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Gender Gap in Earnings in Vietnam

Why Do Vietnamese Women Work in Lower Paid Occupations?

Iffat Chowdhury, Hillary C. Johnson, Aneesh Mannava and Elizaveta Perova

Differences in earnings between male and female workers persist in developed and developing countries despite a narrowing of gaps in educational attainment. This paper examines the gender wage gap in Vietnam and shows that a non-trivial part of the gap is associated with occupational sorting. The study considers three explanations for why occupational sorting emerges. First, data from Labour Force Surveys support the hypothesis that women sort into occupations with better non-monetary characteristics, such as paid leave and shorter hours. Second, the findings do not support the hypothesis of occupational sorting among the adult labour force as being driven by social norms about gender roles learned at an early age. Specifically, the analysis simulates what the gender wage gap would be if children pursued the occupations they aspired for at the age of twelve, and the distribution of salaries remained unchanged. Finally, there is no evidence to support the claim that individuals with higher education sort during the school-to-work transition, when women face higher barriers in finding a job in their field of study. Overall, the findings suggest that, in Vietnam gender-specific preferences for non-monetary job characteristics play a key role in the emergence of occupational sorting.

Keywords: gender wage gap, gender streaming, occupational sorting, Vietnam.

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1. Introduction

An earnings gap between women and men in the labour force is a common empirical feature of the labour market in countries around the world. This gender wage gap has been documented by economists for over half a century. While its magnitude has diminished in that time, it has seldom disappeared. To date, every country has some degree of wage inequality. Even in Iceland, ranked first in gender equality in the World Economic Forum's Global Gender Gap Index 2016, women's earnings are on average approximately 79 per cent that of men. In the country with the lowest ranking, Yemen, that figure is 63 per cent.

One factor frequently cited to explain this gap was the difference in levels of education between male and female workers. Indeed, under the Millennium Development Goal on promoting gender equality and empowering women, one target was to "(e)liminate gender disparity in primary and secondary education … by 2005, and in all levels of education by… 2015". Over the long term, perhaps in part as a result of such directed efforts, the global trend has been a narrowing of the education gap between men and women, and even a reversal in some countries including Vietnam[1] (World Bank 2012a).

If differences in education levels do not explain the gender wage gap in East Asian countries today, what factors are responsible? One factor that has received increasing attention is occupational sorting. Petersen and Morgan (1995) find that wage differences between men and women are very small within an establishment for the same occupation. This study builds on their work by examining the role of occupational sorting in gender wage gaps in Vietnam. It also explores some potential channels for the emergence of occupational sorting. Vietnam offers a great setting for these analyses—gender gaps in educational enrolment have been more or less closed and female labour force participation is relatively high. From an analytical perspective, this implies that differences in human capital and differential selection into the labour force are less likely to be big drivers of the wage gap. From a policy perspective, this setting supports a focus on occupational sorting in the task of tackling inequalities in economic opportunities between genders rather than on first order issues of labour force participation and education.

As a starting point, this paper shows that the gender wage gap in Vietnam persists despite the closing of the education gap, and demonstrates that a large fraction of this gap is associated with occupational sorting. Then, three hypotheses regarding occupational sorting are explored:

1. Occupational sorting occurs once women are in the labour market and is explained by sorting on non-monetary characteristics of jobs. Women are more willing to forego monetary compensation for greater job security, insurance or leave since they have stronger preferences for these characteristics.
2. Occupational sorting emerges much before women enter the labour market. Social norms about gender roles learned at an early age drive differences in career aspirations between young girls and boys. Career aspirations affect choices over level of education and field of study, and thus predetermine occupational choices when girls enter the labour force.
3. Sorting into different occupations occurs during the school-to-work transition, because of gender-specific barriers to finding jobs within one's field of study. This hypothesis is only tested for individuals who have upper secondary, vocational or tertiary education, where specialization during study affects the types of jobs that are available.

The study finds support for the first hypothesis; the analysis suggests that women have stronger preferences for non-monetary job characteristics. However, while women are concentrated in occupations and industries with higher non-monetary benefits, it is also found that women still face an additional penalty in those jobs. This wage differential is similar in magnitude to the unadjusted wage gap. The paper does not find evidence that differences in career aspirations of young boys and girls are a likely culprit for gender wage gaps in the future (the second hypothesis). Similarly, the results do not suggest

that women face greater barriers in the school-to-work transition; they are not more likely compared to men to work outside of their field of study.

The remainder of this paper is structured as follows. The next section provides an overview of the relevant literature. The third and fourth sections present the empirical strategy and data sources, respectively. The results are discussed in the subsequent section. The final section concludes.

2. Literature Review

This paper touches on several strands of literature: the dynamics of the gender wage gap in different parts of the world; the drivers behind the gender wage gap, including, the role of human capital versus sorting; and finally, explanations of why occupation and industry sorting emerge.

Several studies have documented the decline in the gender wage gap in the United States and OECD countries since at least the 1970s (Petersen and Morgan 1995; Blau and Kahn 2008). In developing countries, the trend is less clear-cut—Weichselbaumer and Winter-Ebmer (2005) find conflicting trends in different parts of the world in a meta-analysis. A common driver has been the narrowing of the gap in human capital, particularly relative experience (O'Neill and Polacheck 1993; Blau and Kahn 1997) and education. Grant and Behrman (2010) show that conditional on ever being enrolled, girls have higher levels of educational attainment than boys, and across thirty-eight less developed countries. Becker, Hubbard and Murphy (2010) show that the gender gap in college attainment had reversed in sixty-seven of 120 countries between 1970 and 2010, including countries with below-median per capita GDP. In developing Asian economies[2] the gender gap in education shrank by 80 per cent among younger cohorts between 1960 and 2010. And in Vietnam, education poverty[3] was much higher among young males than young females as of 2010 (Framework of Inclusive Growth Indicators 2014).

More generally, gaps in human capital now explain a smaller portion of the wage gap than in the past. Blau and Kahn (2016) show that human capital variables explained 27 per cent of the gender wage gap in the United States in 1980 but only about 8 per cent in 2010. In contrast, occupation and industry choice explained 27 per cent of the gap in 1980 and 49 per cent in 2010. This is in line with findings from other countries—on average, human capital characteristics explain 5.3 per cent of the wage gap in OECD countries and 6.4 per cent in developing countries, but when controlling for occupation this reduces significantly to 3.6 and 3.2 per cent, respectively (Oostendorp 2009). What then explains occupation-industry sorting?

Sorting into industries has received less attention in the literature than sorting into occupations, but is important from a policy perspective. In the East Asian "miracle" economies, women were often clustered in the manufacturing sector, especially export manufacturing. When Taiwan, China experienced economic growth, manufacturing jobs were lost to countries with lower labour costs; as a result, the women enjoyed fewer benefits from that growth (Zveglich Jr and van der Meulen Rodgers 2004). David, Albert, and Vizmanos (2017) have also documented that there still exists a gender wage gap within many occupations that penalizes women in the Philippines despite the wage gap favouring women in aggregate.

Occupational sorting has been tackled in a few different ways in the literature. A first set of explanations focused on differences in levels of human capital (Mincer and Polachek 1974). Specifically, greater human capital may raise productivity in some occupations more than in others. Individuals then are likely to sort across occupations based on their human capital. However, these differences have become less pronounced over time.

A second set of explanations focuses on differences in preferences and constraints between women and men. Currie and Chaykowski (1992) find differences in benefit coverage between male- and female-dominated occupations. Female-dominated jobs had lower pension benefits but better paid and unpaid leave. They explain the variation using a model where women face a greater trade-off between time in household production and labour production. Van der Meulen Rodgers and Zveglich, Jr. (2012)

and Bhalotra and Umaña-Aponte (2010) also find that preferences and constraints help explain gender discrepancies in labour force participation rates in developing Asian countries. Women's labour supply decisions are largely influenced by economic need, social norms and the burden of caregiving. Both studies similarly find that economic need and income volatility both push women into the labour force while motherhood reduces women's employment.

A third set of explanations centres on gender differences in educational paths. Since many occupations today require occupation-specific human capital that is acquired through education, gender streaming in education can have an effect on occupational choice and the gender pay gap (Black et al. 2008). Women continue to lag in the STEM fields and particularly in mathematically-intensive fields (Ceci et al. 2014). There is substantial evidence that mathematics test scores, maths-based curricula and maths as a college major are predictive of future income, while verbal abilities are not (Arcidiacono 2004).

