Urban Ethiopia. For Uganda, the data is taken from the Integrated Survey of Uganda (1992) and finally, Cote d'Ivoire data is taken from Living Standards Surveys of the time period 1985, 1986, and 1987. They mainly focus on urban residents and individuals above the age of 15 years old. They find that gender wage gap (which is due to difference between actual and pooled returns) is more in Ethiopia and Uganda compared to Cote d'Ivoire. However, the main reason for a small gender wage gap in these countries is due to overrepresentation of working women in the public sector.

Eastough and Miller (2004) study gender wage gap in paid and self-employment in Australia and compare the situation with the U.S. The data is taken from the 1991 Australian Census of Population and Housing, Household Sample File. They examine different factors leading to gender wage gap that have been discussed in the literature mentioned above such as human capital skills, demographic and personal characteristics and structural factors. First, they find that education is not a significant factor for gender wage differential among self-employed in Australia compared to the U.S. where educational attainment and earnings have a positive relationship in self-employment. In addition, the gender wage gap is greater in Australia's self-employed sector mainly due to liquidity constraints, differences in sectors, and lack of wage regulation. However, in a deregulated environment the gender wage gap is large in the U.S. compared to Australia.

Weichselbaumer and Winter-Ebmer (2005) present a quantitative review of previous empirical literatures of gender wage gap. Every research evaluates this gap using different methodology,

time periods, datasets and countries and they cover 63 countries from the time period of 1960 to 1990s. By using meta-regression analysis all the previous literature is reviewed in a systematic manner. Meta analysis tells us how certain restrictions can affect the gender wage gap. They find that the choice of sample restrictions (e.g. just focusing on never-married) greatly impacts the size of the gender wage gap. Finally, their main finding is that raw wage differentials have decreased over time and this is mainly due to better labour market women's endowments.

3. Data and Summary Statistics

For the empirical analysis, I rely on multiple years of the public-use files of the Canadian National Graduates Survey (NGS) datasets i.e. the 2002, 2005, 2007, 2013 and 2018 NGS which is conducted by Statistics Canada.[11] However, for the main analysis I am relying on the 2018 NGS. As the focus of my analysis is the post Great Recession period.[12]

The NGS survey focuses on recent post secondary graduates. This survey can be used to explore the link between the individual's program of study once they graduate and the employment and whether the graduate is satisfied from choosing a specific career path. The survey targets all graduates from Canadian post-secondary education institutions which includes universities, colleges, and trade schools and whether they finished the requirements of degrees, diplomas and certificates during the reference school year are considered in this survey. This 2018 NGS survey covers 19,564 individuals and the sample is designed in a cross-sectional manner.

[11] As mentioned in the introduction, the original goal was to take advantage of the richness of the master files version of the NGS. The advent of the Coronavirus outbreak, however, has made this impossible at this time. In the Future work section, i.e. Section 7, I will discuss the advantages of the master file version of the NGS, and how it could help better understand the source of the gender wage gap.

[12] For my secondary analysis, I look at the 2002, 2005, 2007 and 2013 NGS, for an overview of how the gender wage gap has changed in recent times.

The NGS interviews graduates two or three years after graduation, and for the earlier NGS's five years after graduation.[13] Table 1 presents an overview of the structure of the more recent graduate surveys. For example, those who graduated in 2000 (i.e. class of 2000) are surveyed in 2002 and re-surveyed again another three years later (class of 2000 follow-up). For the class of 2005 there is a 2007 NGS, but no follow-up survey as this was discontinued. Similarly, for the class of 2009/2010, there is a 2013 NGS. Lastly, for the class of 2015, there is a 2018 NGS.

One of the key advantages of the NGS dataset is that it surveys individuals soon after graduation from a post-secondary institution.[14] By doing so one abstracts from the measurement error problem associated with labour market experience. Recall that the traditional datasets, e.g. the LFS and the Census, have had to proxy for labour market experience using age: a very imperfect proxy if women temporarily leave the workforce to have children. By focussing on the period right after graduation one can better understand the source of the gender wage gap found in traditional datasets. One can see whether the gap starts very early on, or if it is something that develops over time.

My sample is restricted to graduates who are aged less than or almost 50 years old at the time of graduation and are working as a full-time employee. The first restriction is the age restriction where graduates who were 50 years old or less are considered. This restriction allows me to base my study on those individuals that get education to improve their skills rather than on those who take education as more of leisure. Another restriction is full-time employees where 30 hours per week or more is considered as full-time employment. This restriction is extremely important as Drolet

[13] For my analysis I only focus on the surveys that focus on graduates two or three years after graduation.

[14] For graduating class of 2000, first survey is done from March to October 2002, and the follow-up is done from April to July 2005. For the class of 2005, the data is collected from May to September 2007. For the class of 2009/10, the data collection period is from April to September 2013. Lastly, for the graduating class of 2015, the survey is done from June to November 2018.

(2002) associate a higher gender wage gap with part-time employment and due to this reason, full-time employment should make men and women more equal. It is also interesting to note here that this dataset shows a higher rate of women working as a full-time employee as when they graduate, they are willing to work more hours and focus more on their career for the time being. The last restriction is on the class of workers which excludes all self-employed individuals and unpaid family workers in Canada. This is mainly done because it is difficult to find the weekly wage of these individuals as their revenue includes profit and remuneration. This reduces my sample to 10,327.

Unlike the 2018 master file, which records wage and earnings as a dollar value, the public-use files only contain annual earnings (no wage data), and only in intervals. In order to calculate the hourly wage, as done by Boudarbat and Connolly (2013),[15] I divide annual earnings by taking the annual earnings for the main job and dividing it by the usual weekly hours which is multiplied by 52.[16] The public-use files present earnings in intervals of $5,000 (for example less than 5,000, 5,000 to 10,000, 10,000 to 15,000 and so on), so I have taken the midpoint of these intervals.[17] Similarly, the usual weekly hours are also recorded in intervals in the public-use files and I have taken the midpoint of weekly hours intervals.[18]

For the educational attainment variable, I have considered a variable that represents the highest level of education attained at the time of each survey. Furthermore, the work experience variable

[15] The older master files of the NGS did not have hourly wage.
[16] For the public-use file of the 2018 NGS, the question asks, "What is the estimated gross annual earnings in Canadian dollars for the job held during the 2018 survey reference week."
[17] For the 2018 NGS (class of 2015), the earnings are recorded in $10,000 interval instead.
[18] For the 2018 and 2013 NGS, usual hours are not given in the public-use files. To calculate usual hours at the main job, I give full-time employees 30 hours of work and part-time employees 15 hours.

is created by adding the pre-diploma full-time work experience with the post-diploma work time as done by Boudarbat and Connolly (2013).

Table 2 presents summary statistics for men and women separately.[19] First, a gender wage gap of $4.14 can be seen as men earn $39.5 and for women it is $35.12. If one looks at education, 51.2% of women in my sample have a bachelor's degree (1.4% higher than men). Similar case holds for the above bachelor's degree where the proportion of women is 2.5% higher than men. There is an important difference in the field of study between men and women. For example, 26.5% of men in my sample, opt for 'Architect, Engineering and related technologies' field compared to women where the proportion is 4.6%. In addition, occupation also accounts for important difference between men and women. 'Natural and Applied Sciences and Related Occupation' has more representation of men compared to women, a 19.4%-point difference. On the other hand, 17.3% of women in my sample choose Health Occupation in comparison to 4.9% of men. This coincides with past findings where women primarily concentrate on working in health occupations (e.g. Boudarbat and Connolly (2013)). Furthermore, one can see a significant difference in industry where 'Good-producing Industries' consists of 19% of men (12.2% higher than women). This is mainly due to higher representation rates of men in manufacturing, construction and transportation industries.

4. Econometric Model

As with Boudarbat and Connolly (2013), the goal is to carry out a Blinder-Oaxaca decomposition of the wage gap. I first estimate a wage equation for men and women, separately. More precisely, I estimate the following equations using OLS

[19] All means are weighted.

$$Y_i^m = X_i^m \beta^m + \varepsilon_i^m \quad \textbf{(1)}$$

$$Y_j^w = X_j^w \beta^w + \varepsilon_j^w \quad \textbf{(2)}$$

where equation (1) is estimated using the sample of men workers, and equation (2) using the sample of women workers. Y_i^m and Y_j^w are the logarithm of the hourly wage of men and women, respectively. The *i* subscript represents the individual observations for men ($i=1,\ldots,n_m$) and the *j* represents the individual observations for women ($j=1,\ldots,n_j$). It is important to note, that the parameter vector is allowed to differ across gender.

X_i^m is the vector of observable characteristics for men, whereas X_j^w is the vector of observable characteristics for women. This vector includes observable characteristics such as family characteristics (marital status, number of dependent children), education level and work/job characteristics. More precisely it includes three education groups where the college or below is the reference group in the regression.[20] The presence of dependent children is created as a binary variable whose value is 1 if the individual has a child, and zero otherwise.[21] The binary variable for marital status is equal to 1 if the individual is married or common law, and zero otherwise.

[20] Three education groups are: College or below, Bachelor's degree and Master's degree. College or below is the base category. CEGEP diploma or certificate are included in the college or below group. University diploma/certificate below BA are included in the bachelor's degree category. Doctorate, university diploma/certificate above BA are included in Master's degree category.

[21] In the public-use files, the dependent children include children for whom you are financially responsible and children for whom you have sole or joint custody.

Finally, there are nine indicator variables for field of study,[22] eight indicator variables for occupation,[23] and six indicator variables for industry.[24]

As a second step I carry out the decomposition. One can write the difference in mean wages as follows:

$$\bar{Y}^m - \bar{Y}^w = (\bar{X}^m - \bar{X}^w)\hat{\beta}^m + \bar{X}^w(\hat{\beta}^m - \hat{\beta}^w) \quad \textbf{(3)}$$

where $\hat{\beta}^m$ *and* $\hat{\beta}^w$ are the OLS parameter estimates. The first right hand side term represents the explained component, i.e. how much of the mean wage differential can be explained by differences in observable characteristics. The second right hand side term represents the unexplained component (which could include discrimination).

The Blinder-Oaxaca Decomposition encounters few problems as mentioned by Jann (2008). There is an issue regarding the identification of the contribution of different categorical variables (i.e. educational level and occupation) where the problem is faced when there are more than three categories of a variable. As for the empirical work, these categories of the variables are generated as dummy variables and in the end one category is omitted from the regression in order to avoid perfect multicollinearity. The problem comes in choosing which variable to omit or consider as a

[22] Field of study dummies are: 1) Education, 2) Visual and Performing Arts, & Communications Technologies, 3) Humanities, 4) Social and Behavioral Sciences and Law, 5) Business, Management and Public Administration, 6) Physical and Life Sciences and Technologies, 7) Mathematics, Computer and information Sciences, 8) Architecture, Engineering and related technologies, 9) Agriculture, Natural Resources and Conservation. The remaining group i.e. 'Other field', is the base category.

[23] Eight 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 education, law, social science, 6) Occupations in art, culture, recreation and sport, 7) Sales and service occupations, 8) Trades, transport, equipment operators and related occupations. The remaining group i.e. 'Natural resources, agriculture, related production occupations' is the reference group.

[24] Six Industry dummies: 1) Trade, transportation and Warehousing, 2) Finance, Insurance, Real estate, Public Administration, 3) Professional, Scientific and Technical Services, 4) Educational Services, 5) Healthcare and Social Assistance, 6) Other services. The remaining group i.e. 'Goods-producing industries' is the reference group.

reference group as it changes the decomposition results. To avoid this issue, I am using Jann (2008) solution which restricts the dummy variable's coefficients so that it could sum up to zero to express them according to the differences from the mean of each category as done by Boudarbat and Connolly (2013). By doing this I can look at the individual contribution of each category.

In this paper, I am estimating three different specifications and the controls are added sequentially. In the first specification, *X* only includes education level and work experience. In the second specification, *X* includes education level, work experience, field of study, occupation and industry. Finally, the third specification includes two additional controls (i.e. marital status and number of dependent children).