A plausible explanation of education streaming may be a performance gap between the genders that has been observed in different fields across different settings. In the United States, girls and boys show no differences in maths or verbal skills at the start of education, but girls fall behind in maths as early as fifth grade (Fryer and Levitt 2009). Furthermore, Niederle and Vesterlund (2010) find that boys are more likely to perform in the right tail of the distribution in the maths section of the SAT, Advanced Placement (AP) and Graduate Record Examinations (GRE) tests in the United States. Bharadwaj et al. (2012) find similar trends in middle- and low-income countries on the Programme for International Student Assessment (PISA).

But there is considerable gender sorting that goes beyond performance. In the United States and the Netherlands, boys are generally more likely to study science and maths than girls even after controlling for performance (Buser, Niederle, and Oosterbeek 2014; Turner and Bowen 1999).[4] These gender-specific choices may be due to the fact that girls have lower levels of self-assessment conditional on performance and that parents are more likely to invest in mathematics education for male children, as Bharadwaj et al. (2012) find in Chile. Vietnam, however, seems to be atypical with respect to these results. Dercon and Singh (2013) in a study of the Young Lives data find that girls outperform boys in Vietnam and that parents have a pro-girl bias in education aspirations for their children.

Another branch of literature has explored the role of psychological traits. This work suggests that women are more risk-averse and altruistic, have a lower preference for competition and are less willing to negotiate. Some of this evidence is context-specific. Women appear more risk averse by their investments (Jianakoplos and Bernasek 1998; Hinz, McCarthy, and Turner 1997), even when controlling for income. Babcock et al. (2017) show that women are more likely than men to be asked to volunteer to tasks with a low impact on promotions and are more likely to accept. Buser, Niederle and Oosterbeek (2014) find that a lower preference for competition, controlling for academic ability, explains about 20 per cent of the gender difference in choice of academic track among high school students in the Netherlands. Bowles, Babcock and Lai (2006) find differences between genders in the propensity to initiate negotiations in the United States, while Card, Cardoso and Kline (2015) find that bargaining helps explain the gender earnings gap in Portugal.

It is important to understand when these observed differences in psychological traits emerge. For instance, Brinig (1995) finds that gender alone does not explain differences in risk preferences, but it becomes a significant predictor when interacted with age and that differences in risk preference peak at thirty. In Israel, Gneezy and Rustichini (2004) find that boys react to competition in running races while girls do not. Dreber, von Essen and Ranehill (2011), on the other hand, find that boys and girls react equally to competition in a similar experiment in Sweden. There is also mixed evidence in gender differences in risk taking at younger ages. Booth and Nolen (2012) find that among ten- and eleven-year-olds, boys are more risk taking when compared to girls in mixed-sex schools, but find no differences between those in single-sex schools. Cardenas et al. (2010) compare competition and risk preferences among children between the ages of nine and twelve in Sweden, a country with a high gender equality

index, and Colombia, a country with a lower gender equality index. In Colombia, girls and boys are equally competitive in four different tasks while in Sweden girls are more competitive than boys in certain tasks while boys are more competitive than girls in others. However, boys in both countries are more risk-taking than girls, with the gap being narrower in Sweden. The evidence overall is varied but suggests that these preferences are not necessarily fixed early on.

3. Data

This paper uses three data sets for our analysis. First, data on wage workers in Vietnam from the Labour Force Surveys (LFS) carried out by the General Statistics Office (GSO) of Vietnam between 2011 and 2014 are used. The LFS include information on occupation, industry and highest level of educational attainment for all respondents. Occupations are classified using the International Standard Classification of Occupations (ISCO-08) and industries using the International Standard Classification of Industry (ISIC-08), with both available at the four-digit level (corresponding to more than 400 occupations and industries), providing a sufficiently granular information on occupational and industry choice. A worker's highest level of education is classified using a system based on the International Standard Classification of Education (ICSED-08). Vietnam has an extensive system of vocational education, so the educational classification is simplified for ease of presentation.[5]

Second, the paper employs data from the Vietnam Young Lives (YL) project. YL is an international longitudinal cohort study of childhood poverty which has been following 12,000 children in four countries (Ethiopia, Peru, Vietnam and India) over a period of fifteen years. Each country has two cohorts, one consisting of 2,000 children born in 2001–02 and another consisting of 1,000 children born in 1994–95. The survey consists of three main elements: a household questionnaire; a child questionnaire; and a community questionnaire.

The first of four rounds of data collection under YL took place in 2002. It used a sampling strategy designed to ensure over-sampling of poor communities. An equal number of eligible children (aged either one or eight) were randomly selected into the sample in each community. Three more rounds of data collection took place in 2006, 2009 and 2013—by which time the younger cohort was eleven and twelve years old. The data from Round 4 (2013) are used for the younger cohort for two reasons. First, Round 4 of data collection falls within the time-frame of the LFS data used for the study; and second, due to differences in the questionnaires of the older and younger cohort, fine measures of cognitive ability are only available for the younger cohort in this round.

Data from the child questionnaire are used to explore gender differences in aspirations for a future job, controlling for cognitive ability. The YL project used the Raven's Matrix test in the first round and a Peabody Picture Vocabulary test (PPVT) in the following rounds. For Round 4, the PPVT test was only administered to the younger cohort. The Raven's Matrix test is a progressive non-verbal test where subjects identify the missing pattern in a visual geometric design. The PPVT is a rapid-fire test in which the subject is shown a series of pictures and given a word that describes one of the pictures. He or she is then asked to choose the appropriate picture that the word describes.

The occupation that children claim they would like to have when they are twenty-five years old are then matched to the occupations in the 2013 LFS to construct the monetary and non-monetary characteristics associated with these aspirational occupations. The aspirational occupations from the YL codes are general job titles like "doctor" or "teacher", and do not have any accompanying description to frame the type of "doctor" or "teacher". These jobs were matched to multiple four-digit occupation codes in the LFS based on the title and description of occupation. Online Appendix (https://openknowledge.worldbank.org/bitstream/handle/10986/29390/123477Appendix.pdf?sequence=5&isAllowed=y) provides more details on the matching procedure.

The final source of data made it possible to examine the relationship between field of study and occupation. The paper uses the World Bank's Skills Towards Employability and Productivity (STEP) programme. The STEP programme is a World Bank initiative to measure the relationship between skills, employability and productivity in low- and middle-income countries. STEP targets the urban working age adults aged.[6] In Vietnam, the surveys were carried out in Hanoi and Ho Chi Minh City, with households selected through a process of stratified random selection. The primary respondent within each household was chosen randomly. Data from the first wave of STEP surveys carried out in 2012 are used since they fall within the time-frame covered by the LFS data.

STEP includes an employee and employer module and covers 3,405 adults, of whom 2,037 are women. For this study, data from the employee module are used, and the analysis is restricted to employees (rather than employers or self-employed individuals) to make the sample comparable to the pool of wage workers from the LFS. This reduces the sample to 1,316 observations (643 women).

The STEP data have information on occupation and industry at the three-digit level rather than the four-digit classification available in LFS. Nevertheless, this corresponds to over 100 occupations and industries in the data. STEP makes a distinction between general and vocational education, using different survey questions to capture the level of educational attainment in each. The responses to these questions are combined and the levels simplified to make them similar to the ICSED-08 classification system used in the LFS. This leaves us with eight levels of education.

4. Empirical Strategy

The analysis in this paper consists of two stages. The first establishes the premise of this study—that gender wage gap persists in Vietnam despite a narrowing of differences in levels of educational attainment, and that occupational sorting explains a non-trivial portion of this gap. The second part explores the three explanations for the emergence of occupational sorting. Each stage is explained in more detail below.

4.1 Role of Occupational Sorting in Gender Wage Gaps in Vietnam

To establish the persistence of the gender wage gap and the importance of occupational segregation, this study relies on a decomposition approach similar to Petersen and Morgan (1995) and Fafchamps et al. (2009). It attempts to document the magnitude of gender wage gap and assess the importance of different factors, including education and, occupational and industry sorting. The estimated coefficients on education or industry or occupation dummies can be interpreted as the return to education (or choice of occupation or industry) as well as its correlation with an unobserved ability term. The following equations are estimated:

$$LnY_i = \alpha + \beta_1 Female_i + \gamma X_i + \varepsilon_i \tag{1}$$

$$LnY_i = \alpha + \beta_2 Female_i + \gamma X_i + \Sigma_{p=1}^{P} \tau_p Edu_{ip} + \varepsilon_i \tag{2}$$

$$LnY_i = \alpha + \beta_3 Female_i + \gamma X_i + \Sigma_{p=1}^{P} \tau_p Edu_{ip} + \Sigma_{q=1}^{Q} \rho_q Occ_{iq} + \Sigma_{r=1}^{R} \omega_r Ind_{ir} + \varepsilon_i \tag{3}$$

where Y_i is the measure of earnings; X_i includes a set of controls for the province, whether the area is rural or urban, the respondent's age and whether he/she belongs to an ethnic minority; Edu_{ip} represents dummies for the highest level of education; and Occ_{iq} and Ind_{ir} are dummies for the occupation and industry respectively using LFS data. Comparing the βs[7] across the three equations provides a descriptive picture of relative contributions of education and choice of occupation and industry to the gender wage gap.

4.2 Emergence of Occupational and Industry Sorting

4.2.1 In the Labour Market: Sorting Over Non-monetary Characteristics. The first hypothesis is that occupational sorting is a result of sorting over the non-monetary characteristics of jobs. Here, the focus is on average weekly hours, having a formal job contract and having the following employment benefits: health insurance; social insurance; and paid leave. To check for evidence that women who are currently employed as wage workers have a stronger preference for these non-monetary characteristics, the following equations are estimated:

$$Prob(C_i) = \alpha + \beta_4 Female_i + \gamma X_i + \Sigma_{p=1}^{P} \tau_p Edu_{ip} + \varepsilon_i \quad (4)$$

$$H_i = \alpha + \beta_5 Female_i + \gamma X_i + \Sigma_{p=1}^{P} \tau_p Edu_{ip} + \varepsilon_i \quad (5)$$

where C_i is a dummy variable that takes a value of one if a specific non-monetary characteristic is available to individual i in their job; and H_i is the number of hours of work per week with LFS data.

To see whether these preferences contribute to the gender gap, the decomposition exercise is continued in (1) to (3), adding controls for non-monetary characteristics. Specifically, it is estimated:

$$LnY_i = \alpha + \beta_6 Female_i + \gamma X_i + \Sigma_{s=1}^{S} \mu_s C_{is} + \varepsilon_i \quad (6)$$

$$LnY_i = \alpha + \beta_7 Female_i + \gamma X_i + \Sigma_{p=1}^{P} \tau_p Edu_{ip} + \Sigma_{q=1}^{Q} \rho_q Occ_{iq} + \Sigma_{r=1}^{R} \omega_r Ind_{ir} + \Sigma_{s=1}^{S} \mu_s C_{is} + \varepsilon_i \quad (7)$$

Taken together, results from (4) to (7) provide descriptive evidence of the role that gender specific preferences for non-monetary benefits play in occupational segregation and the wage gap.

4.2.2 Before the Labour Market: The Role of Norms. The second hypothesis is that streaming occurs well before men and women enter the labour market. This has important policy implications because some occupations and industries require occupation- or industry-specific human capital that needs to be accumulated starting at an early age. To become an engineer, for instance, one typically needs an engineering degree. But in order to pursue an engineering degree, one may need a minimum level of training in mathematics and science prior to entering university. This is affected by the choices one makes in choosing between the humanities and sciences tracks in high school, which may in turn be affected by a choice of focus subjects in middle school. Consequently, decisions made at an early age may rule out specific occupations entirely.

In Vietnam, students must make choices that affect their career options early. Around the age of fifteen, for instance, they must decide on the field of study by choosing between exams in the social sciences and natural sciences, and between vocational and tertiary tracks. Those who choose the vocational track apply for technical training school. Those who choose the tertiary track continue in school for grades ten through twelve and can subsequently apply to university.

This paper takes advantage of the YL data and the LFS data to probe the following question: Do girls and boys aspire for different occupations as early as age twelve years old? The threshold of twelve is chosen primarily due to data, but it coincides with the age at which gender differences in performance and psychological traits have been observed in economic literature (see, for instance, Fryer and Levitt 2011). The literature in psychology suggests that orientation to sex roles forms as early as between the ages of six and eight[8] (Gottfredson 1981; Bian, Leslie, and Cimpian 2017; Cvencek, Meltzoff, and Greenwald 2011). Based on these studies, it seems reasonable to expect differences in aspirations at the age of twelve. Moreover, there is relatively little economic literature on whether gender-specific labour

market preferences are shaped years before entering the labour market. This paper will be among the first attempts to fill this gap,[9] and further work can address the question regarding the specific age at which these preferences first emerge.

The aspirations variable is constructed from the following survey question: "When you are about twenty-five years old, what job would you like to be doing?" Combining the two surveys allows us to answer the following question: If boys and girls succeed in pursuing occupations they aspire to at the age of twelve, and the relative wages at the time of the survey do not change, would we observe a gender wage gap? It is important to note that no assumptions are made about twelve-year-old boys and girls making choices based on expected earnings or non-monetary characteristics. Rather, it is understood that, at an early age these aspirational choices are made based on idealized perceptions of jobs, where social norms play an important role. Social norms affect perceptions about which occupations are seen as interesting and exciting, as well as which are suitable for men and women.

Consequently, it is expected that if: (i) social norms mandate that some occupations are more suitable for men than for women; (ii) these occupations tend to be better remunerated; and (iii) social norms play an important role in aspirations of the current generation, then a gender wage gap will be observed in a simulated distribution of earnings, based on stated aspirations and median earnings that correspond to these jobs in the current LFS. This is specifically checked by estimating the following simple regression:

$$LnY_i = \alpha + \beta_8 Female_i + \varepsilon_i \tag{8}$$

where Y_i is a measure of the aspirational wage, defined as the median wage in the occupation that a respondent i aspires for. The extent to which gender gap in aspirational earnings varies depending on the level of ability is estimated using:

$$LnY_i = \alpha + \beta_9 Female_i + \gamma\theta_i + \varepsilon_i \tag{9}$$

$$LnY_i = \alpha + \beta_{10} Female_i + \gamma\theta_i + \rho(Female_i * \theta_i) + \varepsilon_i \tag{10}$$

where θ is a measure of ability. Equation (9) captures the gender gap in aspirational wages conditional on ability, and equation (10) allows for variation in the size of the gender gap at different levels of θ.

The study also tests whether gender gaps would be observed in non-monetary characteristics of jobs. To do so, aspirational occupations are again mapped to concurrent labour force surveys, focusing on non-monetary characteristics. The approach is identical to that in (8) to (10), but using P_i—a proportion of jobs within each occupation that have a specific non-monetary characteristic—as the dependent variable. The set of non-monetary characteristics remains the same as in section 4.2.1. As before, the analysis takes advantage of the availability of data on ability to explore whether preferences vary depending on the ability level and how ability interacts with gender:

$$P_i = \alpha + \beta_9 Female_i + \varepsilon_i \tag{11}$$

$$P_i = \alpha + \beta_{10} Female_i + \gamma Ability_i + \varepsilon_i \tag{12}$$

$$P_i = \alpha + \beta_{11} Female_i + \gamma Ability_i + \rho(Female_i * Ability_i) + \varepsilon_i \tag{13}$$

4.2.3 Transition to the Labour Market. Even if women choose the same fields of study as men, occupational sorting may be observed if there are gender-specific barriers to finding jobs within one's field of study. In this case, occupational sorting occurs not at a young age when boys and girls make decisions about what

type of human capital to accumulate (Hypothesis 2), nor once they are in the labour force and have to make a trade-off between monetary and non-monetary benefits (Hypothesis 1), but during the transition to the labour market. This would require a different set of policies.

To test this hypothesis, the analysis checks whether women are more likely to be working outside their field of study using the STEP data. A matching exercise is carried out between field of study and occupation to identify whether a worker is working within their field of study or outside it. Specifically, it is estimated:

$$Pr(Mismatch) = \alpha + \beta_{14}Female_i + \gamma X_i + \varepsilon_i \quad (14)$$

where *Mismatch* takes the value of one when person *i* works outside their field of study, and zero otherwise.

5. Findings

This section presents the results from these estimations. The preferred earnings measure is hourly total compensation, which includes wage income and any non-wage payments such as overtime benefits, measured in nominal terms.[10] The results are robust to using hourly wages instead of hourly total compensation.[11] An hourly measure is preferred since there are differences in hours worked between men and women. The top and bottom 0.1 per cent of earnings are trimmed to avoid the outsized influence of outliers. Equations (4) and (14) are estimated using a linear probability model for ease of interpretation, and the remaining equations using an OLS regression and robust standard errors.