5. Results

5.1 2018 NGS

Tables 3, 4, and 5 show the OLS regression results for men and women separately.[25] Table 3 only controls for education level and work experience. In Table 4, I add additional explanatory variables for field of study, occupation and industry. Finally, Table 5 shows the result for the richest specification which also includes presence of dependent children and marital status.

First, it can be seen that the education profile is common across all three specifications. As expected, the higher the education the higher the return, and this holds for all three specifications.[26] For example in Table 5, men with bachelor's degree make 15.4% more than men with a college degree or below. Furthermore, the coefficient estimates in the field of study are also similar for men and women across Tables 4 and 5. For example 'Architect, Engineering and related Technologies' have a larger coefficient estimate across the specifications (i.e. In table 4, men

[25] All regressions are weighted.
[26] The findings in Tables 4 and 5 are very similar.

compared to men in 'other field' make 11.3% more).[27] One can also see an important difference in occupation for both men and women across specifications. The coefficient estimates of 'Health Occupations' for women in Tables 4 and 5 are economically significant: in both cases, women in these occupations make approximately 30% more than women in the base group i.e. Resources, Agriculture, Related production and Manufacturing occupation. Similarity across tables is also present in industry. For example, men in 'Finance, Insurance, Real estate, Public Administration' industry make 7.2% more than men in 'Goods-producing industry' in both specifications 2 and 3 i.e. Tables 4 and 5.

Although one cannot directly compare the coefficient estimates between men and women, one can still get some insight from the comparison. If one focuses on Table 5, the richest specification, one can see an important differences in the field of study. As said earlier, the big difference is seen in 'Architect, Engineering and related Technologies' field which has more proportion of men (26.5%) than women (4.6%). If we look at returns for this field, men in 'Architect, Engineering and related Technologies' make 11% more compared to men in the base group i.e. 'other fields' whereas women in the same field make 8.7% more than women in the base group. However, this does not mean that men make more than women as the comparison is always with respect to the base group. Furthermore, occupation also accounts for important differences. For example, it is interesting to look at 'Management Occupations' as there is evidence in literature than men CEOs or men in senior position make more than women. However, the results are similar as women in 'Management Occupations' make 34.2% more as compared to women in the base group (Natural Resources, Agriculture, Related production and Manufacturing) whereas men in Management

[27] Other field includes Information and cultural industries, Arts, entertainment and recreation, accommodation and food services.

Occupations' make 28.2% more than the base group. Finally, the industry also shows significant differences among men and women. There is more representation of women (27.6%) in 'Healthcare and Social Assistance' industry compared to men (8%). One can see a higher return where women in this industry make 12.6% more than women in 'Goods-producing Industries' (i.e. base category), whereas men in the same field make 8.6% more than the base category.

Table 6 illustrates the decomposition results for the 2018 NGS (class of 2015). Columns (1), (2) and (3) shows the results for the three specifications.[28] Before discussing the decomposition findings it should be noted that the difference in the means of the log of the hourly wage is 9.77%. The results are very similar to those of findings of Boudarbat and Connolly (2013) who looked at pre-Great Recession years. It would appear, at least in the aggregate, that the gap has not worsened (or improved) after the Great Recession.

Table 6 shows that the gap still remains unexplained across all three specifications. For specification 1, the one with few explanatory variables, the unexplained component accounts for 120.42% of the gap. When add controls, one should expect to be included, the unexplained components account for approximately a 100% of the gap. This means that mean characteristics do not explain the gap. For example, in the richest specification, column (3), the unexplained portion indicates that if we account for mean characteristics and give women the same mean characteristics as men then the gap would be 3.75% bigger.

The contribution of education as a group is essentially the same across all three specifications. In all three cases, giving women the mean education level of men, would make the gap increase by

[28] Column (1) shows the decomposition result when using education level and work experience as the explanatory variables. Column (2) presents additional explanatory variables i.e. field of study, occupation and industry. Column (3), the richest specification, adds two additional controls i.e. presence of dependent children and marital status.

approximately 11%. This is not surprising as women are more educated than men in my sample. This total negative effect of education is largely driven by the negative contribution of college or below degree (It ranges between -7% to -8%).

Field of study can only explain a small fraction of the gender wage gap. For example, it increases from 4% in column (2) to 8% in column (3). The largest contributor is 'Architect, Engineering and related technologies' across columns (2) and (3), which is the same field as found by Boudarbat and Connolly (2013) and Drolet (2002) where men choose engineering field more than women. This field is more 'male-dominant' and contributes almost 13% across columns. On the other hand, 'Agriculture, Natural Resources and Conservation' field offers negative impact in both columns (2) and (3) (i.e. it accounts for -12.6% in both). This is mainly because 80% of women in this sample decide to graduate from 'Agriculture, Natural Resources and Conservation' program.

Interestingly, one can see that one-third of the gap can only be explained by industry. In column (2), the industry explains 21% of the gap and it increases in column (3) to 32%. This is coherent with previous research and also with Boudarbat and Connolly (2013) where they say women may choose less lucrative fields and industry than men. This total positive effect is mostly driven by 'Goods-producing Industries' and other services (i.e. Information and cultural industries, Arts, entertainment and recreation, accommodation and food services). Goods-producing Industries accounts for almost 7% in both of the specifications (i.e. specifications 2 and 3) and Other services presents almost 20% (increases by 1% in specification 3). These findings align with summary statistics in Table 2 where 'Goods producing industries' comprises of 19% of men (12.2% higher than women).

Occupation have large but opposite impact compared to field of study and industry. It consistently explains between -12% to -14% across specifications 2 and 3. If we account for the differences in

the proportion of men and women in different occupations, the gap would be even bigger (12% more). Once again, the results again completely aligns with Boudarbat and Connolly (2013) as the largest positive impact is due to the 'Natural and Applied Sciences and Related Occupations' which makes sense as this field is more rewarding for men and is clearly a "male-dominated field" as 70.5% men work in this field compared to women. However, 'Health Occupations' comes on the negative side of impact across the specifications (i.e. by a change of only 2% from specifications 2 to 3 and this could be because three times more women choose this occupation over men.