5.1 Gender Wage Gap and Occupational Sorting

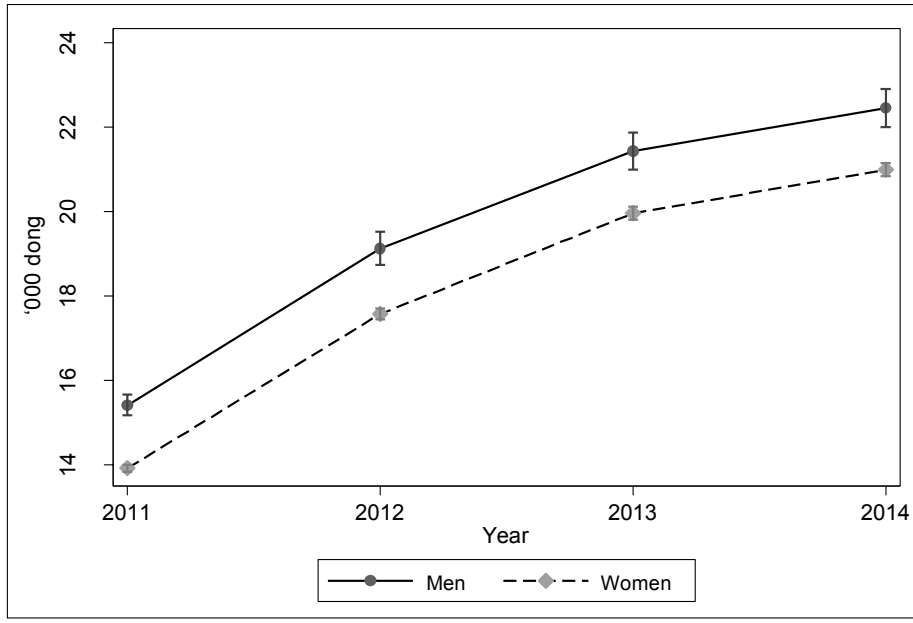
The coefficient on the female dummy (β_1) is negative and significant in the earnings function in each of the four years, suggesting that women earned consistently less than men.[12]

As Figure 1 demonstrates, the gap between male and female earnings remains consistent—and corresponds to annual earnings to about VND3,000,000, or US$130.[13] However, the hourly compensation increased substantially over this period, and as a result, the gap falls in relative terms from close to 10 per cent in 2011 to nearly 5 per cent in 2014. Note that this is smaller than the gender wage gap observed in other countries; for instance, Blau and Kahn (2016) find that the ratio of unadjusted female earnings to male earnings in the US in 2010 was 79 per cent and, adjusting for covariates including human capital and occupation-industry, increases to 91 per cent.

The size of the gender wage gap is examined across different age groups, and it is seen that the earnings gap is more or less similar in magnitude, with the notable exception of the cohort aged fifty-five to fifty-nine. This age group includes the retirement age for women in Vietnam, fifty-five. It may be the case that women who continue working beyond the retirement age are concentrated in lower paying occupations, or that women switch to lower paying occupations at retirement. This is consistent with the fact that the gap narrows once again in the sixty-plus cohort, when men approach retirement age (sixty) (Figure 2).

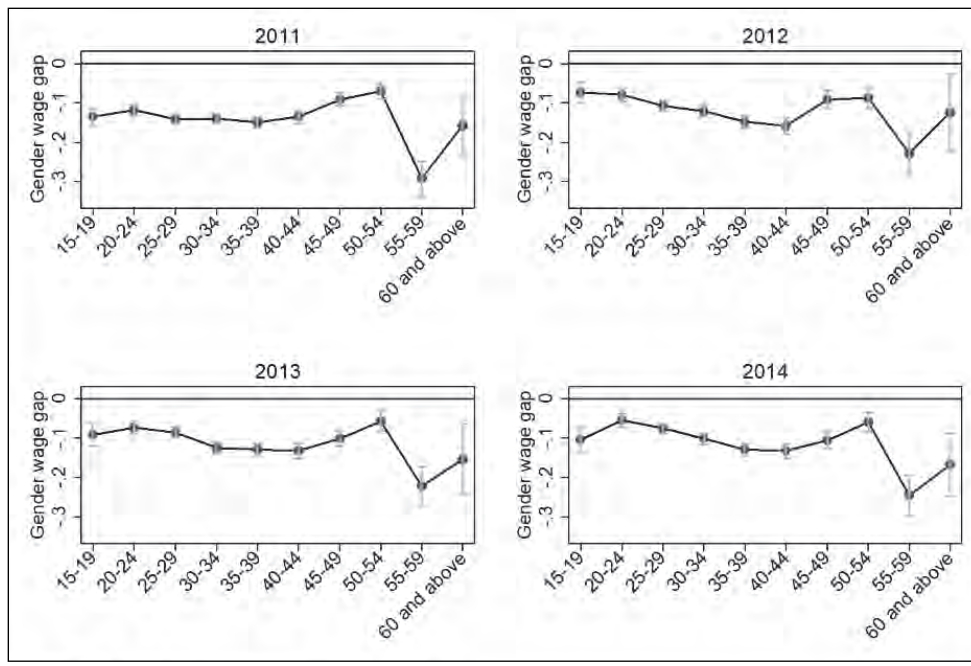
The primary takeaway from these findings is that while there is heterogeneity in the magnitude of the gap, there is consistently an earnings gap between men and women in the data. The premise of this paper is that this gap persists despite women having closed the gap in education levels; and a key factor driving this is women sorting into lower paying occupations. To verify this claim, the results from estimating equations (1) to (3) are also presented. If the earnings gap is driven by women having lower levels of education, we would expect the gap to narrow (i.e., $\beta_1 > \beta_2$). Figure 3 plots the estimates of β_1 and β_2, and suggests that the opposite is true: controlling for education widens the earning gap between men and

FIGURE 1
Total (Nominal) Hourly Compensation for Men And Women in Vietnam
(from Labour Force Surveys)



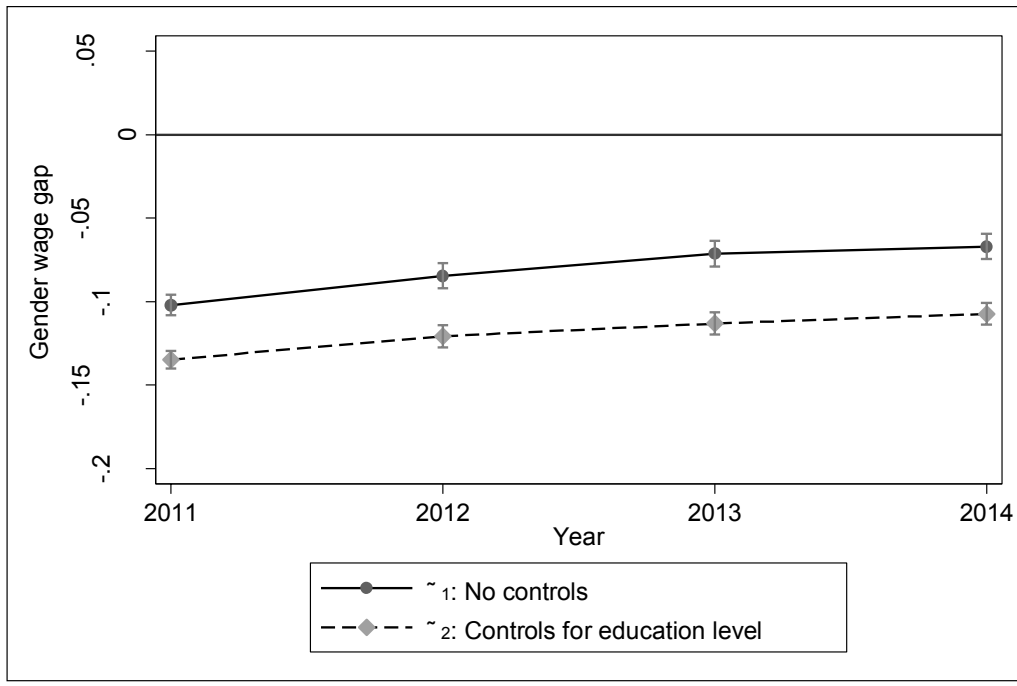
NOTE: 95 per cent confidence interval is shown by bars.
SOURCE: Calculated by authors using the Vietnam Labour Force Surveys from 2011 to 2014.

FIGURE 2
Gender Wage Gaps in Each Age Cohort



NOTE: 95 per cent confidence interval is shown by bars.
SOURCE: Calculated by authors using the Vietnam Labour Force Surveys from 2011 to 2014.

FIGURE 3
Gender Wage Gap in the Presence of Controls for Education Levels



NOTE: 95 per cent confidence interval is shown by bars.
SOURCE: Calculated by authors using the Vietnam Labour Force Surveys from 2011 to 2014.

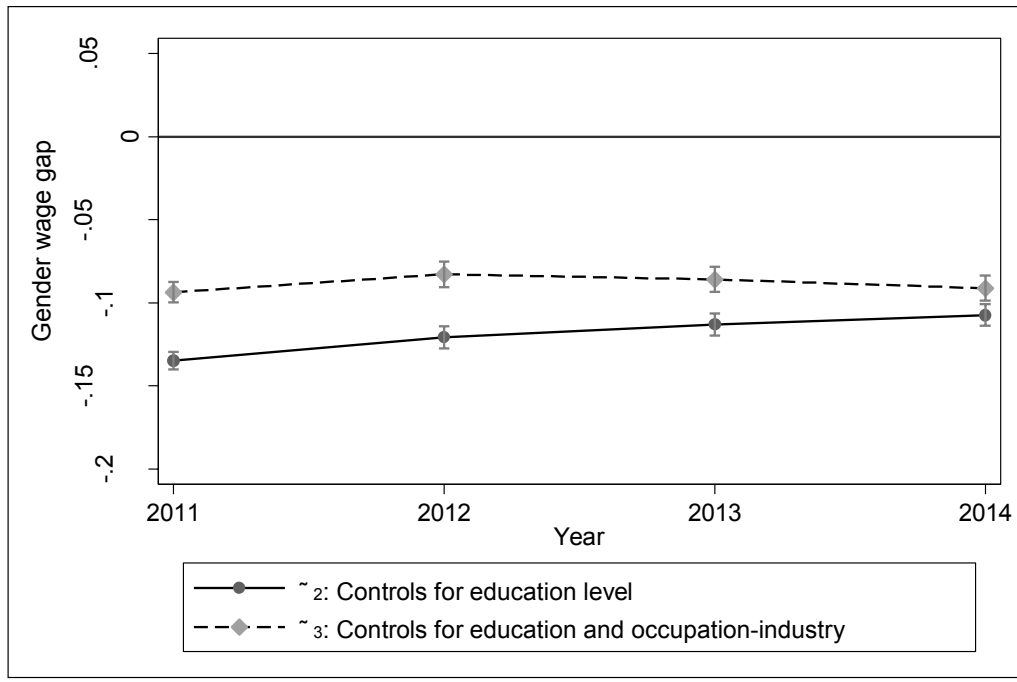
women. Strikingly, the magnitude of the gender wage gap conditional on the level of education is 50 per cent larger.

Similarly, comparing β_2 and β_3 sheds light on whether segregation across occupations and industries contributes to the gender wage gap. If men and women were equally likely to work in a specific industry and occupation, we would expect that controlling for occupation and industry would not change the observed gender wage gap ($\beta_2 = \beta_3$). However, like Petersen and Morgan (1995), it is found that the gender wage gap narrows when occupation and industry are controlled for ($\beta_2 > \beta_3$) (Figure 4). This result is in line with evidence from the United States and OECD countries (Blau and Kahn 2016; Oostendorp 2009). There is some heterogeneity at different levels of education; specifically, occupational segregation seems to matter the most at lower levels of education. Overall, occupational segregation appears to be a key contributor to the gender wage gap in Vietnam.

5.2 The Emergence of Occupational Sorting

Having established that gender wage gap persists in Vietnam despite women closing the education gap, and the role of occupation-industry sorting, this subsection evaluates the three hypotheses about the emergence of occupational sorting.

FIGURE 4
Gender Wage Gap in the Presence of Occupation-Industry Controls

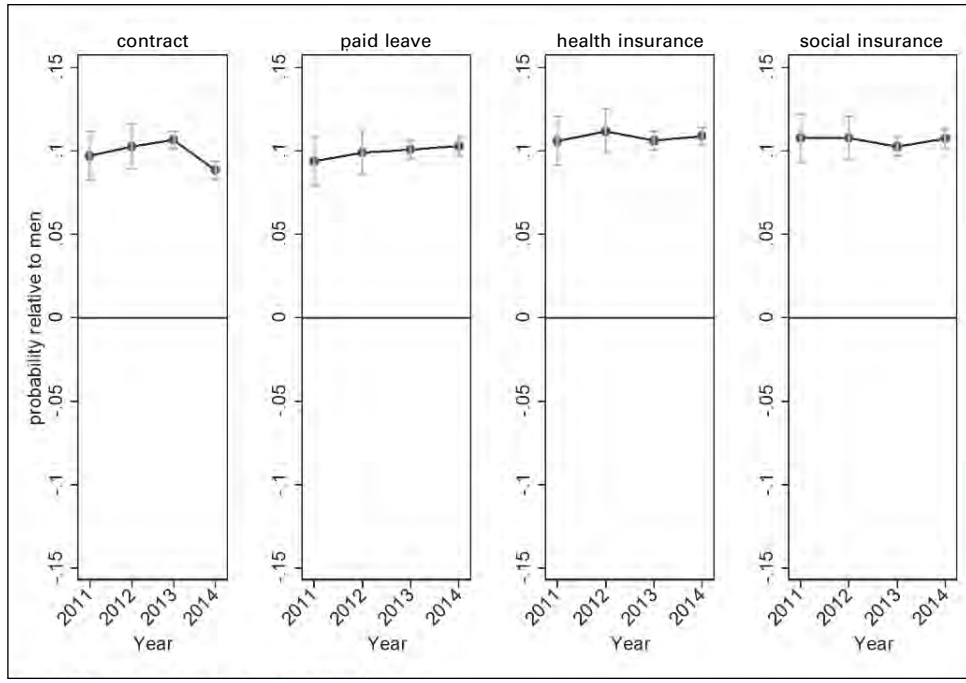


NOTE: 95 per cent confidence interval is shown by bars.
SOURCE: Calculated by authors using the Vietnam Labour Force Surveys from 2011 to 2014.

5.2.1 Sorting Over Non-monetary Job Characteristics. The first hypothesis is that sorting over non-monetary characteristics explains the greater likelihood of women working in lower paying occupations. Women may have stronger preferences for having a formal contract, health insurance, social insurance and paid leave, and are willing to forego monetary compensation. To examine whether this is the case in the labour market in Vietnam among those currently employed as wage workers, equations (4) and (5) are estimated. Figure 5 shows that women,[14] indeed, are more likely than men to be working in jobs with greater probability of non-monetary benefits. Figure 6 shows that women also work fewer hours per week on average than men.

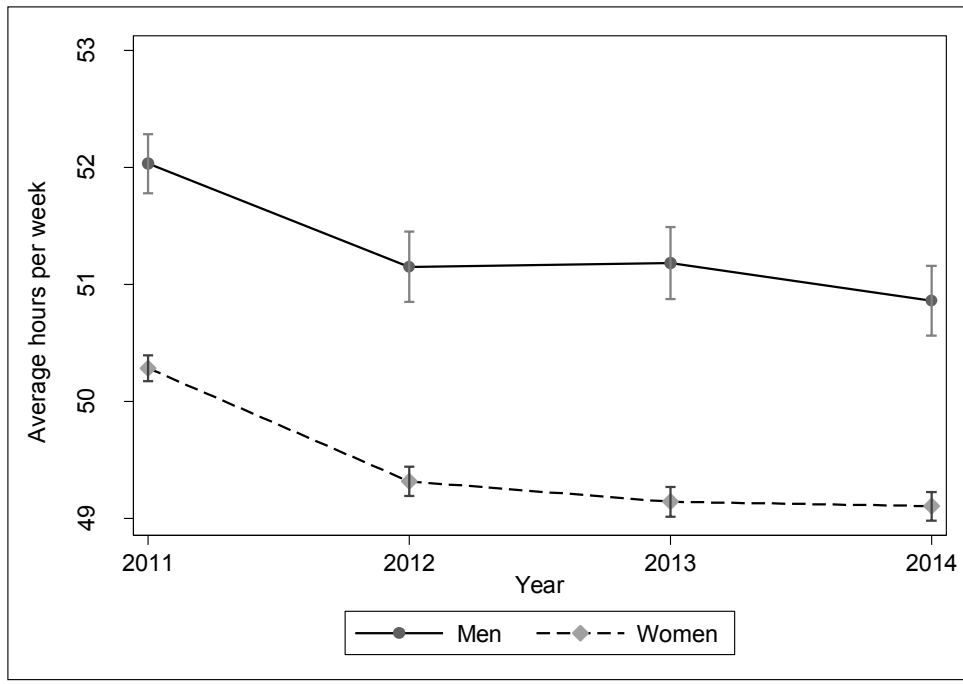
While the results from Figures 5 and 6 indicate a stronger preference among women for favourable non-monetary job characteristics, Figures 7 and 8 reflect the extent to which sorting over these preferences overlaps with occupational sorting. First, Figure 7 compares the gender wage gap from equation (1) with the gender wage gap from equation (6) and shows that adding controls for non-monetary characteristics shrinks the wage gap. Figure 8 shows that the reduction in the wage gap when controlling for non-monetary characteristics is similar to the reduction when adding occupation-industry controls. However, when controlling for both sets of characteristics, the gap widens substantially. This suggests that variations in non-monetary characteristics within occupation and industry do not explain the gender wage gap. Rather, women sort into occupations and industries with better non-monetary characteristics. However, within these occupations and industries, for jobs with similar non-monetary characteristics, women face a