Finally, other factors have smaller effect on gender wage gap. For example, work experience remains negative but similar across all the specifications (falls by 1% from specification 2 to 3). Sociodemographic variables (presence of children, marital status) describes between 1% to 5% of the gap in specifications 2 and 3.

5.2 Overview of the gap from Class of 2000 – Class of 2015

Figure 1 provides a comparison for all the other graduating classes (i.e. class of 2000 to 2018),[29] using the complete model specification i.e. specification 3.

It shows the gender wage gap at mean for two years after graduation,[30] and for three to five years after graduation.[31] The gap at mean presents the difference between the average of the log of wages for men and women. It is very clear that the gap remains positive across all cohorts indicating that men earn more than women.[32] The figure demonstrates that on average women earn 8.7% to 9.2%

[29] There is no variable that could account for work experience in public-use files of the 2002, 2005, 2007 and 2013 NGS.
[30] Two years after graduation includes the 2002 NGS (class of 2000) and the 2007 NGS (class of 2005).
[31] It includes: the 2005 NGS (class of 2000), the 2013 NGS (class of 2009/10) and the 2018 NGS (class of 2018).
[32] The wage gap is shown through blue dots and the y-axis on left side presents the fraction in percentage of explained and unexplained which is computed through the Blinder-Oaxaca Decomposition.

less than their male counterparts after the two years of graduation. For the class of 2009/10 (the 2013 NGS) the gap reached its highest level of 14% whereas it decreased to 9.7% when using class of 2015 (the 2018 NGS). One can say that this increase in gap could be due to the Great Recession of 2008 which affected the labour market activity. This coincides with the finding of Piazzalunga and Di Tommaso (2019). They consider the time period of 2004 to 2012 and find similar results in Italy where the gender wage gap increased from 3.8 to 8.6% during the crisis. Interestingly, one can see that across all the cohorts, most of the gap remains consistently unexplained. It ranges from 52% to 103.75%. This means that women's mean characteristics have minimum explanatory power (for example, if we account for mean characteristics and give women the same mean characteristics as men the gap would be 3.75% bigger according to the 2018 NGS.

6. Robustness Check

In this section, I carry out a robustness check where I include part-time workers in my analysis, using the 2018 NGS. Although it is common to look at full-time workers there are some researchers that have included part-time workers in their analysis i.e. Blau and Kahn (2006)

Column (1) of Table 8 shows my main decomposition results when I only use full-time workers, and column (2) presents results where I now include part-time workers in the analysis.[33] The analysis is only for the richest specification i.e. specification 3. Most importantly, the results are very similar. The overall gap mainly remains unexplained (reduces from 103.7% to 98.8%). This means that if you look at the mean characteristics and give women the same mean characteristic as men the gap would be essentially the same. If one focuses on some of the main categories i.e. education, field of study, occupation and industry, there are small differences in their respective

[33] Table 7 presents the regression results for Table 8.

contribution. For education profile, one can see a small change as the total effect of education still remains negative but decreases in magnitude (-10.65% to -7.4%). Again, this explains that women tend to get more education than men. Field of study explains a small portion of the gap and it decreases from 7.9% to 3.3%. Similarly, industry also shows a small change as it decreases by 1% when including part-time workers. It can be said that field of study and industry benefit men more than women. Lastly, occupation shows an opposite effect but is similar in both (changes by only 2%).

7. Benefit of the NGS Master files

In this section, I discuss the advantages of the NGS master files over the public-use files. I discuss four main advantages. First, in the master files the earnings and wages are recorded as a continuous variable (in dollars), whereas in the public-use files it is only provided in either $5,000 or $10,000 intervals.[34] The recent master files of the NGS offer a direct measure of wage compared to reporting the 'annual earnings' in previous NGS surveys. The problem of using earnings brackets from public-use files is the occurrence of measurement error. Given that earnings' is my dependent variable, it is critical to have it as a continuous variable, and as such a key reason to use the master files.

Second, there is a significant difference between the master files and public-use files when it comes to how a variable like education is analyzed. The master files have a rich source of detailed schooling information of individuals, more so than in the public-use files which could have made this research more detailed.[35] It would have been interesting to see how the detailed information

[34] The master files of the NGS has a series of questions that highlight last week's activities (in detail) as follows: "*What is your hourly wage or annual salary, including tips and commissions, before taxes and other deductions?*"

[35] There are broad categories of education in the master files: 1) High school diploma or equivalency certificate, 2) Trades or vocational certificate or diploma, 3) Certificate of Apprenticeship or Certificate of Qualification, 4) CEGEP

on educational attainment could affect the gender wage gap and previous studies advocate educational attainment is one of the important determinants of gender wage gap.

Third, by using the master files, one can find more reliable analysis on gender wage gap. Since the master files contain information for all 10 provinces of Canada, a provincial analysis would have been great in order to see the current situation of gender wage differential. Province presents the place of residence and there is correlation between where you live and the wage you earn, so if the place of residence is correlated with another explanatory variable it has an omitted variable bias. However, only the public-use files of the 2018 NGS contains information on region of residence compared to other public-use NGS datasets.

Lastly, the master files provide more detail if the graduates have successfully found the employment or not and provides more information on work experience (by focusing on the work duration from pre-diploma to post-diploma). In contrast, only the 2018 NGS public-use files provides information on work experience.

8. Conclusion

The main aim of this paper is to update the Canadian evidence on the gender wage differential using the 2018 National Graduates Survey. I use a standard Blinder-Oaxaca decomposition to see if differences in mean characteristics of men and women can explain the gender wage gap.

There are three main findings. First, the gender wage gap remains the same ten years after the Great Recession as it was before the recession. In contrast, other papers that used the Canadian data found the gender wage gap to be narrowing (for example, Pelletier et al., 2019; Schirle, 2015).

certificate or diploma , 5) College or other non-university certificate or diploma, 6) University certificate or diploma below a bachelor's degree, 7) Bachelor's degree, 8) University certificate or diploma above a bachelor's degree, 9) Degree in medicine, dentistry, veterinary medicine or optometry, 10) Master's degree, 11) Earned doctorate, 12) Other.