FIGURE 5
Likelihood of Having Each Non-monetary Characteristic, Relative to Men



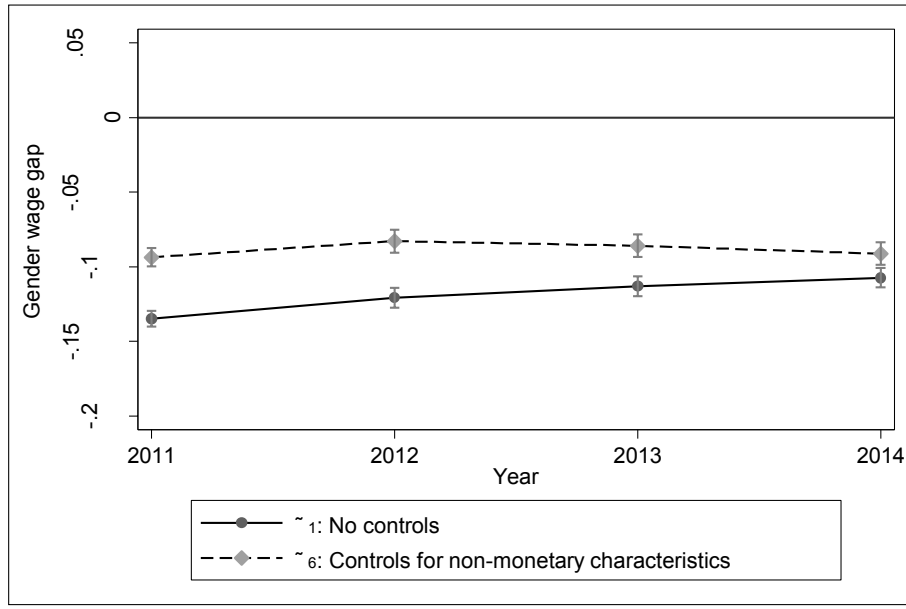
NOTE: 95 per cent confidence interval is shown by bars.
SOURCE: Calculated by authors using the Vietnam Labour Force Surveys from 2011 to 2014.

FIGURE 6
Hours Worked Per Week



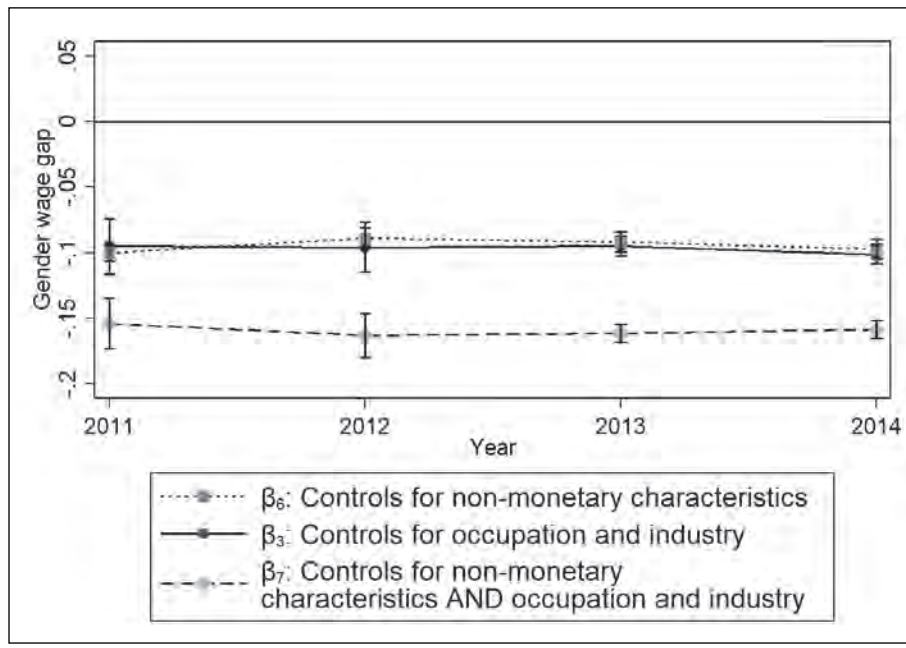
SOURCE: Calculated by authors using the Vietnam Labour Force Surveys from 2011 to 2014.

FIGURE 7
Gender Wage Gap Widens When Controlling for Non-monetary Characteristics



NOTE: 95 per cent confidence interval is shown by bars.
SOURCE: Calculated by authors using the Vietnam Labour Force Surveys from 2011 to 2014.

FIGURE 8
Gender Wage Gap with Both Non-monetary Characteristics and Occupation-Industry Controls Is Larger Than the Gender Gap with Occupation-Industry Controls Alone



NOTE: 95 per cent confidence interval is shown by bars.
SOURCE: Calculated by authors using the Vietnam Labour Force Surveys from 2011 to 2014.

wage penalty similar in magnitude or larger than the unadjusted wage gap. This may suggest that within these narrow occupation-industry cells, women face a trade-off between non-monetary benefits and pay that men do not.

5.2.2 Social Norms. The next hypothesis considers whether gender streaming takes root at an early age through the effects of social norms using the YL data and the LFS. Using a natural logarithm of median wage for the occupation as a dependent variable, equations (8) to (10) are estimated. The idea behind this line of questioning is not to claim that the aspirations of boys and girls at the age of twelve are based on having perfect information on earnings and the non-monetary characteristics of jobs. It is rather to ask: if boys and girls made education and career choices based on their aspirations at the age of twelve, would we still observe a gender wage gap?

Table 1 shows there is a reverse gender gap in aspirations among the twelve year olds in this study; at twelve, girls aspire for jobs that have higher median wages than boys, even after controlling for ability. These results suggest that if girls and boys were to pursue and realize their career aspirations and the relative wages for different occupations remained the same, female earnings would, on average, exceed male earnings. Interestingly, the coefficient of the interaction term between gender and the measure of cognitive ability is negative and similar in magnitude to the coefficient of ability. This suggests that boys with higher ability have higher aspirations, whereas for girls, even if their overall aspirations are higher than boys, their aspirations are not linked to their ability.

The absence of a gender wage gap, extrapolated from the aspirational occupations of boys and girls at age twelve, at first glance appears to be at odds with the abundance of informal evidence on the prevalence of norms and gender stereotyping in most societies. However, one mitigating factor here may be that the extent of stereotyping varies between societies and may change overtime. Further research is needed to explore this phenomenon in Vietnam.

How is a gender gap in aspirational earnings favouring girls at the age of twelve compatible with lower earnings for women as adults in Vietnam? Two possible explanations are tested. Girls may make human capital accumulation decisions similar to boys, so that streaming does not occur before the labour market. When women enter the labour market, however, they may face difficulties in finding jobs within their field of study. This hypothesis is explored in the subsequent section. On the other hand, women may

TABLE 1
Gender Wage Gap, Based on Aspirational Occupations

	Log Median Wage			
	(1)	*(2)*	*(3)*	*(4)*
Female	0.079***	0.080***	0.263***	0.256***
	(0.012)	(0.012)	(0.091)	(0.091)
PPVT		0.002**	0.003***	0.003**
		(0.001)	(0.001)	(0.001)
Female*PPVT			–0.003**	–0.003**
			(0.002)	(0.002)
Other controls				*Yes*
R2	0.035	0.038	0.042	0.075
N	1,180	1,180	1,180	1,180

SOURCE: Authors' calculations.

choose to forego higher earnings for a better package of non-monetary benefits. Section 5.2.1, indeed, demonstrates some evidence in support of this hypothesis.

Preference for a better non-monetary package is likely to be driven by the fact that in Vietnam, as in most societies, social norms place the burden of care and household responsibilities on women. Notably, although the need to balance market and household roles may only emerge in adulthood, it is worth noting that the YL data suggest that already at the age of twelve girls seem to also aspire to occupations with better non-monetary characteristics, in addition to occupations with higher wages. Table 2 shows that girls aspire to occupations where the non-monetary characteristics are more common—formal contract (columns 1 to 4), paid leave (5 to 8), health insurance (9 to 12), and social insurance (13 to16). Table 3 shows preference for occupations with shorter weekly hours. The gender gap seems to narrow at higher levels of ability for most characteristics—the coefficient of the interaction term is significant in columns 3, 9 and 12 of Table 2.