Second, the gender wage differential consistently remains unexplained by mean characteristics. It accounts for 103.75% of the gap when using complete specification (i.e. specification 3). This explains that if we give women the same mean characteristics as men the gap would be 3.75% bigger. Finally, industry is the only group that can explain one-third of the gender wage gap. This is no surprise as other researchers also find similar result in the case of Canada (for e.g. Boudarbat and Connolly, 2013) and Pelletier et al., 2019). Interestingly, if one focuses on individual categories within the groups (for e.g. industry or occupation), one can notice variation in contribution. It is just when you sum up the contribution of each individual categories, the contribution of the entire groups, except for industry, have little explanatory power.

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Table 1: Overview of NGS Surveys

Graduation Year	Survey Year	Survey Name
2000	2002	National Graduates Survey - Class of 2000 (2000 NGS)
	2005	Follow-up of Graduates Survey - Class of 2000 (2000 FOG)
2005	2007	National Graduates Survey - Class of 2005 (2005 NGS)
2009/2010	2013	National Graduates Survey – Class of 2009/2010 (2013 NGS)
2015	2018	National Graduates Survey – Class of 2015 (2018 NGS)

Note: Starting from the class of 2005, the five-year follow-up has been discontinued.

Table 2: Summary Statistics, 2018 NGS (class of 2015)

Variables	Men (1)	Women (2)
A. Wage		
Hourly Wage	39.536 (18.327)	35.122 (15.580)
B. Educational Attainment		
College or below	0.241 (0.428)	0.202 (0.401)
Bachelor's Degree	0.498 (0.500)	0.512 (0.499)
Master's Degree and Above	0.259 (0.438)	0.284 (0.451)
C. Field of Study		
Education	0.033 (0.179)	0.083 (0.277)
Visual and Performing Arts, & Communications Technologies	0.029 (0.169)	0.041 (0.200)
Humanities	0.041 (0.200)	0.046 (0.210)
Social and Behavioral Sciences and Law	0.111 (0.315)	0.215 (0.411)
Business, Management and Public Administration	0.240 (0.427)	0.248 (0.432)
Physical and Life Sciences and Technologies	0.049 (0.216)	0.056 (0.231)
Mathematics, Computer and information Sciences	0.077 (0.268)	0.018 (0.133)
Architecture, Engineering and related technologies	0.265 (0.441)	0.046 (0.211)
Agriculture, Natural Resources and Conservation	0.073 (0.260)	0.191 (0.393)
Other	0.077 (0.267)	0.050 (0.219)
D. Occupation		
Management Occupations	0.066 (0.249)	0.044 (0.206)
Business, Finance and Administrative Occupations	0.181 (0.385)	0.251 (0.434)
Natural and Applied Sciences and Related Occupations	0.281 (0.449)	0.087 (0.283)
Health Occupations	0.049 (0.217)	0.173 (0.378)
Occupations in Education, Law, Social Science and Community	0.138 (0.344)	0.262 (0.439)
Occupations in Art, Culture, Recreation and Sport	0.027 (0.163)	0.039 (0.195)
Sales and Service Occupations	0.139 (0.346)	0.123 (0.328)
Trades, Transport, Equipment Operators and related Occup.	0.074 (0.262)	0.004 (0.068)
Natural Resources, Agriculture, Related Production, Manufacturing	0.042 (0.201)	0.012 (0.109)
E. Industry		
Goods-producing Industries	0.190 (0.392)	0.068 (0.252)
Trade, transportation and Warehousing	0.127 (0.333)	0.093 (0.290)
Finance, Insurance, Real estate, Public Administration	0.196 (0.397)	0.161 (0.368)
Professional, Scientific and Technical Services	0.202 (0.401)	0.136 (0.343)
Educational Services	0.065(0.248)	0.131 (0.338)
Other Services	0.137 (0.344)	0.131 (0.337)
Healthcare and Social Assistance	0.080 (0.271)	0.276 (0.447)
F. Work Experience	36.747 (28.669)	41.474 (29.192)
G. Presence of Children	0.139 (0.346)	0.179 (0.378)
H. Region		
Atlantic Provinces	0.081 (0.274)	0.069 (0.255)
Quebec	0.286 (0.451)	0.302 (0.459)
Ontario	0.462 (0.498)	0.441 (0.496)
Western provinces and territories	0.169 (0.375)	0.186 (0.389)
Observations	4,331	5,996

Note: All means are weighted. Standard deviations are presented in parenthesis.

Table 3: Regression Result using Specification 1, 2018 NGS

Variables	Male (1)	Female (2)
A. Education level		
Bachelor's Degree	0.1970*** (0.0160)	0.2840*** (0.0139)
Master's Degree and Above	0.3510*** (0.0182)	0.4300*** (0.0154)
B. Work Experience	0.0012*** (0.0002)	0.0016*** (0.0001)
Constant	3.345*** (0.0157)	3.132*** (0.0142)
Observations	4,331	5,996
R-squared	0.085	0.126

Note: Standard errors are in brackets. All regressions are weighted. Column (1) shows regression estimates for male and column (2) shows result for female. Specification 1 requires only the impact of educational level and work experience. For educational attainment, college or below is used as a reference group. *** p<0.01, ** p<0.05, * p<0.1

Table 4: Regression Result using Specification 2, 2018 NGS

Variables	Male (1)	Female (2)
A. Education level		
Bachelor's Degree	0.1580*** (0.0165)	0.2580*** (0.0130)
Master's Degree and Above	0.2870*** (0.0190)	0.3750*** (0.0147)
B. Work Experience	0.0011*** (0.0002)	0.0014*** (0.0001)
C. Field of Study		
Education	0.1230*** (0.0442)	0.0190 (0.0305)
Visual and Performing Arts, & Communication Technologies	-0.0310 (0.0428)	-0.0650* (0.0340)
Humanities	-0.0401(0.0373)	-0.0846*** (0.0316)
Social and Behavioral Sciences and Law	0.0233 (0.0293)	-0.0623** (0.0246)
Business, Management and Public Administration	0.1230*** (0.0266)	0.0824*** (0.0244)
Physical and Life Sciences and Technologies	-0.0933*** (0.0360)	-0.0734** (0.0303)
Mathematics, Computer and information Sciences	0.0928*** (0.0325)	0.119*** (0.0425)
Architecture, Engineering and related technologies	0.1130*** (0.0262)	0.0871*** (0.0326)
Agriculture, Natural Resources and Conservation	0.0301 (0.0390)	0.1090*** (0.0283)
D. Occupation		
Management Occupations	0.2950*** (0.0388)	0.3450*** (0.0520)
Business, Finance and Administrative Occupations	0.0795** (0.0362)	0.0468 (0.0480)
Natural and Applied Sciences and Related Occupations	0.2100*** (0.0339)	0.2280*** (0.0494)
Health Occupations	0.3830*** (0.0557)	0.3030*** (0.0519)
Occupations in Education, Law, Social Science and Community	0.1700*** (0.0384)	0.1210** (0.0493)
Occupations in Art, Culture, Recreation and Sport	-0.0061 (0.0506)	0.0920* (0.0538)
Sales and Service Occupations	-0.1360*** (0.0369)	-0.114** (0.0493)
Trades, Transport, Equipment Operators and related Occup.	0.0531 (0.0374)	0.0814 (0.0826)
E. Industry		
Trade, transportation and Warehousing	-0.0330 (0.0241)	-0.0419 (0.0264)
Finance, Insurance, Real estate, Public Administration	0.0702*** (0.0224)	0.1070*** (0.0238)
Professional, Scientific and Technical Services	-0.0338 (0.0214)	-0.0116 (0.0239)
Educational Services	-0.1100*** (0.0348)	0.00897 (0.0280)
Healthcare and Social Assistance	-0.0920*** (0.0243)	-0.1330*** (0.0251)
Other services	-0.1390*** (0.0357)	-0.0735*** (0.0259)
Constant	3.2250*** (0.0367)	3.0460*** (0.0471)
Observations	4,331	5,996
R-squared	0.220	0.284

Note: Standard errors are in brackets. All regressions are weighted. Column (1) shows regression estimates for male and column (2) shows result for female. Specification 2 includes educational attainment, work experience, occupation, field of study and industry. For educational attainment, college or below is used as a reference group. For field of study, 'other fields' is a base category. In occupation, Natural Resources, Agriculture, Related production and manufacturing is a base category. For industry, Goods-producing Industries is a base category. *** p<0.01, ** p<0.05, * p<0.1

Table 5: Regression Result using Specification 3, 2018 NGS.

Variables	Male (1)	Female (2)
A. Education level		
Bachelor's Degree	0.1540*** (0.0163)	0.2640*** (0.0131)
Master's Degree and Above	0.2650*** (0.0189)	0.3750*** (0.0147)
B. Work Experience	0.0006*** (0.0002)	0.0012*** (0.0001)
C. Field of Study		
Education	0.0998** (0.0438)	0.0117 (0.0304)
Visual and Performing Arts, & Communication Technologies	-0.0334 (0.0423)	-0.0624* (0.0399)
Humanities	-0.0455 (0.0369)	-0.0905*** (0.0315)
Social and Behavioral Sciences and Law	0.0306 (0.0290)	-0.0621** (0.0245)
Business, Management and Public Administration	0.1170*** (0.0263)	0.0777*** (0.0244)
Physical and Life Sciences and Technologies	-0.0839** (0.0356)	-0.0716** (0.0302)
Mathematics, Computer and information Sciences	0.0970*** (0.0321)	0.1080** (0.0423)
Architecture, Engineering and related technologies	0.1100*** (0.0259)	0.0871*** (0.0325)
Agriculture, Natural Resources and Conservation	0.0295 (0.0385)	0.1050*** (0.0282)
D. Occupation		
Management Occupations	0.2820*** (0.0384)	0.3420*** (0.0518)
Business, Finance and Administrative Occupations	0.0829** (0.0357)	0.0494 (0.0478)
Natural and Applied Sciences and Related Occupations	0.2020*** (0.0355)	0.2250*** (0.0492)
Health Occupations	0.3740*** (0.0511)	0.3030*** (0.0517)
Occupations in Education, Law, Social Science and Community	0.1660*** (0.0379)	0.1200** (0.0491)
Occupations in Art, Culture, Recreation and Sport	0.00823 (0.0501)	0.0975* (0.0536)
Sales and Service Occupations	-0.1310*** (0.0364)	-0.1070** (0.0491)
Trades, Transport, Equipment Operators and related Occup.	0.0532 (0.0370)	0.0850 (0.0823)
E. Industry		
Trade, transportation and Warehousing	-0.0263 (0.0239)	-0.0368 (0.0263)
Finance, Insurance, Real estate, Public Administration	0.0702*** (0.0222)	0.1090*** (0.0237)
Professional, Scientific and Technical Services	-0.0316 (0.0212)	-0.0067 (0.0239)
Educational Services	-0.1190*** (0.0344)	0.0082 (0.0279)
Healthcare and Social Assistance	-0.0869*** (0.0240)	-0.1260*** (0.0250)
Other services	-0.144*** (0.0353)	-0.0756*** (0.0258)
F. Children	0.0721*** (0.0199)	0.0291** 90.0139)
G. Married	-0.0999*** (0.0143)	-0.0633*** (0.0104)
Constant	3.4070*** (0.0448)	3.1460*** (0.0503)
Observations	4,331	5,996
R-squared	0.238	0.290

Note: Standard errors are in brackets. All regressions are weighted. Column (1) shows regression estimates for male and column (2) shows result for female. Specification 3 includes educational attainment, work experience, occupation, field of study, industry, marital status and dependent children. For educational attainment, college or below is used as a reference group. For field of study, 'other fields' is a base category. In occupation, Natural Resources, Agriculture, Related production and manufacturing is a base category. For industry, Goods-producing Industries is a base category. *** p<0.01, ** p<0.05, * p<0.1

Table 6: Detailed Blinder-Oaxaca Decomposition of gender wage gap at mean, 2018 NGS (class of 2015)