It is possible that social norms governing career aspirations become stronger after age twelve but before entering the labour market. This would be consistent with the evidence from several studies that find that gender differences in performance and psychological traits begin to emerge around the age of ten to twelve and widen thereafter. To test this, this type of inquiry would be repeated for girls and boys aged fifteen or sixteen, if the data become available for future rounds of the YL survey. The analysis of the STEP data in the next section provides some initial support for this argument. In addition to any barriers in the school-to-work transition, there appears to be some streaming before the labour market—women are overrepresented in lower paying fields of study compared to men.

One explanation that does not seem to be backed by the data is that social norms may be changing in Vietnam. Although we cannot rule out the possibility that the female YL respondents will enjoy higher salaries than male YL respondents when they eventually enter the labour market, analysis of the change in the gender wage gaps across different cohorts suggests that this is unlikely. Figure 3 suggests that gender gaps are more or less at the same level across different cohorts and do not show signs of having narrowed in younger cohorts, which would be an indication of changing norms.

It is also worth considering some of the limitations of this analysis. The choice of future occupations in the YL data was limited to a set that is much narrower than the options reported in the LFS data. Consequently, when interpreting results, it should be kept in mind that the children were choosing from a limited number of options. Nonetheless, the results suggest that at the age of twelve—and at least in aspirations—girls are not constrained by restrictive social norms about what jobs are appropriate for men and what jobs are appropriate for women.

5.2.3 Labour Market Transition. The third hypothesis about the emergence of streaming is that streaming resulting in gender wage gaps does not occur prior to the labour market, but happens during the school-to-work transition. Gender differences in the school-to-work transition could occur in the presence of gender-specific barriers to entry for some fields. One indication of such differences between genders would be a higher fraction of women working outside of their field of study. Data on field-of-study available in the World Bank's STEP survey are used to check whether mismatch between field of study and occupation is observed more often among women than men in the STEP sample. Notably, in this case gender gaps due to streaming would be exacerbated by the education-occupation mismatch penalty (Nordin, Persson, and Rooth 2010; Robst 2007a).

In order to construct the $Mismatch_i$ dummy occupations are matched to fields of study using a unique classification (presented in the online Appendix), based on the classification by Montt (2015). Since specialization in the field of study tends to occur at higher levels of education, the sample is restricted to respondents who have completed the equivalent of upper-secondary education (including vocational school).[15] Interestingly, STEP asks both about their current occupation as well as first occupation. This

TABLE 2
Preferences for Non-monetary Characteristics among Twelve-Year-Old Girls and Boys

	Formal Contract				*Paid Leave*			
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
Female	0.054***	0.054***	0.158***	0.140***	0.153***	0.154***	0.297***	0.284***
	(0.006)	(0.006)	(0.046)	(0.046)	(0.013)	(0.013)	(0.097)	(0.097)
PPVT		0.002***	0.003***	0.002***		0.002***	0.003***	0.003**
		(0.000)	(0.001)	(0.001)		(0.001)	(0.001)	(0.001)
Female*PPVT			–0.002**	–0.001*			–0.002	–0.002
			(0.001)	(0.001)			(0.002)	(0.002)
Other controls				*Yes*				*Yes*
R2	0.060	0.087	0.091	0.123	0.106	0.112	0.113	0.134
N	1,180	1,180	1,180	1,180	1,180	1,180	1,180	1,180

	Health Insurance				*Social Insurance*			
	(9)	*(10)*	*(11)*	*(12)*	*(13)*	*(14)*	*(15)*	*(16)*
Female	0.198***	0.199***	0.403***	0.378***	0.199***	0.199***	0.407***	0.383***
	(0.016)	(0.016)	(0.120)	(0.120)	(0.016)	(0.016)	(0.120)	(0.120)
PPVT		0.003***	0.005***	0.004**		0.003***	0.005***	0.004**
		(0.001)	(0.001)	(0.002)		(0.001)	(0.001)	(0.002)
Female*PPVT			–0.003*	–0.003			–0.004*	–0.003
			(0.002)	(0.002)			(0.002)	(0.002)
Other controls				*Yes*				*Yes*
R2	0.114	0.123	0.125	0.147	0.114	0.123	0.125	0.147
N	1,180	1,180	1,180	1,180	1,180	1,180	1,180	1,180

SOURCE: Authors' calculations.

TABLE 3
Average Weekly Hours of Jobs Aspired to at Age Twelve

	Average hours per week			
	(1)	*(2)*	*(3)*	*(4)*
Female	–2.098***	–2.089***	–1.205	–1.491
	(0.155)	(0.154)	(1.153)	(1.150)
PPVT		0.035***	0.043***	0.011
		(0.010)	(0.014)	(0.015)
Female*PPVT			–0.015	–0.010
			(0.019)	(0.019)
Other controls				*Yes*
R2	0.134	0.144	0.144	0.180
N	1,180	1,180	1,180	1,180

SOURCE: Authors' calculations.

allows us to check if women are mismatched when they first enter the labour market or switch into mismatched occupations subsequently.

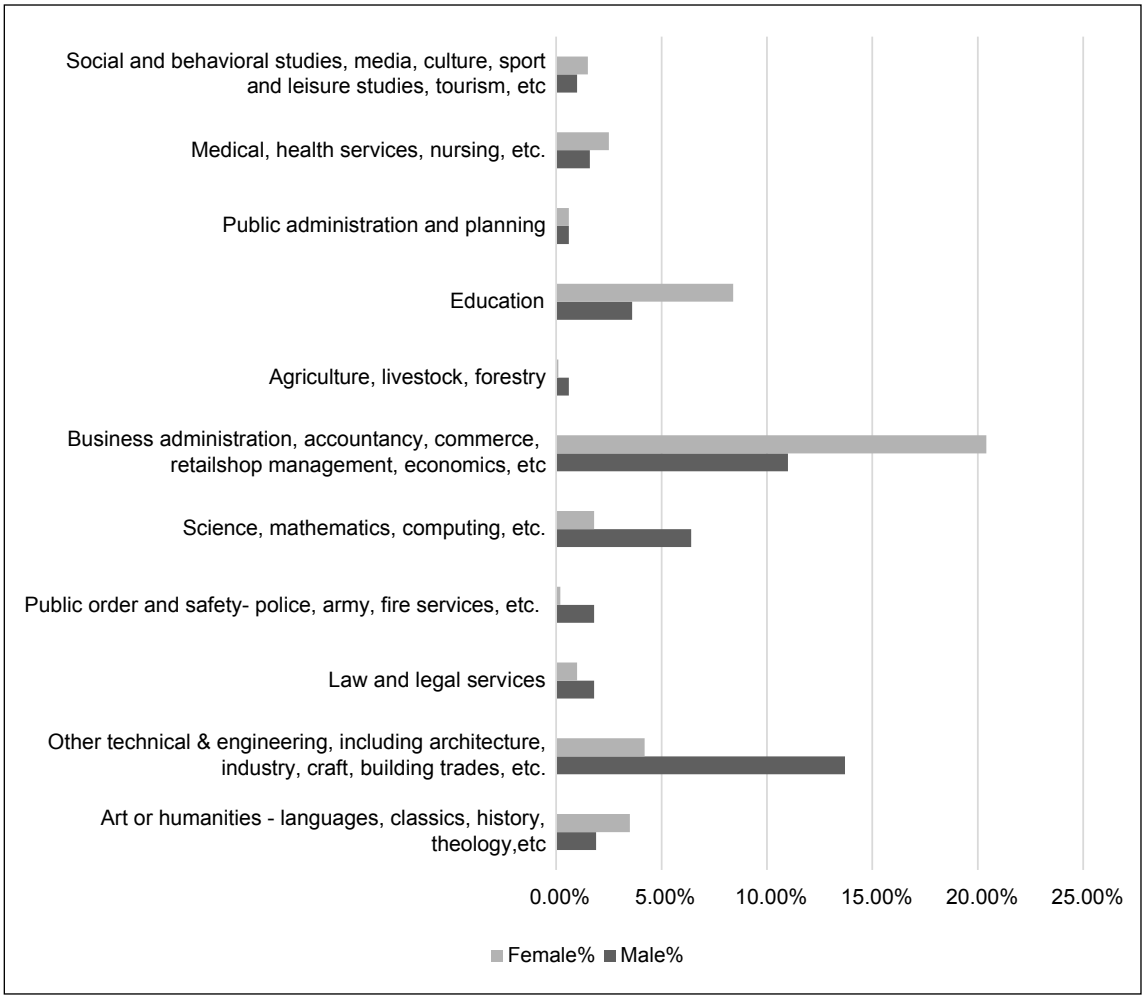
We first look for signs of streaming in education in the STEP data. Ranking fields of study by the median wages,[16] it is found that in fields at the lower-end of the earnings scale, a greater proportion of women relative to men like "Education". The opposite is true at the higher-end fields like "Science, mathematics and computing" or "Other technical and engineering fields". The exception to this trend is "Arts or humanities", which appears to be the field with the highest median wage in the sample—here more women are in the field than men. Overall, Figure 9 provides suggestive evidence of some streaming in education in Vietnam.