	(1)	(2)	(3)
Log wage gap at mean (0.0977)			
Fraction Explained	-20.478%	-1.794%	-3.744%
Fraction Unexplained	120.427%	101.8395	103.753%
Fraction Explained by:			
A. Education level	-11.734%	-10.587%	-10.655%
College and below	-8.451%	-7.591%	-7.585%
Bachelor's Degree	-0.534%	-0.593%	-0.755%
Master's Degree and above	-2.752%	-2.404%	-2.315%
B. Work Experience	-8.717%	-7.520%	-6.025%
C. Field of Study		3.946%	7.903%
Education		-3.601%	-3.049%
Visual and Performing Arts, & Communications Technologies		0.757%	0.722%
Humanities		0.450%	0.460%
Social and Behavioral Sciences and Law		2.629%	2.393%
Business, Management and Public Administration		-0.194%	-0.189%
Physical and Life Sciences and Technologies		0.060%	0.063%
Mathematics, Computer and information Sciences		3.928%	3.979%
Architecture, Engineering and related technologies		13.403%	13.675%
Agriculture, Natural Resources and Conservation		-12.687%	-12.585
Other fields		-0.878%	-0.782%
D. Occupation		-14.419%	-12.013%
Management Occupations		4.819%	4.555%
Business, Finance and Administrative Occupations		5.115%	5.044%
Natural and Applied Sciences and Related Occupations		18.276%	16.821%
Health Occupations		-32.291%	-34.914%
Occupations in Education, Law, Social Science and Community		-1.831%	-1.451%
Occupations in Art, Culture, Recreation and Sport		0.650%	0.556%
Sales and Service Occupations		-4.757%	-4.665%
Trades, Transport, Equipment Operators and related Occup.		-2.3435	-1.862%
Natural Resources, Agriculture, Related production and manufacturing		-2.303%	-2.306%
E. Industry		20.906%	31.861%
Goods-producing Industries		7.480%	7.175%
Trade, transportation and Warehousing		-0.144%	0.061%
Finance, Insurance, Real estate, Public Administration		4.819%	4.808%
Professional, Scientific and Technical Services		-1.637%	0.693%
Educational Services		-0.516%	-0.385%
Healthcare and Social Assistance		-0.705%	-0.695%
Other services		19.092%	20.210%
F. Children			-1.023%
G. Married			-4.256%

Note: The log wage gap at mean is the difference between the mean of the log wage for men, and the mean of the log wage for women. Column (1) is the decomposition where only education and work experience are included as explanatory variables. Column (2) is the decomposition where I add field of study, occupation and industry. Column (3) is the decomposition which adds two additional controls i.e. children and marital status.

Table 7: Regression Result including part-time workers using Specification 3, 2018 NGS (class of 2015)

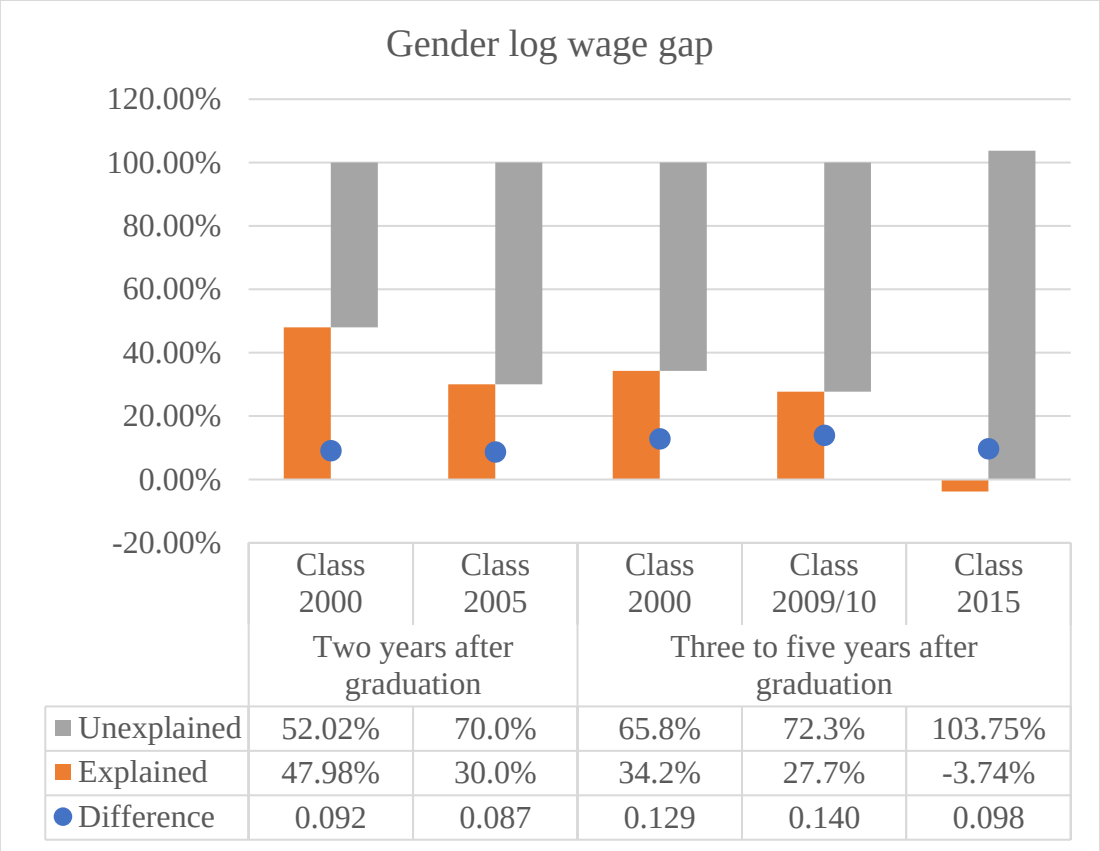
Variables	Male (1)	Female (2)
A. Education level		
Bachelor's Degree	0.1280*** (0.0167)	0.2330*** (0.0140)
Master's Degree and Above	0.2350*** (0.0194)	0.3170*** (0.0158)
B. Work Experience	0.0005** (0.0002)	0.0014*** (0.0001)
C. Field of Study		
Education	0.1510*** (0.0438)	0.0004 (0.0324)
Visual and Performing Arts, & Communication Technologies	-0.0945** (0.0403)	-0.0647* (0.0355)
Humanities	-0.0300 (0.0371)	-0.1100*** (0.0337)
Social and Behavioral Sciences and Law	0.0275(0.0296)	-0.0936*** (0.0268)
Business, Management and Public Administration	0.1190*** (0.0269)	0.0628** (0.0269)
Physical and Life Sciences and Technologies	-0.1010*** (0.0360)	-0.1310*** (0.0328)
Mathematics, Computer and information Sciences	0.0865*** (0.0334)	0.0779* (0.0460)
Architecture, Engineering and related technologies	0.0880*** (0.0266)	0.0538 (0.0364)
Agriculture, Natural Resources and Conservation	0.0639* (0.0386)	0.0548* (0.0302)
D. Occupation		
Management Occupations	0.2970*** (0.0405)	0.4460*** (0.0581)
Business, Finance and Administrative Occupations	0.0951** (0.0376)	0.1280** (0.0534)
Natural and Applied Sciences and Related Occupations	0.2360*** (0.0352)	0.3280*** (0.0550)
Health Occupations	0.3110*** (0.0556)	0.3980*** (0.0570)
Occupations in Education, Law, Social Science and Community	0.1500*** (0.0396)	0.2130*** (0.0548)
Occupations in Art, Culture, Recreation and Sport	-0.0016 (0.0507)	0.1300** (0.0590)
Sales and Service Occupations	-0.1520*** (0.0377)	-0.0340 (0.0546)
Trades, Transport, Equipment Operators and related Occup.	0.0586 (0.0388)	0.0545 (0.0899)
E. Industry		
Trade, transportation and Warehousing	-0.0454* (0.0248)	-0.1100*** (0.0293)
Finance, Insurance, Real estate, Public Administration	0.0610*** (0.0234)	0.1040*** (0.0271)
Professional, Scientific and Technical Services	-0.0340 (0.0224)	-0.0219 (0.0272)
Educational Services	-0.1680*** (0.0343)	-0.0399 (0.0306)
Healthcare and Social Assistance	-0.1030*** (0.0247)	-0.1460*** (0.0278)
Other services	-0.1330*** (0.0357)	-0.0840*** (0.0289)
F. Children	0.0758*** (0.0207)	0.0238 (0.0151)
G. Married	-0.1010*** (0.0148)	-0.0848*** (0.0114)
Constant	3.4240*** (0.0466)	3.1470*** (0.0560)
Observations	4,650	6,855
R-squared	0.240	0.248