Taken together with the finding that there is no gender wage gap in aspirations at age twelve, Figure 9 narrows down the period when educational streaming may emerge—after the age of twelve, but prior to graduation from high school. However, the effects of educational streaming can be exacerbated or mitigated during the transition to the labour market in the presence of gender specific barriers.[17] Equation (14) is then estimated to look for whether such differences lead to a great degree of education-occupation mismatch between female and male workers. Table 4 presents the results for current occupation and first occupation.

The coefficient of female dummy is negative in Table 4, indicating that women are less likely to be mismatched either in their first job or in their current job. This result does not support the hypothesis that occupational sorting occurs during transition to work due to involuntary occupation-education mismatches. However, it is also acknowledged that this study's approach to testing the hypothesis comes with a number of limitations.

First, this exercise is sensitive to the level of aggregation in the data. As the level of aggregation increases, it becomes more difficult to identify when people are working outside their field of study because the fields of study and occupations become broader. The paper uses the lowest level of aggregation available, which is occupation at the three-digit level and field of education as available in the STEP data. For this analysis, the information on occupation is a level of aggregation higher than in the LFS and the fields of study in STEP, and span several specializations. This renders the dummy for mismatch a conservative estimate of the true extent of mismatch. Repeating this analysis with more detailed information on fields of study could lead to different conclusions.

FIGURE 9
Proportion of Male and Female Populations in Each Field of Study, in Order of Increasing Median Wage



NOTE: "General" and "Other" fields excluded from figure, hence the percentages do not sum up to 100.
SOURCE: Calculated by authors using the Skills Towards Employability and Productivity (STEP) Survey 2012.

Second, no distinction can be made between mismatches that are involuntary and those that are voluntary. While the hypothesis is about the former, voluntary mismatches may be desirable. For instance, they may reflect reallocations of labour to more productive and higher paying occupations. Finally, the indicator of mismatch comes from a classification of occupations to fields of study. Like any such classification, this is imperfect. Altogether, the results may reflect these limitations.

TABLE 4
Likelihood of an Occupation-Education Mismatch in STEP

Marginal effect of each variable on likelihood of…	*…mismatch in current job*		*…mismatch in first job*	
	m1	*m2*	*m3*	*m4*
Female	–0.071*	–0.073*	–0.071*	–0.072*
	(0.034)	(0.034)	(0.035)	(0.036)
Age		–0.0010		–0.00055
		(0.0016)		(0.0017)
Province			*Yes*	*Yes*
Observations	850	850	764	764

* p<0.05, ** p<0.01, *** p<0.001
Source: Authors' calculations.

6. Conclusion

This study establishes that gender wage gap persists in Vietnam despite the fact that women have achieved similar levels of education as men, or even surpassed men at higher levels of education. It also demonstrates that sorting into different occupations and industries explains a non-trivial portion of this gap.

Although occupational sorting is a phenomenon common to labour markets, relatively little is known empirically about what drives it and when it emerges. The analysis presented in this paper is a first step in this direction. Three explanations of the emergence of occupational sorting are offered and tested empirically using data from Vietnam. Little support is found for the hypothesis of occupational sorting being driven by social norms, which affect aspirations at a young age and subsequently influence human capital accumulation decisions. Likewise, no evidence is found in support of the hypothesis that occupational sorting occurs due to the gender-specific differences in the school-to-work transition.

This paper does, however, find support for the hypothesis that women have stronger preferences than men for favourable non-monetary job characteristics, such as having a formal contract, social insurance, health insurance, paid leave and shorter weekly hours. This is in line with the literature starting from Becker (1985), who points to the unequal distribution of the burden of household responsibilities affecting women's labour market outcomes. Interestingly, it is found that stronger preferences for favourable non-monetary job characteristics are reflected in the aspirations of girls at the age of twelve. These results point towards two streams of interventions. First, interventions that enable women to better balance household and market roles. These include making childcare services more easily available, allowing flexible and gender-neutral parental leave policies or allowing flexible work arrangements such as telecommuting (Dettling 2017). The design of such interventions requires further attention. For instance, policies that mandate the provision of social services to women by their employers can increase the costs of hiring women and be counterproductive; Prada, Rucci and Urzúa (2015), for instance, find that the starting wages of women were lower after the introduction of mandated employer-provided childcare in Chile. Similarly, simply expanding the number of spots available for childcare may not be sufficient to promote female labour force participation if it does not tackle the demand side constraints to accessing childcare. Taking the example of the Chilean government's large

plans for expansion of childcare services, Mateo-Diaz and Rodriguez-Chamussy (2016) point out that 9 per cent of spots remained unused in the largest national programme, Junta Nacional de Jardines Infantiles (JUNJI). They highlight the importance of factors such as affordability, distance to home, and opening and closing hours of the centres.

Second, changing cultural norms about household work to enable a more equitable distribution of the burden of household responsibilities. Promundo, for instance, has a number of programmes to shift social norms and gender attitudes, including educating men in order to increase their participation in caregiving activities.[18]

Finally, the results on the persistence of the gender wage gap and the wage gap in different groups are also relevant in the context of the currently ongoing revision of Vietnam's labour code, expected to be finalized in 2019. The proposed changes include improvement to the protection of female employees and an increase in the retirement age of female and male workers (and a decrease of the gap in retirement age). The results of this study provide empirical support for these changes from the perspective of their influence on the gender wage gap.

NOTES

1. The World Bank data portal puts the ratio of female to male lower secondary completion rate at 106 per cent as of 2016.
2. This grouping is of the forty-five regional developing members of the Asian Development Bank which includes Vietnam.
3. Defined as having less than four years of schooling.
4. Buser, Niederle and Oosterbeek (2014) look at the track choices of ninth grade students for their last three years of high school, whereas Turner and Bowen (1999) look at incoming university students' choice of college major.
5. The analysis was originally conducted on the fully extended system of educational levels. The results are robust to the choice of classification system.
6. Individuals between fifteen and sixty-four years old are considered working age adults.
7. The coefficients will be compared in absolute value terms if all are strictly negative or strictly positive.
8. Between the ages of five and six, girls change from associating their own gender with "really, really smart" to associating boys with "really, really smart," whereas boys change from associating their own gender with "really, really nice" to associating girls with "really, really nice (Bian, Leslie, and Cimpian 2017).
9. For literature in psychology and sociology, see, for example, Oosterbeek (2014) and Gneezy and Rustichini (2004).
10. Inflation is not adjusted for, since the focus of this analysis is on within-year comparisons of female earnings to male earnings rather than across year comparisons.
11. These results are available from the authors upon request.
12. Earnings data in the LFS, and typically in other labour force surveys, are confined to respondents who are employees or "wage workers", and therefore do not include earnings of own-account, self-employed or unpaid workers. It is worth noting that in Vietnam, women are less likely to be in the labour force or be wage workers and more likely to be unpaid workers. The gap in earnings that is examined therefore represents only a partial picture of the difference in economic opportunities between the genders in Vietnam.
13. Assuming a forty-hour work week and fifty-two working weeks. Conversion to US dollar based on an exchange rate in 2017 of VND22,700 = US$1.
14. Note that since the sample here is wage workers covered in the LFS, these results must be treated as being true conditional on being a wage worker in Vietnam.
15. Specifically, the analysis includes respondents with Upper Secondary or University education (corresponding to a level of education equivalent to ICSED-4 or higher) and respondents who have attended vocational school/trade school or vocational college.
16. The study only considers the wages of individuals who work in an occupation that matches their field of study, since this arguably provides a better estimate of the expected earnings of a field.

17. One example of such barriers may be how men and women search for jobs. According to STEP, women are less likely to search for jobs through employment agencies, contacting employers directly, or through internships.
18. See Promundo's website for more: http://promundoglobal.org/programs/mencare/.

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