Note: Standard errors are in brackets. All regressions are weighted. Column (1) shows regression estimates for male and column (2) shows result for female. Specification 3 includes educational attainment, work experience, occupation, field of study, industry, marital status and dependent children. For educational attainment, college or below is used as a reference group. For field of study, 'other fields' is a base category. In occupation, Natural Resources, Agriculture, Related production and manufacturing is a base category. For industry, Goods-producing Industries is a base category. *** p<0.01, ** p<0.05, * p<0.1

Table 8: Detailed Blinder-Oaxaca Decomposition of gender wage gap at mean, including part-time workers, 2018 NGS (class of 2015)

	(1)	(2)
Log wage gap at mean	0.977	0.104
Fraction Explained	-3.744%	1.108%
Fraction Unexplained	103.753%	98.887%
Fraction Explained by:		
A. Education level	-10.655%	-7.441%
College and below	-7.585%	-5.840%
Bachelor's Degree	-0.755%	-0.777%
Master's Degree and above	-2.315%	-0.824%
B. Work Experience	-6.025%	-5.130%
C. Field of Study	7.903%	3.37%
Education	-3.049%	-3.916%
Visual and Performing Arts, & Communications Technologies	0.722%	0.563%
Humanities	0.460%	0.574%
Social and Behavioral Sciences and Law	2.393%	3.177%
Business, Management and Public Administration	-0.189%	0.705%
Physical and Life Sciences and Technologies	0.063%	-0.164%
Mathematics, Computer and information Sciences	3.979%	3.720%
Architecture, Engineering and related technologies	13.675%	10.826%
Agriculture, Natural Resources and Conservation	-12.585	-11.507%
Other fields	-0.782%	-0.611%
D. Occupation	-12.013%	-14.735%
Management Occupations	4.555%	4.919%
Business, Finance and Administrative Occupations	5.044%	3.596%
Natural and Applied Sciences and Related Occupations	16.821%	20.694%
Health Occupations	-34.914%	-33.822%
Occupations in Education, Law, Social Science and Community	-1.451%	-2.120%
Occupations in Art, Culture, Recreation and Sport	0.556%	0.803%
Sales and Service Occupations	-4.665%	-4.284%
Trades, Transport, Equipment Operators and related Occup.	-1.862%	-1.620%
Natural Resources, Agriculture, Related production and manufacturing	-2.306%	-2.896%
E. Industry	31.861%	30.743%
Goods-producing Industries	7.175%	8.227%
Trade, transportation and Warehousing	0.061%	-0.901%
Finance, Insurance, Real estate, Public Administration	4.808%	5.763%
Professional, Scientific and Technical Services	0.693%	1.474%
Educational Services	-0.385%	1.061%
Healthcare and Social Assistance	-0.695%	-0.709%
Other services	20.210%	15.822%
F. Children	-1.023%	-1.112%
G. Married	-4.256%	-4.602%

Note: The log wage gap at mean is the difference between the mean of the log wage for men, and the mean of the log wage for women. Column (1) shows the decomposition result done in Table 6 column (3). Column (2) shows how the decomposition changes when I include part-time workers and using all the explanatory variables (i.e. education, work experience, field of study, occupation, industry, children and married).



	Two years after graduation		Three to five years after graduation		
	Class 2000	Class 2005	Class 2000	Class 2009/10	Class 2015
Unexplained	52.02%	70.0%	65.8%	72.3%	103.75%
Explained	47.98%	30.0%	34.2%	27.7%	-3.74%
Difference	0.092	0.087	0.129	0.140	0.098

Figure 1: Gender log wage gap at the mean and percentage of fraction explained and unexplained.